SDS, HCI and Cisco

Converged, Hyper-converged, Software Defined Storage

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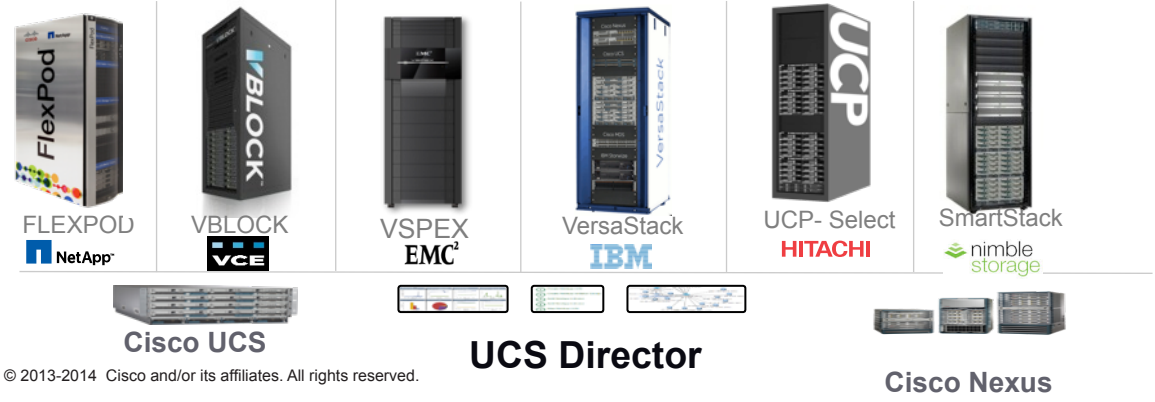
November 2015

Converged Infrastructure

- Pretested
- Preconfigured
- Bundled solutions, acting as whole,
- consisting of ***compute***, ***network***, ***storage*** and ***management*** software.

- Consistent,
- Financially efficient
- Operationally simplified
- Independently scalable solution
- Rapidly deployable
- Allows granular upgrades



- SaaS and Hybrid Cloud
- Critical applications on our infrastructure
- 60% virtualized -> still 40% physical servers

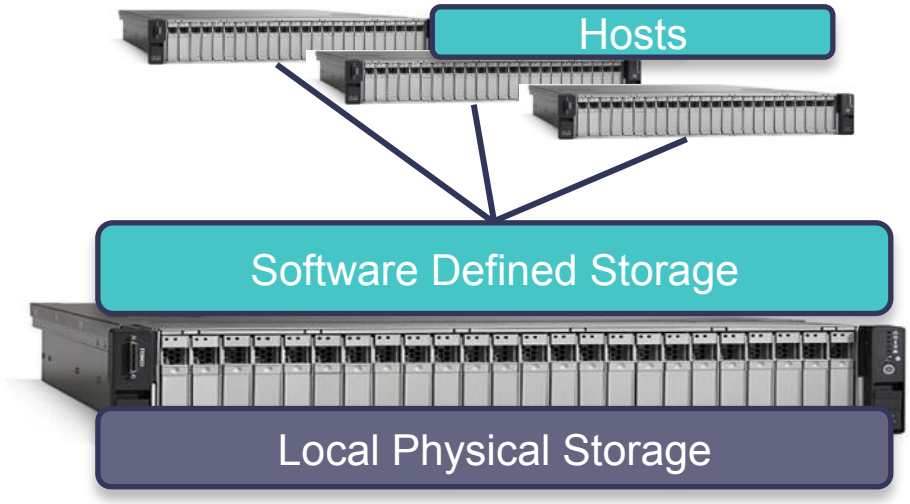
Cisco Converged Infrastructure Vision

- **Cisco captured the vision of Converged Infrastructure 5 years ago**
  - Cisco based Converged Infrastructure solutions lead the industry

- **Bring the same simplicity model to all Converged Infrastructure solutions**
  - Not dependent on a specific storage type (Physical, SdS, HCI, or All Flash)

Definition: What is Software Defined Storage (SdS)

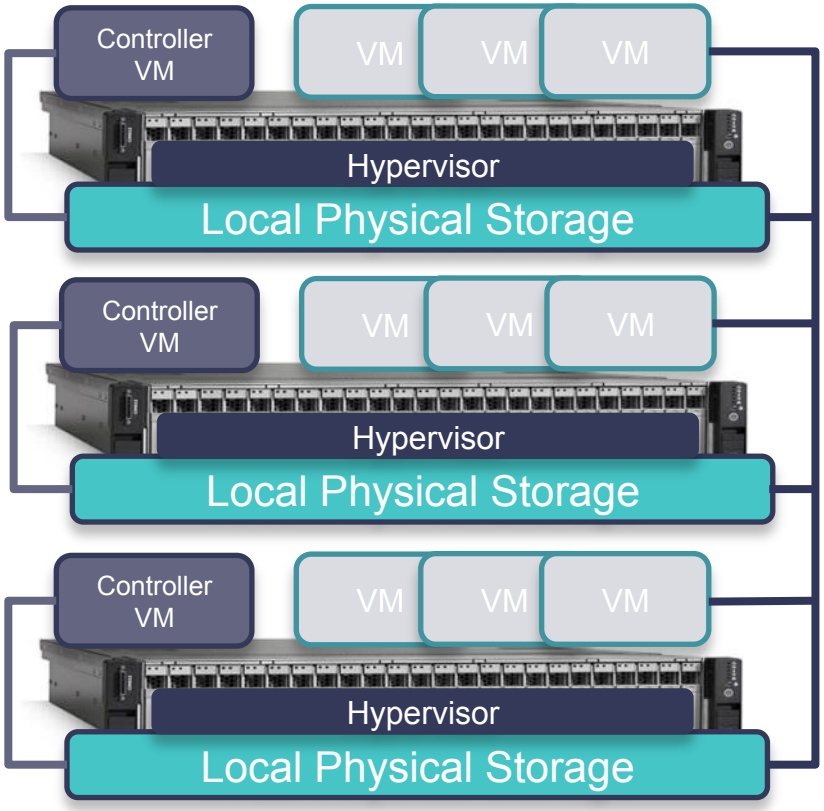
- The programming that controls the storage is decoupled from the physical hardware
- Consists of the **Storage Only**
- Emphasizes storage services such as deduplication or replication, instead of storage hardware
- A shared pool that runs on commodity hardware
- Utilizes Policy Based Management
- Often referred to as Storage Virtualization and is part of a bigger industry trend of Software Defined Datacenter



Storage Software can run on bare metal or as a VM on a hypervisor host

Definition: What is Hyper-convergence?

- **New** Converged Infrastructure offering utilizing Software Defined Storage
- Tight integration of x86 servers for compute and storage, networking and virtualization in all-in-one appliance.
- Integration of hypervisors and physical infrastructure
- Simple Scale one unit/appliance at a time
- Simple Deployment measured in hours
- Centralized Management, intuitive UI

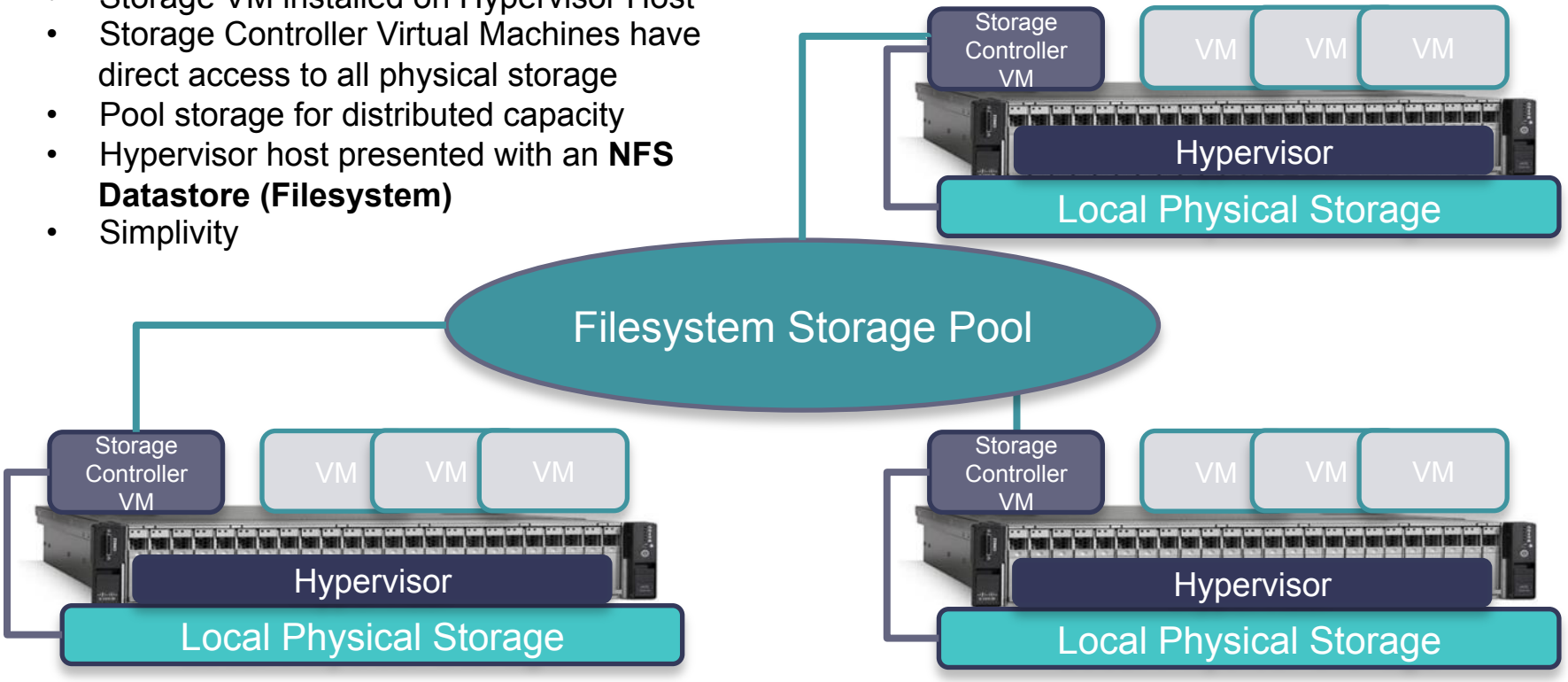


What does Hyper-converge promise?

