
TOMORROW
starts here.
CISCO
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Hyper-Converged Computing

BRKCOM-2601

Chris Dunk

Cisco UCS Sr Technical Marketing Engineer

#clmel

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Agenda

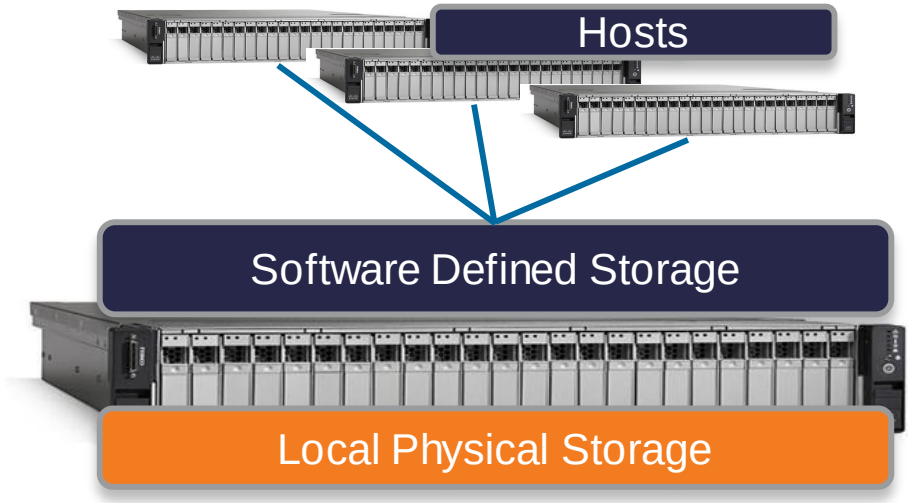
- Hyper-Converged and Software Defined Storage Defined
- Cisco Storage Software Strategy
- Hyper-Converged Use Cases
- Software Defined Storage Architectures
- Hyper-Converged Testing
- Cisco Based Solutions

Hyper Convergence - Why?

- Why is this interesting?
  - Hyper-Convergence is a evolving market transition disrupting traditional storage vendors
  - Hyper-Convergence solutions marketing promises sound compelling
  - Opportunity to review current storage needs and requirements
  - Changes the cost structure for some workloads
- Customer Perspective, why do you care?
  - Hyper-converged solutions promise lower cost and greater speed of application deployment
  - The majority of cost for new application infrastructure is in the storage
  - Aligns to the software defined everything industry buzz

Definition: What is Software Defined Storage (SdS)

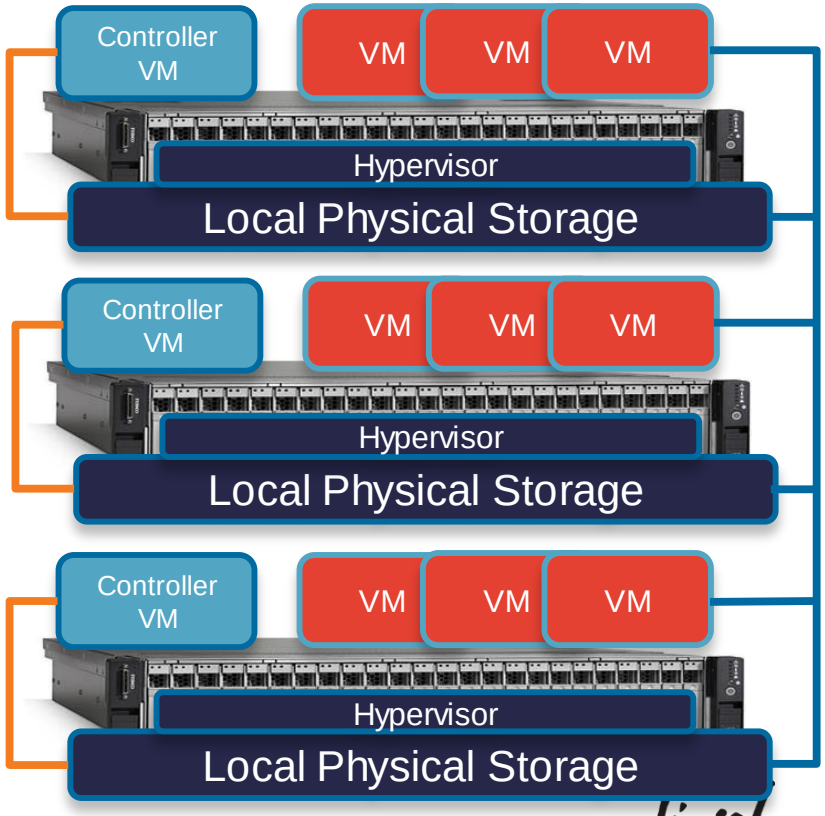
- The programming that controls the storage is decoupled from the physical hardware
- Consists of the **Storage Only**
- Emphasises storage services such as deduplication or replication, instead of storage hardware
- A shared pool that runs on commodity hardware
- Utilises Policy Based Management
- Often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



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

Definition: What is Hyper-convergence?

- New landscape utilising Software Defined Storage
- Tight integration of x86 servers for compute and storage, networking and virtualisation in the same box.
- Combines server, storage, network, and virtualisation in a software defined stack running on a single x86 server vs separate HW components
- Combination of hypervisors and physical infrastructure integrated together
- All in one appliance or Software for compute and storage
- Scale one unit/appliance at a time



Hyper-Converged Market

Disruptive

- Competing for mind-share with traditional Integrated Infrastructures – many customers are now looking more closely after VMware market validation
- Companies like Nutanix, Simplivity, VMware are selling complete, supported, all-in-one appliances with message of simplicity/scale
- New projects like VDI allow customers to try new solutions like Hyper-Converged in the name of cost-savings, while keeping segregated
- Software-Defined Storage (SDS) is a good fit for certain customer requirements (i.e. ROBO). Cisco has partnership examples at large customers

Reality

- Vendors generally saying the same thing – ease of scaling, simple to deploy/size, lower cost vs. SAN
- There are a lot of discrepancies here and Cisco is doing our homework to separate fact from fiction
- Reality is two main tiers exist – those that are trying to replicate enterprise storage and those who are simply SDS software serving a purpose like retail – Cisco will play in both
- Many limitations exist outside of vendor designed test plans/POC in areas of data integrity, management, scaling and performance
- NOT one-size-fits-all. Does not solve every business need. Cost savings are often inflated.

Converged Infrastructure vs. Hyper-Converged

- **Converged or Integrated Infrastructure – i.e. vBlock, FlexPod, VersaStack, etc**
  - Preconfigured bundles of hardware & software delivered as a single-solution
  - Basically disparate components acting as a whole with some type of software management layer
  - Typically includes a compute tier & storage tier connected together with one or more networks
  - Works with both virtualised and non-virtualised (Baremetal) workloads
  - Can easily scale one component separate from another since they are separate building blocks – allows for granular upgrades and tweaks
- **Hyper-Converged Infrastructure**
  - Compresses the Compute & storage tiers of hardware into a single tier
  - Deployed as a cluster of nodes with each node having compute/storage resources
  - Storage is virtualised & shared across entire cluster
  - Foundational components often include integrated backups, snapshot capability, data deduplication, inline compression and even WAN optimisation
  - Hypervisor Centric, so often only works with virtualised workloads
  - Typically a node includes both compute and storage resources, so cannot add one without the other

Cisco Storage Software Strategy

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Integrated Infrastructure Leadership

Cisco is a partner in ~69% of all Integrated Infrastructure*

FLEXPOD

NetApp

VBLOCK

VCE

VSPEX

EMC²

HDS UCP- Select

HITACHI

SmartStack

nimble storage

VersaStack

IBM

Cisco UCS

CISCO

Cisco Nexus

UCS Integrated Infrastructure

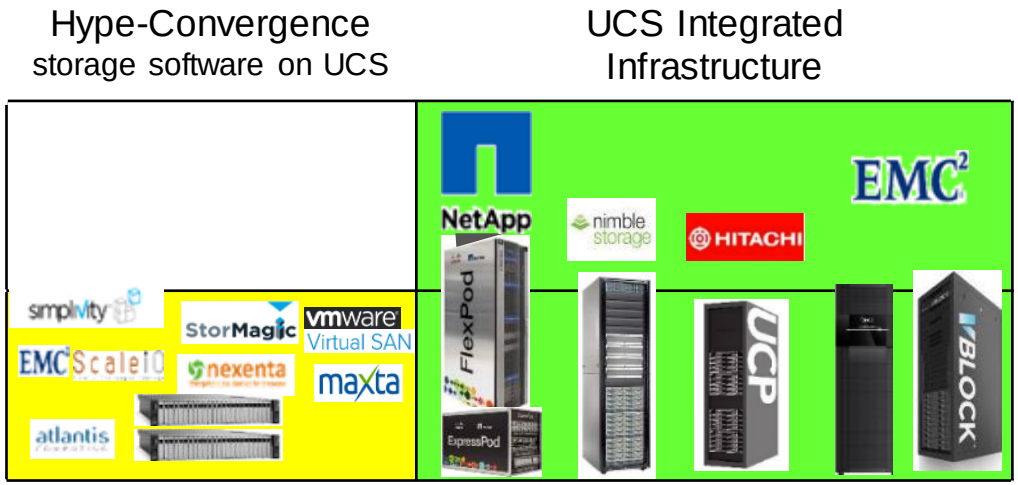
*IDC Worldwide Integrated Infrastructure & Platforms Tracker, April 29, 2014