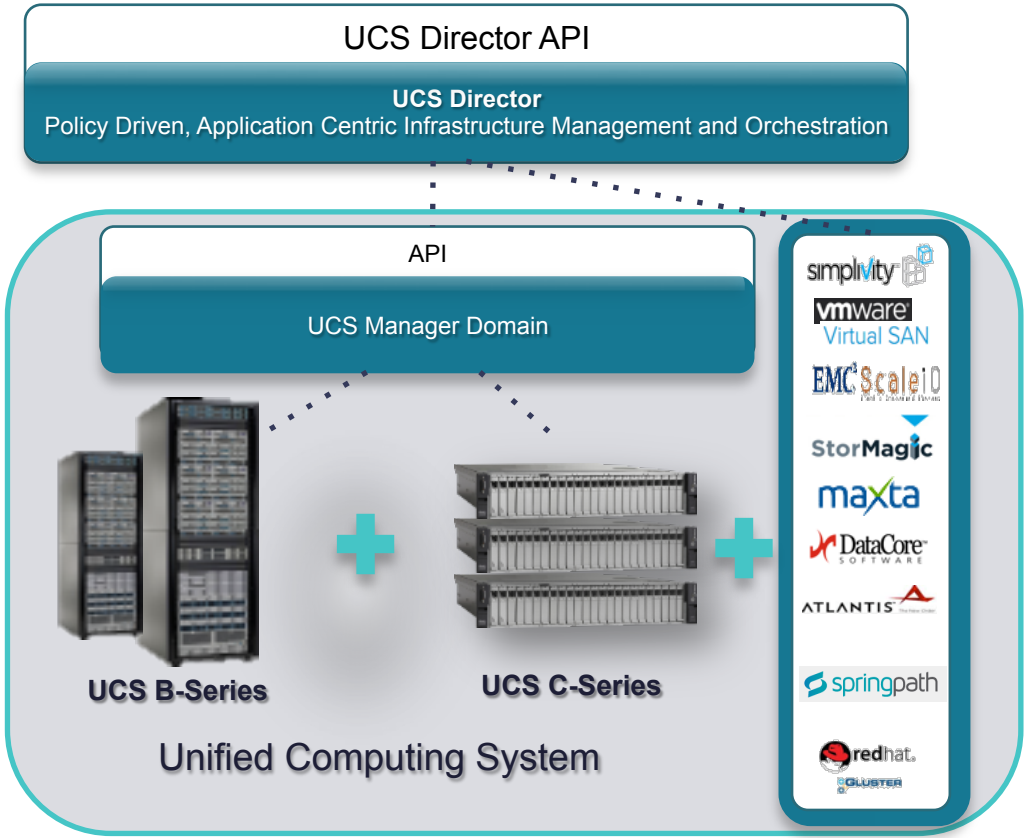
- **Fast Deployment** (Hours not Days)
- **Management Simplicity** (Centralized and intuitive UI)
- **Operational Simplicity** (Target VM administrator)
- **Simple Elasticity** (automatic scale)
- **Cost efficiency** (predictable small step-based growth)

Hyper Converged Architectures

- Storage VM installed on Hypervisor Host
- Storage Controller Virtual Machines have direct access to all physical storage
- Pool storage for distributed capacity
- Hypervisor host presented with an **NFS Datastore (Filesystem)**
- Simplivity



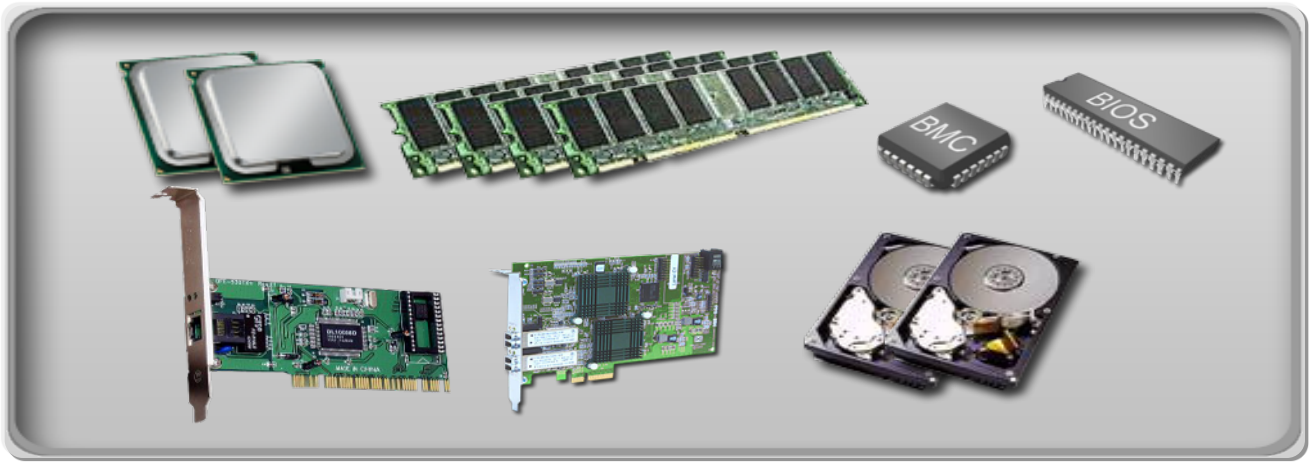
UCS Software Defined Storage Strategy



UCS and Hyper-Converged Software

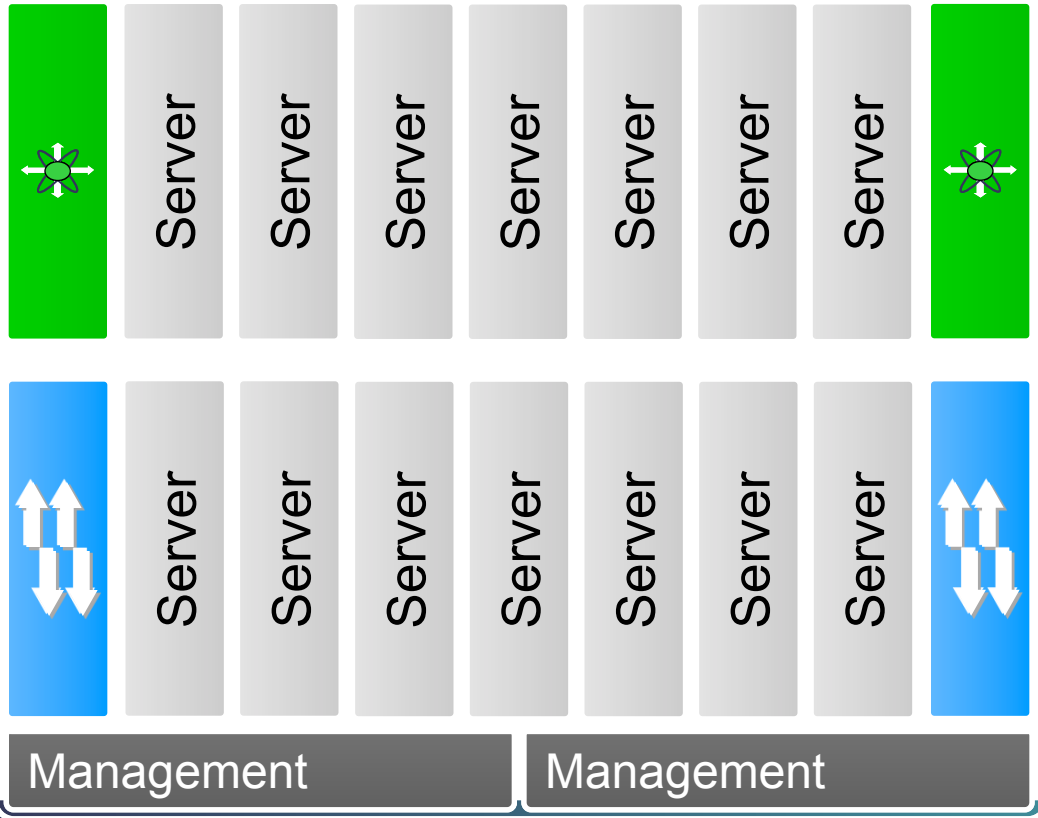
- Cisco Validated to minimize business risk
- Delivered with all of the programmatic and operational benefits of Cisco UCS
  - Unified Management
  - UCS Director integration
  - Unified Fabric

“I want to manage my physical servers just like my virtual machines”



Server

Server Deployment Management



Chassis Management

- New management layer

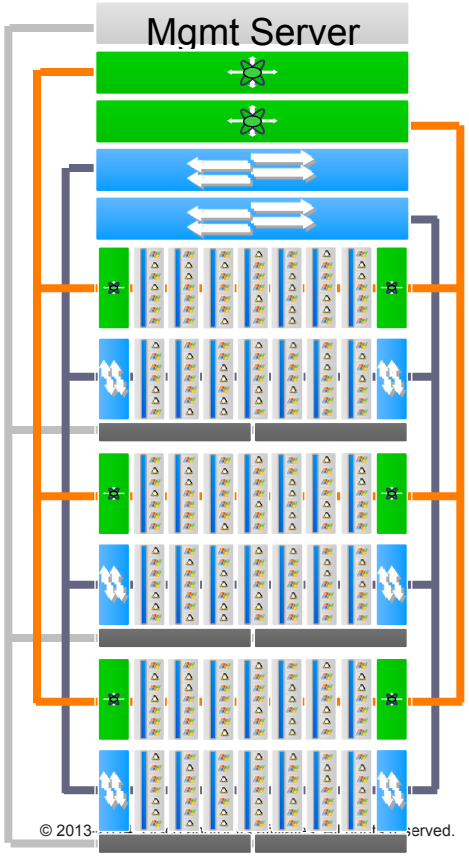
Benefits

- Consistency in chassis
- Shared chassis infrastructure monitoring

Weakness

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

Server Deployment Today



Over the past 10 years

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

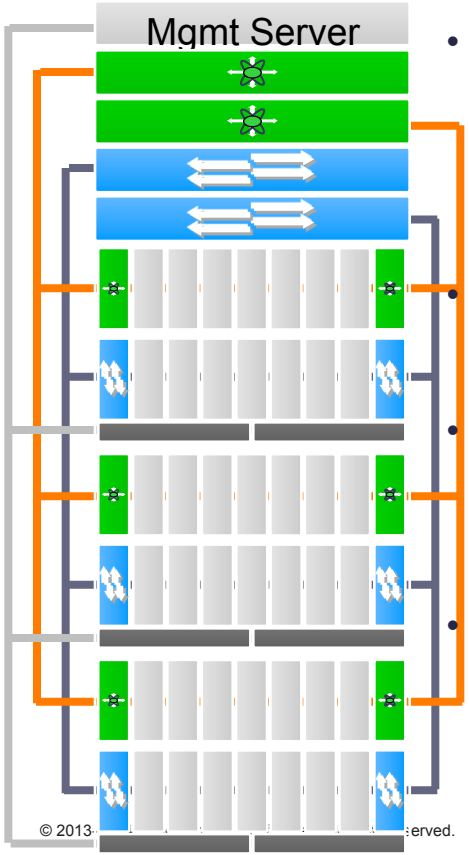
An accidental architecture

- Still a 1980's PC model

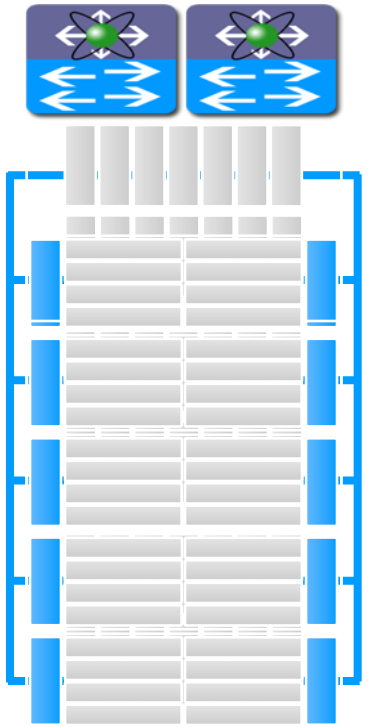
Result: Complexity

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

Our Solution: UCS

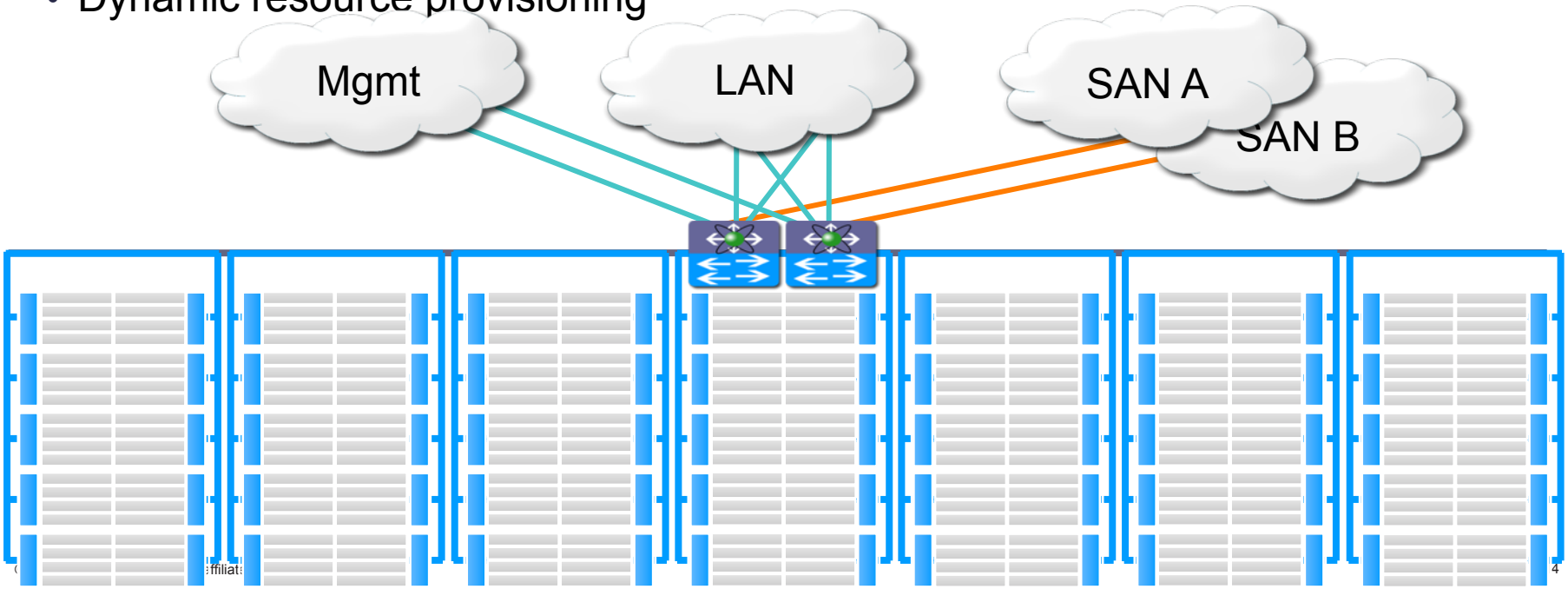


- A single system that encompasses:
  - Network: Unified fabric
  - Compute: Industry standard x86
  - Virtualization optimized
- Unified management model
  - Dynamic resource provisioning
- Efficient Scale
  - Cisco network scale & services
  - Fewer servers with more memory
- Lower cost
  - Fewer servers, switches, adapters, cables
  - Lower power consumption
  - Fewer points of management