Hyper-Convergence and UCS Integrated Infrastructure

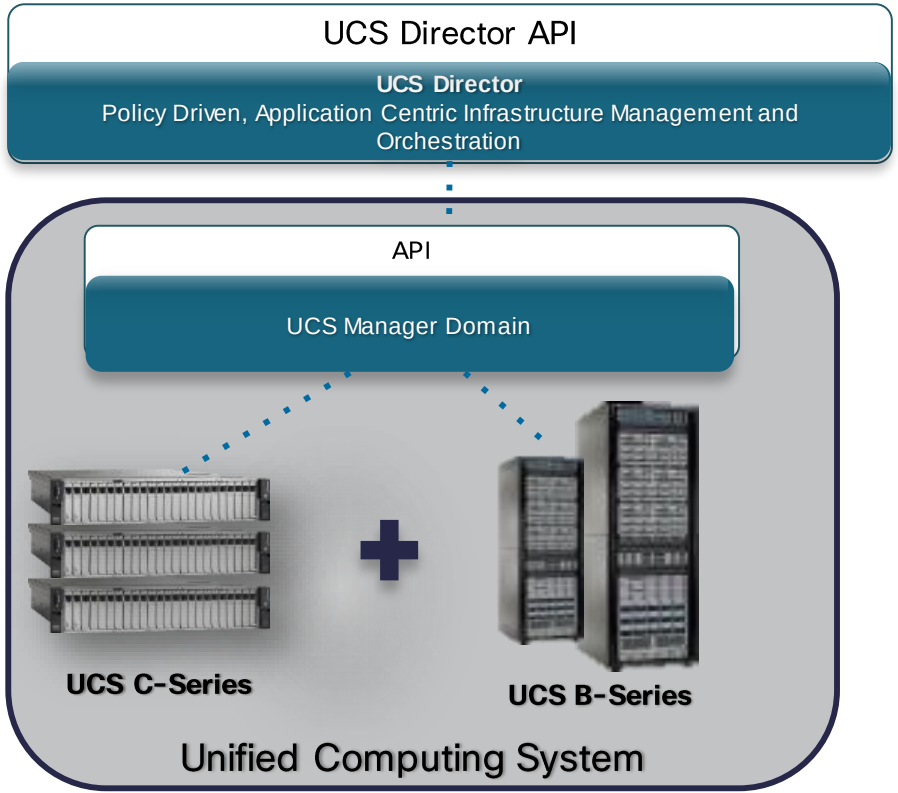
- Cisco solutions cover entire landscape
- Understand when to consider Integrated Infrastructure or Hyper-Converged Systems
  - Know your options both from ISV and UII partners
  - Will there be Mixed Workloads and Higher Performance needs
  - What is the perception about traditional storage
  - Is there a need to have separate compute and storage scaling

Large scale Fabrics

Small Scale Clusters



UCS Software Defined Storage Strategy



UCS and Hyper-Converged Software

simplivity · vmware Virtual SAN · maxta · springpath · DataCore SOFTWARE · redhat. GLUSTER · StorMagic · EMC ScaleIO · ATLANTIS

- Open Eco-System with industry leading partners
- Cisco Validated to minimise business risk
- Delivered with all of the programmatic and operational benefits of Cisco UCS
  - Unified Management
  - UCS Director integration
  - Unified Fabric

Cisco Open Ecosystem for Hyper-Converged Software

- A fast moving space with lots of vendors
- It's primarily all about storage software running on standard servers
  - Initial use cases around VDI
- Cisco supporting multiple partners
  - Enabling validations on UCS
  - Meeting in channel through joint reseller partners
- Solutions focused on C-series today
  - Solutions with UCS Mini
  - Vision for differentiation through UCS Director integration and fabric scale