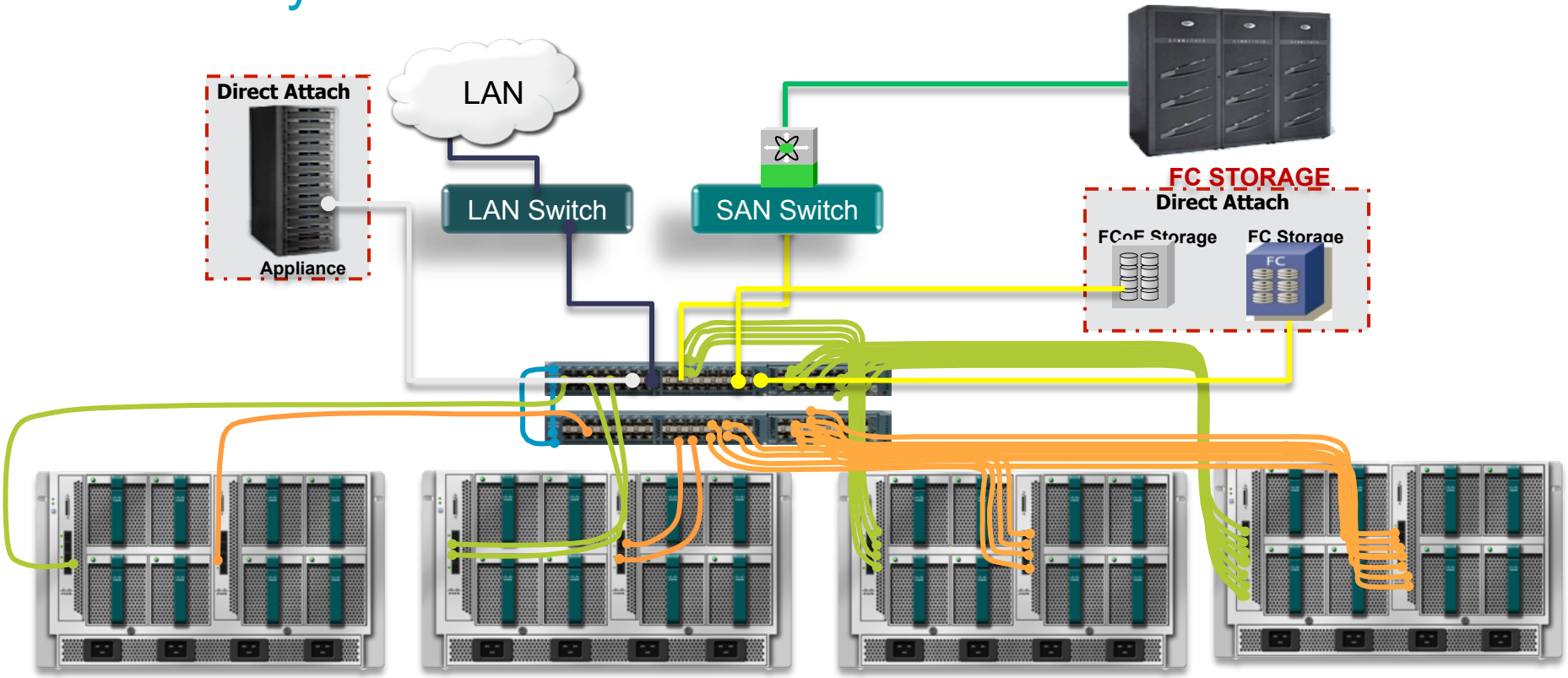


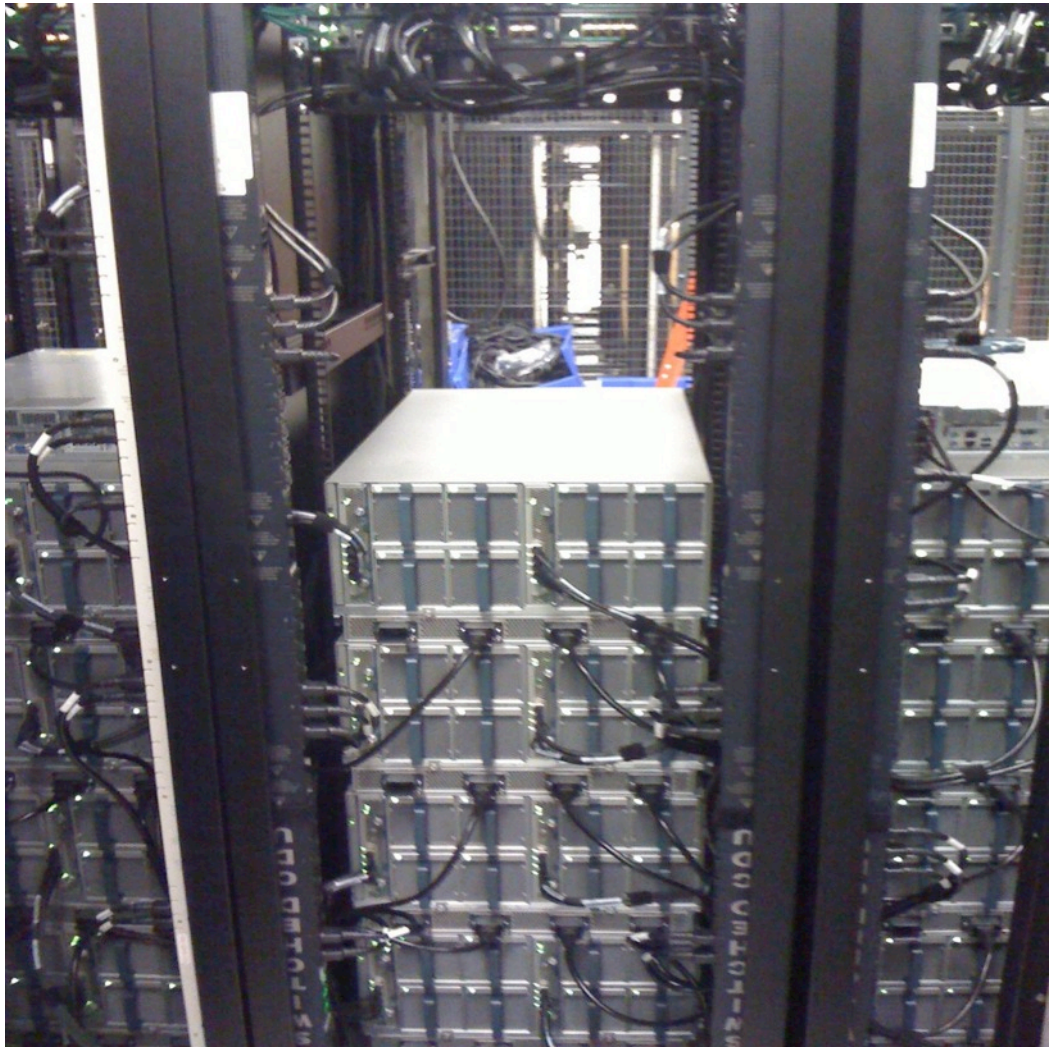
Our Solution: UCS

- Single, scalable integrated system
- Network + compute virtualization
- Dynamic resource provisioning

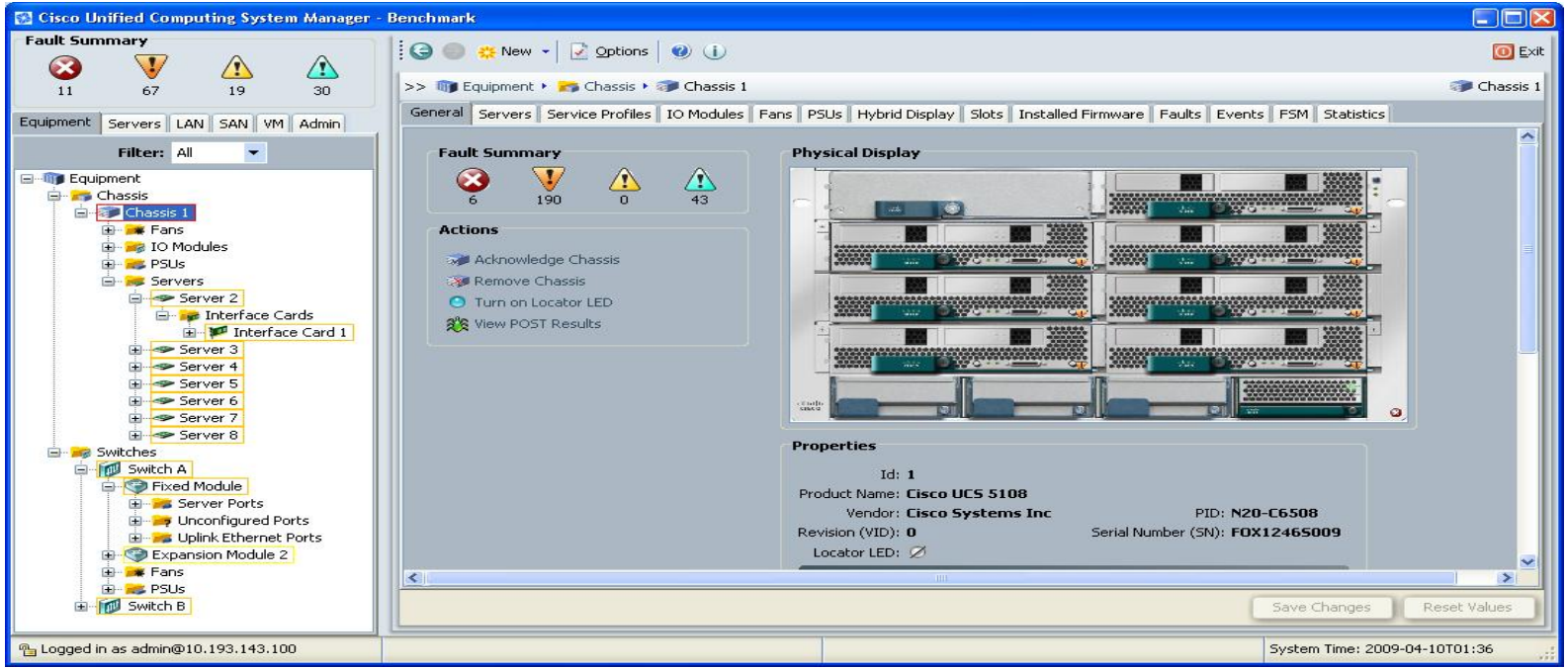


UCS System Architecture





Unified Computing System Manager



- Embedded device manager for family of UCS components
- Enables stateless computing via Service Profiles
- Efficient scale: Same effort for 1 to 160 blades/rack servers
- APIs for integration with new and existing data center infrastructure

UCS C-Series Compute Portfolio

Cisco UCS: Many Server Form Factors, One System

Industry-Leading Compute Without Compromise

Enterprise Performance

UCS C240 M4
Ideal Platform for Big Data, ERP,
and Database Applications

UCS C220 M4
Versatile, General Purpose Enterprise
Infrastructure, and Application Server

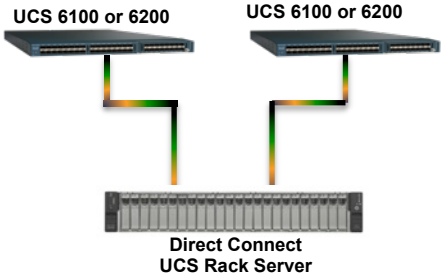
Compute Intensive/Mission Critical

UCS C460 M4
Mission-Critical, 4-Socket Server for Large,
CPU-Intensive Applications

Storage Density

UCS C3260
Storage Density with High Availability

Single Connect C-Series at Scale



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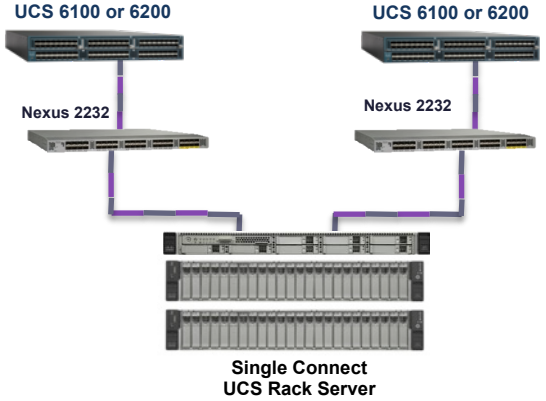
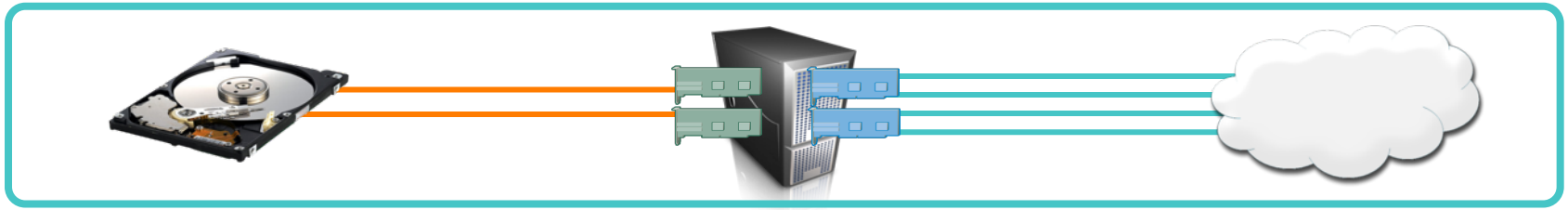


Service Profile



Storage

- Optional Disk usage
- SAN settings
  - LUNs
  - Persistent Binding
- SAN settings
  - vSAN
- Firmware
  - Revisions

Server

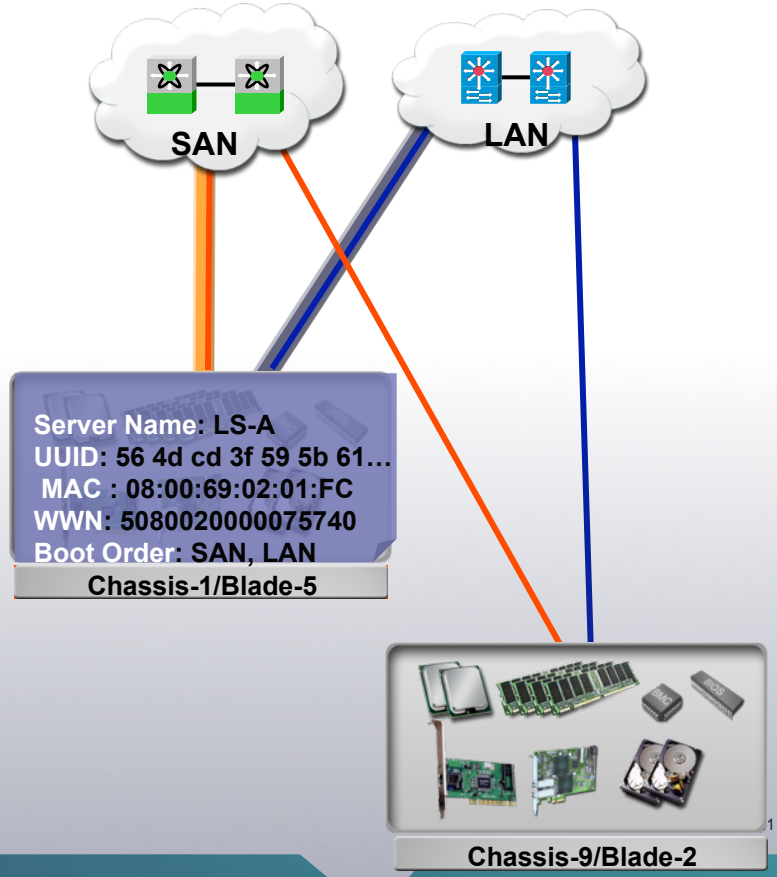
- Identity (UUID)
- Adapters
  - Number
  - Type: FC, Ethernet
  - Identity
  - Characteristics
- Firmware
  - Revisions

Network

- Uplinks
- LAN settings
  - vLAN
  - QoS
  - etc…
- Firmware
  - Revisions

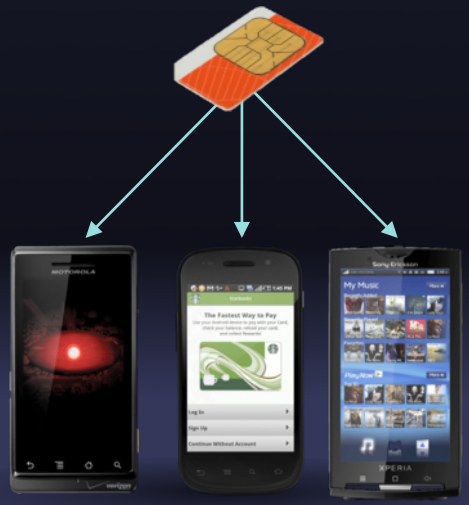
Integrated Stateless Computing

- Server identity no longer has to be tied to physical server hardware
- Boot over network (LAN or SAN)
- Dynamic Provisioning



UCS Service Profiles
Configuration Portability

SIM Card
Identity for a Phone



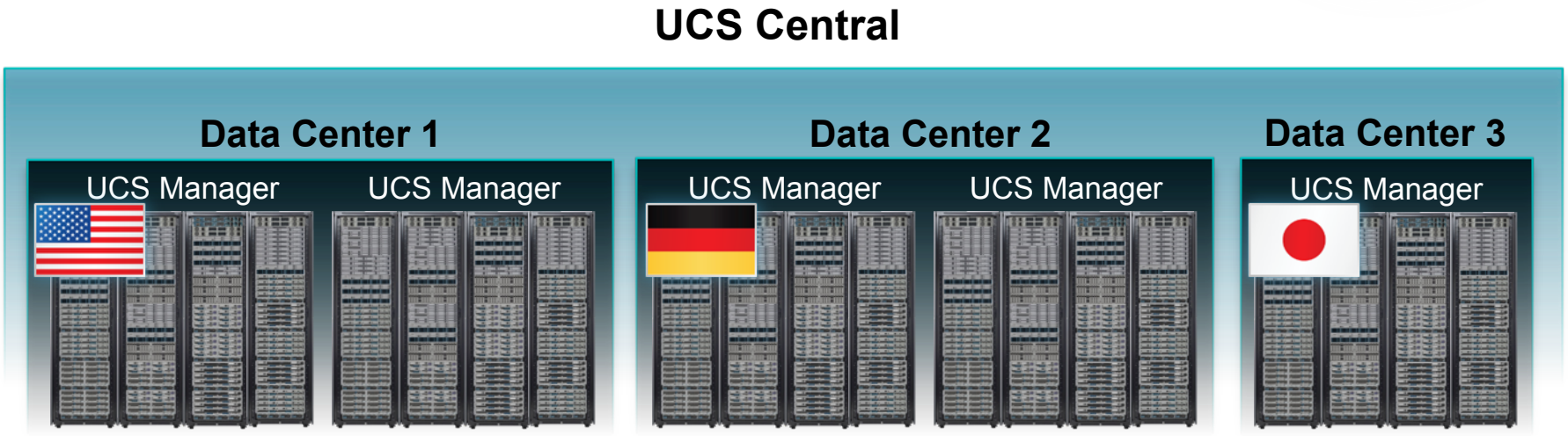
Service Profile
Identity for a Server

UCS Service Profile
Unified Device Management

- Network Policy
- Storage Policy
- Server Policy

UCS Central
Unified Management for Multiple UCS Domains

Unified Management at Scale



Cisco UCS Director Turn-Key Solution

On-Demand Automated Delivery

Policy-Driven Provisioning

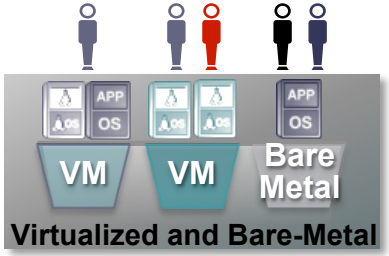
UCS Director

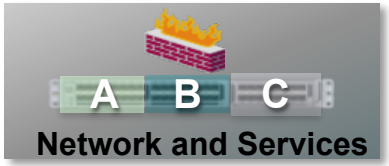
Single Pane of Glass

End-to-End Automation

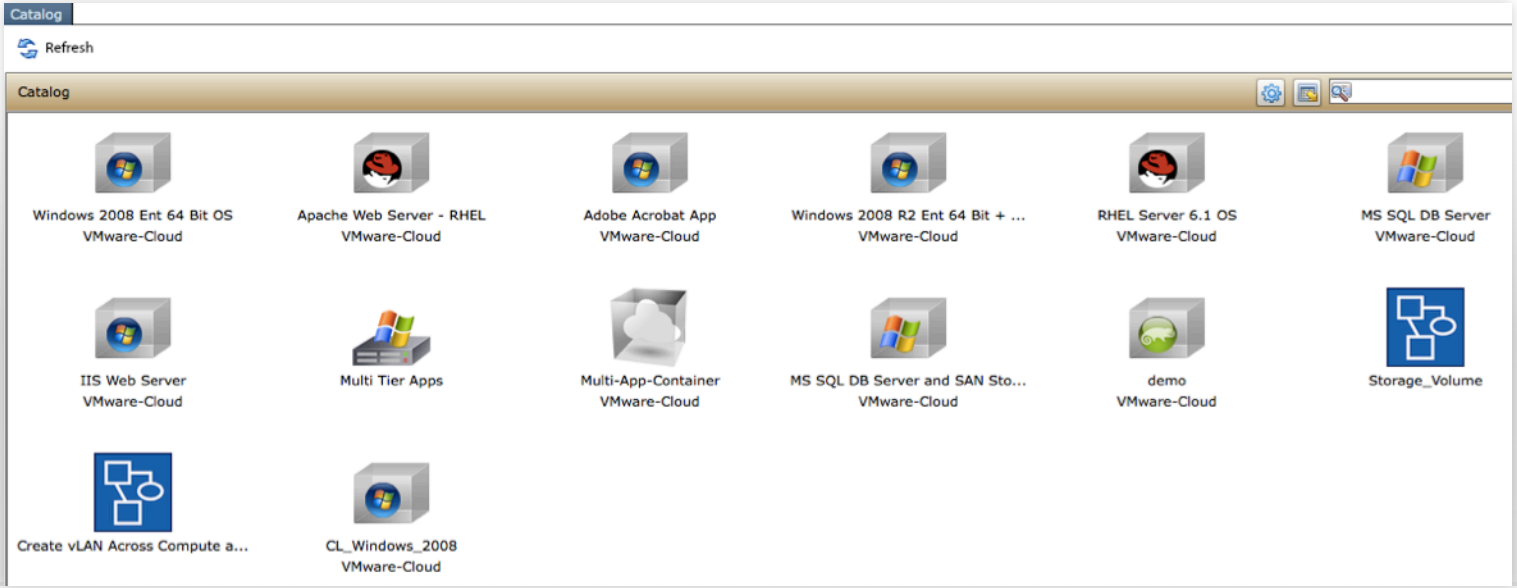
Domain Managers

- OS and Virtual Machines
- Compute
- Network
- Storage





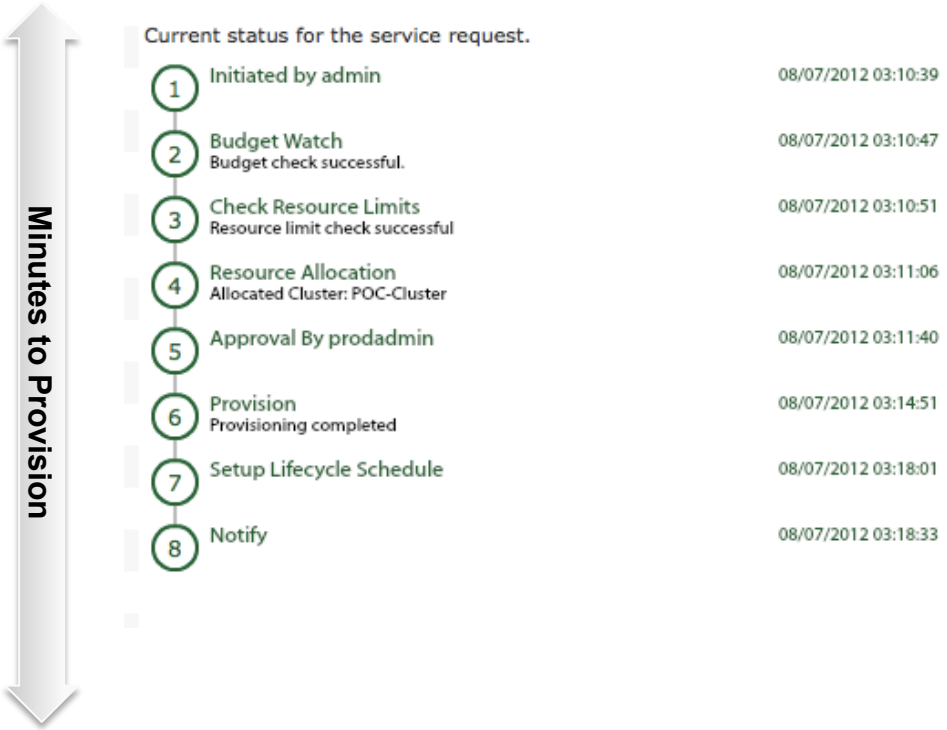
Infrastructure Catalog



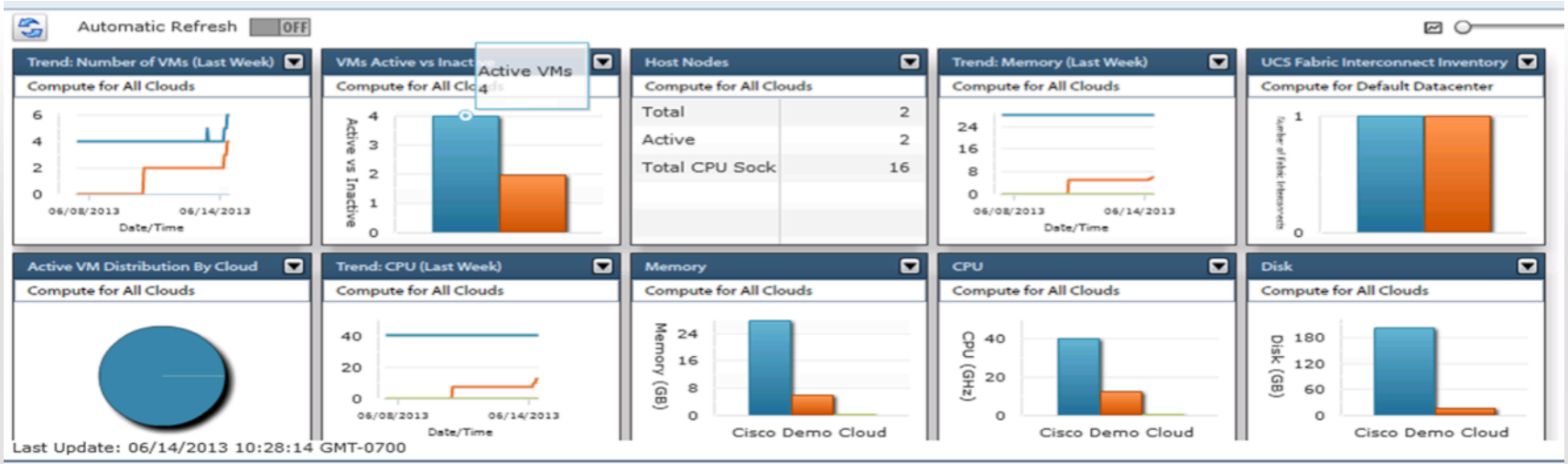
- Self-serve provisioning of IT infrastructure
- Role-based access for technical users

Example – Self-Service Portal

- Self-Service User login
- Catalog items
- Create Request for a Virtual Resource
- Monitor the VM provisioning process
- Management of VM Life Cycle and resources

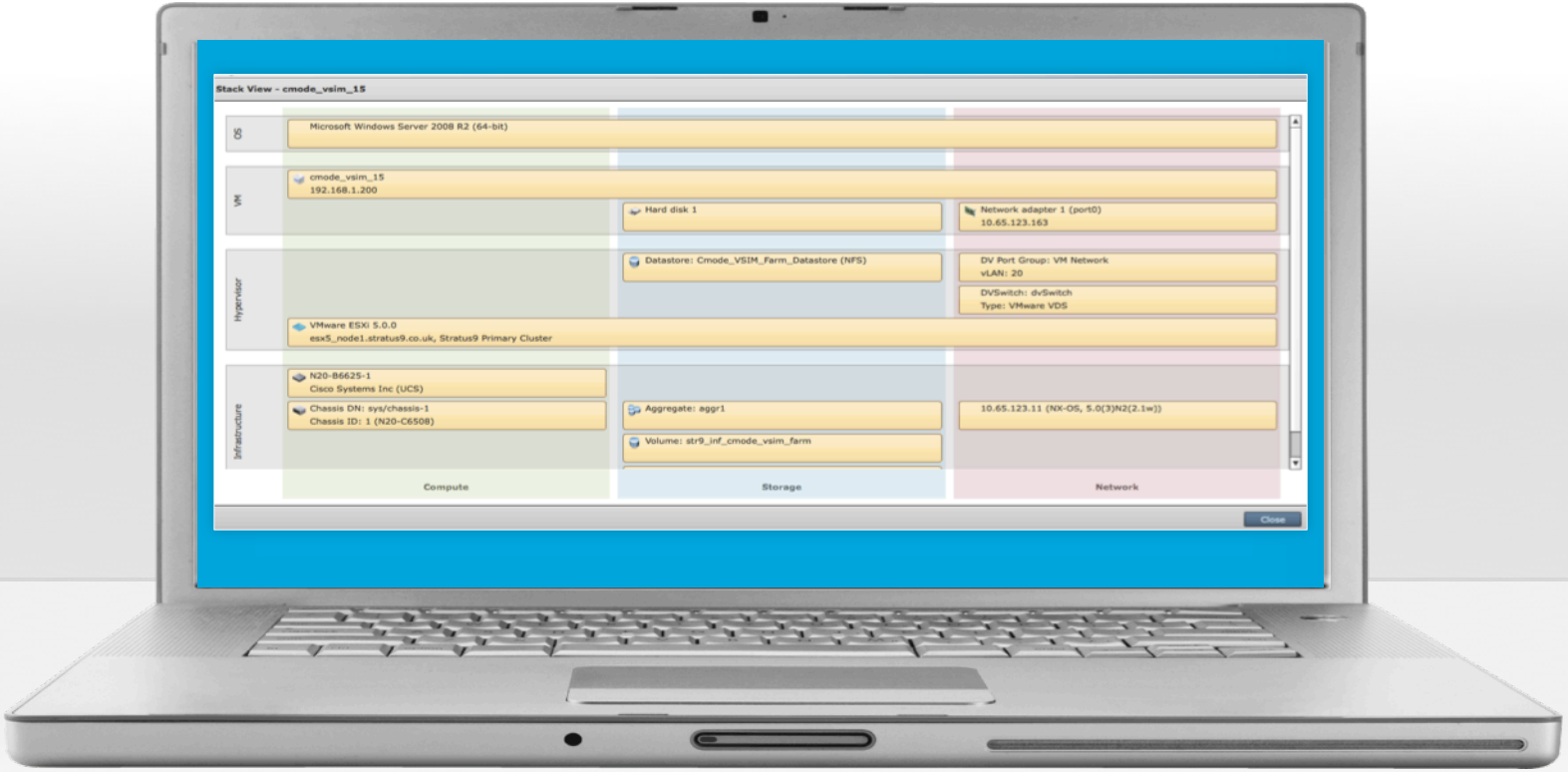


Dashboards for Single System Focus



- Rapid configuration and monitoring
- Customizable view
- Quick status across critical components

Infrastructure as a Stack



Rapidly View Shared Infrastructure Stacks

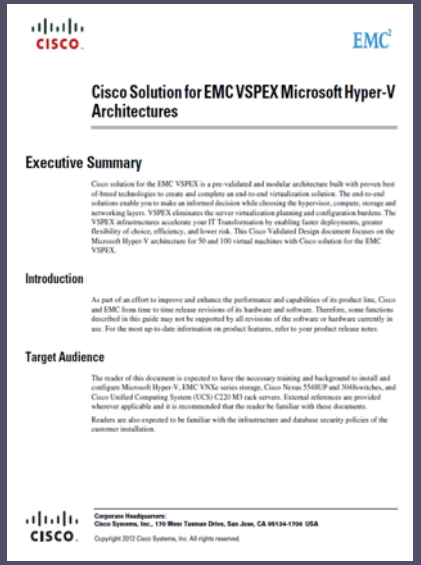
Cisco UCS Performance: 100 Records
World-Record Performance

23	17	7	17	18	18
CPU	Virtualization /Cloud	Database	Enterprise Application	Enterprise Middleware	HPC

Cisco UCS Benchmarks that held world record performance records as of date of publication For details, please see source document “Cisco Unified Computing System and Intel Xeon Processors: 100 World-Record Performance Results” at http://www.cisco.com/c/dam/en/us/products/collateral/servers-unified-computing/le_32801_pb_ucs_worldrecords.pd

Cisco Validated Designs

Cisco Validated Designs



Cisco Solution for EMC VSPEX Microsoft Hyper-V Architectures

Executive Summary

Cisco solution for the EMC VSPEX is a pre-validated and modular architecture built with proven best of-breed technologies to create and complete an end-to-end virtualization solution. The end-to-end solutions enable you to make an informed decision while choosing the hypervisor, compute, storage and networking layers. VSPEX eliminates the server virtualization planning and configuration burdens. The VSPEX infrastructures accelerate your IT Transformation by enabling faster deployments, greater flexibility of choice, efficiency, and lower risk. This Cisco Validated Design document focuses on the Microsoft Hyper-V architecture for 50 and 100 virtual machines with Cisco solution for the EMC VSPEX.

Introduction

As part of an effort to improve and enhance the performance and capabilities of its product line, Cisco and EMC from time to time release revisions of its hardware and software. Therefore, some functions described in this guide may not be supported by all revisions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

Target Audience

The reader of this document is expected to have the necessary training and background to install and configure Microsoft Hyper-V, EMC VNXe series storage, Cisco Nexus 5548UP and 3048switches, and Cisco Unified Computing System (UCS) C220 M3 rack servers. External references are provided wherever applicable and it is recommended that the reader be familiar with these documents.

Readers are also expected to be familiar with the infrastructure and database security policies of the customer installation.

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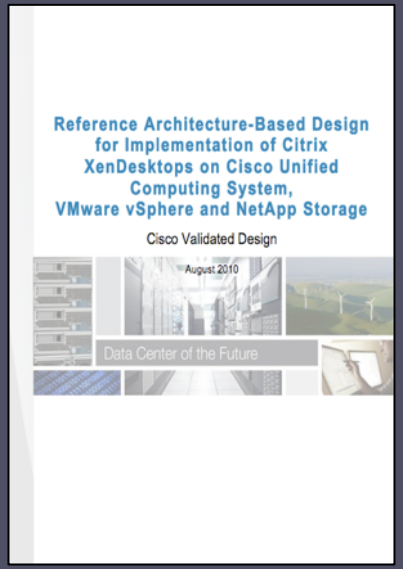
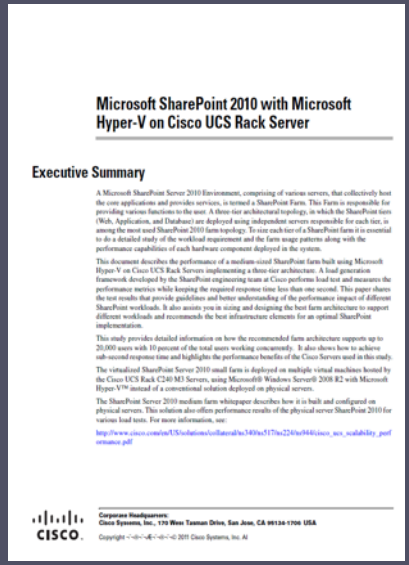


Reference Architecture-Based Design for Implementation of Citrix XenDesktops on Cisco Unified Computing System, VMware vSphere and NetApp Storage

Cisco Validated Design

August 2010

Data Center of the Future



Microsoft SharePoint 2010 with Microsoft Hyper-V on Cisco UCS Rack Server

Executive Summary

A Microsoft SharePoint Server 2010 Environment, comprising of various servers, that collectively host the core applications and provides services, is termed a SharePoint Farm. This Farm is responsible for providing various functions to the user. A three-tier architectural topology, in which the SharePoint tiers (Web, Application, and Database) are deployed using independent servers responsible for each tier, is among the most used SharePoint 2010 farm topology. To size each tier of a SharePoint farm it is essential to do a detailed study of the workload requirement and the farm usage patterns along with the performance capabilities of each hardware component deployed in the system.

This document describes the performance of a medium-sized SharePoint farm built using Microsoft Hyper-V on Cisco UCS Rack Servers implementing a three-tier architecture. A load-generation framework developed by the SharePoint engineering team at Cisco performs load test and measures the performance metrics while keeping the required response time less than one second. This paper shares the test results that provide guidelines and better understanding of the performance impact of different SharePoint workloads. It also assists you in sizing and designing the best farm architecture to support different workloads and recommends the best infrastructure elements for an optimal SharePoint implementation.

This study provides detailed information on how the recommended farm architecture supports up to 20,000 users with 10 percent of the total users working concurrently. It also shows how to achieve sub-second response time and highlights the performance benefits of the Cisco Servers used in this study.

The virtualized SharePoint Server 2010 small farm is deployed on multiple virtual machines hosted by the Cisco UCS Rack C240 M3 Servers, using Microsoft® Windows Server® 2008 R2 with Microsoft Hyper-V™ instead of a conventional solution deployed on physical servers.

The SharePoint Server 2010 medium farm whitepaper describes how it is built and configured on physical servers. This solution also offers performance results of the physical server SharePoint 2010 for various load tests. For more information, see:

http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns944/cisco_ucs_scalability_performance.pdf

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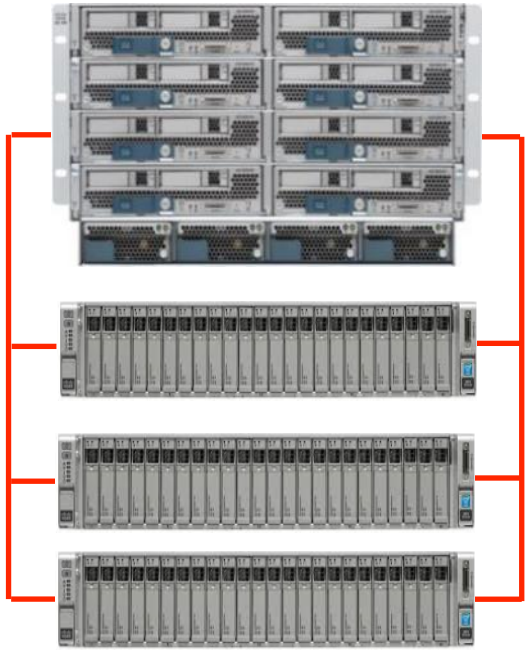
Hyper-Converged Use Cases

Small DC

Customer Requirements

- Compute and low cost storage needs
- Traditional SAN viewed as too expensive/ complex
- Simple setup and management
- Adequate performance for larger workloads
- Advanced storage services a bonus
- Ability to scale compute and storage

Cisco UCS Mini + C-Series

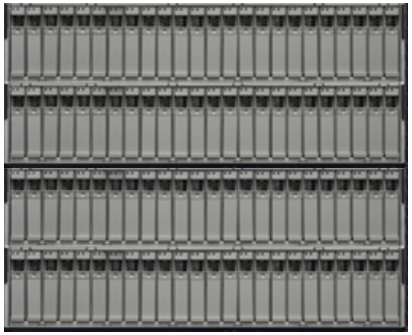


Enterprise Datacenter Storage Alternative

Customer Requirements

- Lower Centralized storage costs than traditional storage
- Maximum Performance for Enterprise Workloads
- Requires advanced storage services
  - Site to Site replication
  - Advanced clone and snapshot
  - Compression, Dedupe
- Simple and predictable linear scaling
  - Scale one node at a time
- Simple Centralized Management
- Mix of compute and storage nodes

Cisco UCS Blades + C-Series



simplivity

General Purpose

Customer Requirements

- Lower Centralized storage costs than traditional storage
- Technically acceptable performance needs for VDI/TestDev/Private Cloud
- Desire for advanced storage services
  - Site to Site replication
  - Advanced clone and snapshot
  - Compression, Dedupe
- Simple and predictable linear scaling
  - Scale one node at a time
- Simple Centralized Management

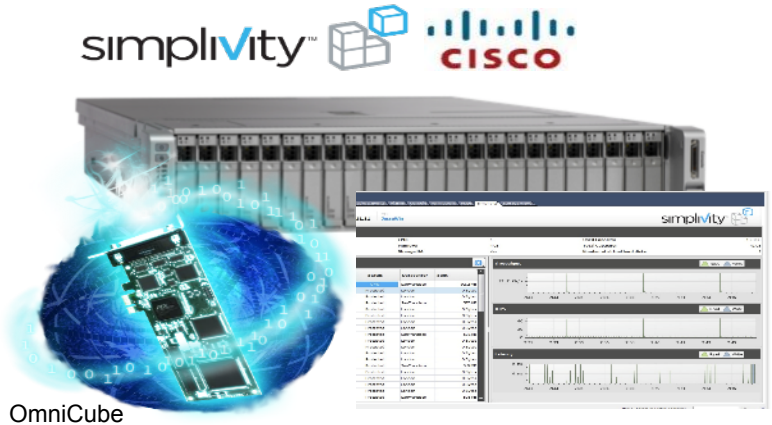
Cisco UCS C-Series

simplivity

Cisco Based Solutions

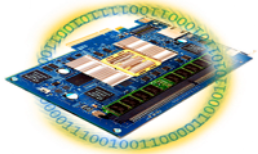
OmniStack Integrated Solution with Cisco UCS
Product Differentiation

- Highly Available VM Infrastructure
- Scale Out Architecture in 2U modular increments
- Data Virtualization Platform, powered by the OmniStack Accelerator Card: Dedupe, Compress, Optimize, At Ingest, Inline, In Real-Time, Once and Forever: Primary, Backup, Archive, WAN, Cloud
- VM-Centricity & Mobility: all policies, commands and info on per VM basis for backup, replication and DR
- Global Unified Management with one screen: VMware vCenter
- **Infrastructure Management with Cisco UCS Manager**



OmniCube Accelerator™

SimpliVity OmniStack™ Product Family



OmniStack Accelerator™ Included

CISCO

OmniStack 2400
"small"

OmniStack 3400
"medium"

OmniStack 5400
"large"

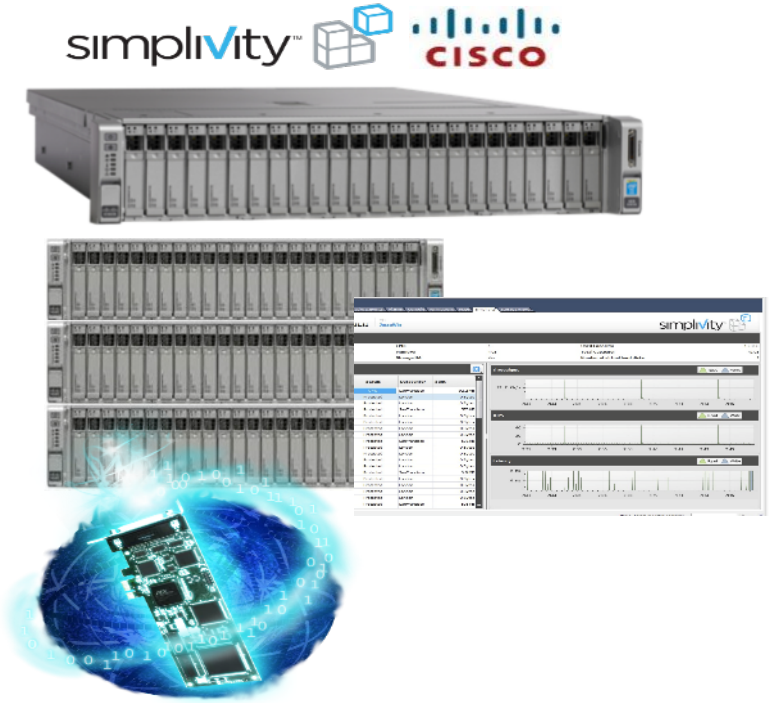
OmniStack Integrated Solution for Cisco UCS C240 M4

CPU Intel v3	8 - 28 cores	16 – 28 cores	16 - 28 cores
Memory*	71 – 455 GB	128 – 412 GB	267 – 667 GB
2.5‘ HDDs	8x1TB	20x1TB	20x1.2TB 10K
2.5‘ SSDs	2x400GB	4x400GB	4x400GB
Usable Capacity	4.9 TB	13.1 TB	15.7 TB
Size	2RU	2RU	2RU
Common Features	Global Dedupe, Compression, Optimization, High Availability, Redundant Power, VM-centric Policy-based Backup/Recovery/DR, Replication, VM Mobility, Integrated Management via vCenter, Single File Restore		

* Usable

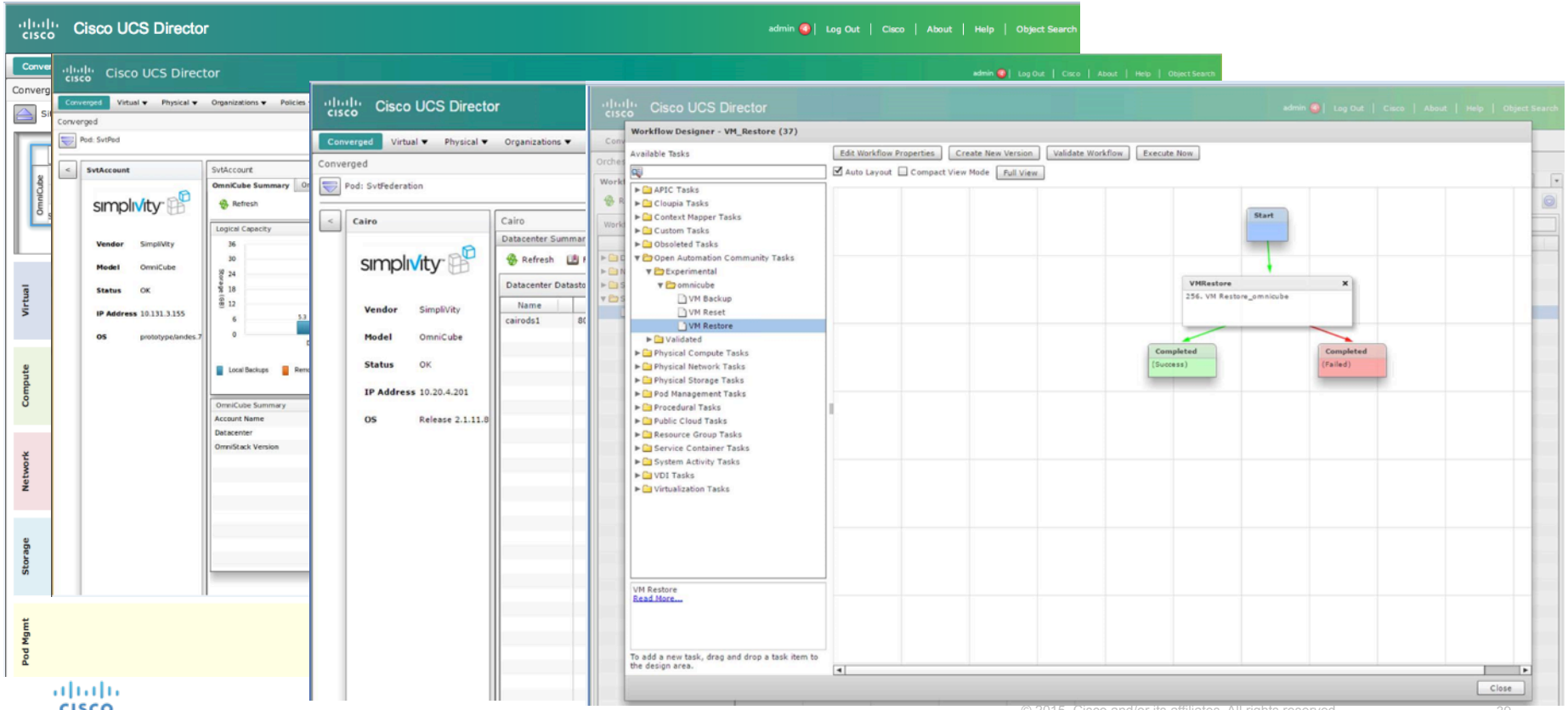
OmniStack Integrated Solution with Cisco UCS *Technical Details*

1. Configurable CPU up to 2 x 12 core Intel CPUs
2. Configurable RAM 256GB – 768 GB RAM
3. Capacity:
   a. 6 x 400GB SSD, RAID 5
   b. 18 x 1TB HDD RAID 6 (2 disk groups)
   c. 2 or 4 x 10GbE (Copper or SFP+) + 4 x 1GbE
4. Redundant power supplies, fans, hardware components and a highly available configuration = no single point of failure
5. SimpliVity OmniStack Software
6. SimpliVity OmniStack Accelerator Card



OmniCube Accelerator™

UCSD SimpliVity Integration Examples



Thank you.