Validated on Cisco UCS

simplivity

Inline storage function validation w/ Multi-site data protection, VM Mobility

https://www.simplivity.com/wp-content/uploads/SimpliVity_OmniStack_Data_Sheet.pdf

vmware Virtual SAN

Validation up to 100 VMs per server

http://partnerweb.vmware.com/programs/vsan/Virtual%20SAN%20Ready%20aNodes.pdf

EMC ScaleIO

VSPEX solution up to eight nodes and scale out

StorMagic

1000+ retail branch installation for Kohl's

http://www.cisco.com/c/dam/en/us/solutions/collateral/switches/catalyst-6500-series-switches/stormagic_digital_risk_external_cs_fnl_06_27_13.pdf

maxta

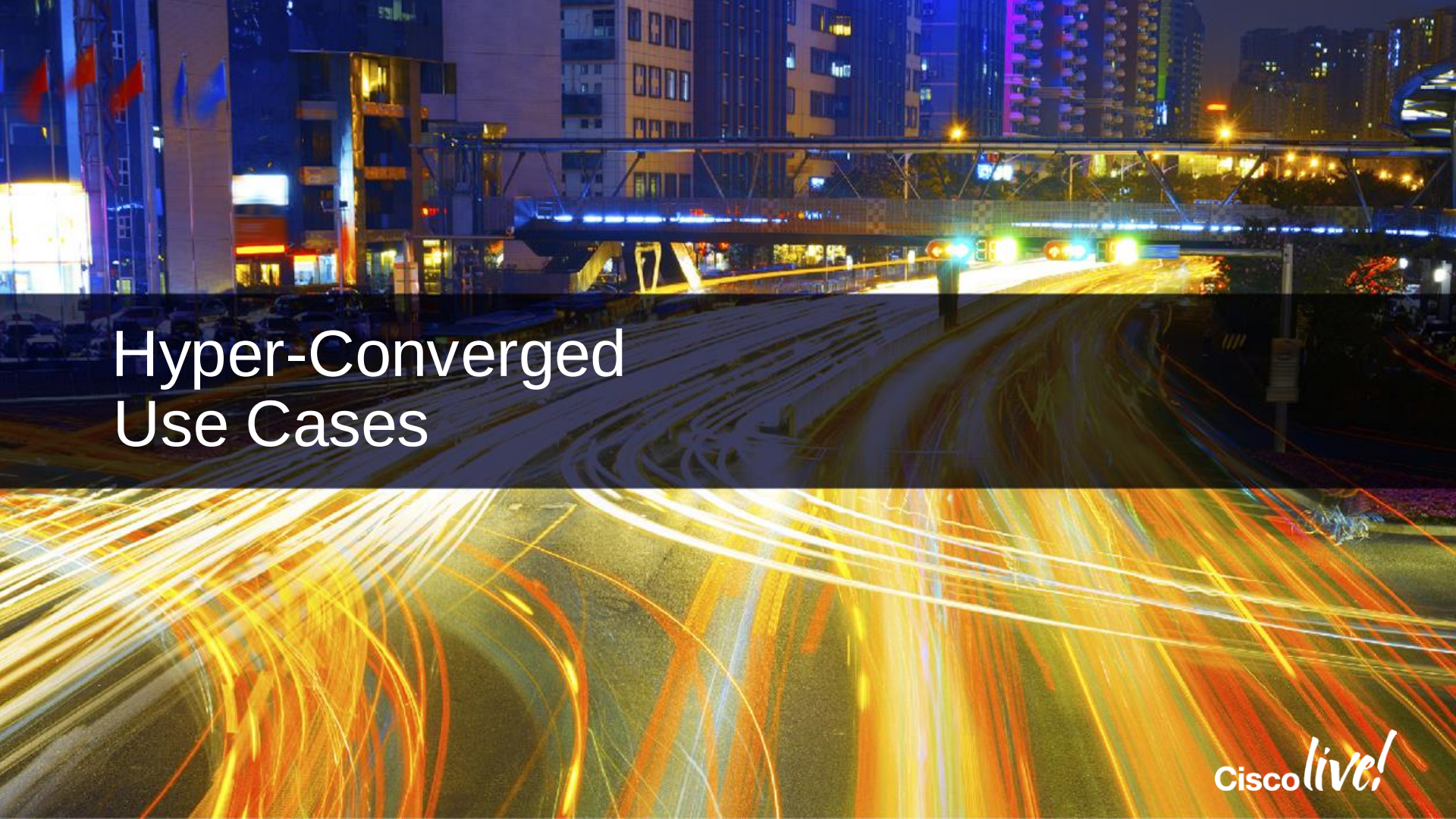
UCSM based solution for Private Cloud

https://marketplace.cisco.com/catalog/search?utf8=%E2%9C%93&search=maxta&search[cat]=

nexenta

VDI solution for 1000 desktops

http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/dc-partner-vmware/nexenta_ref_arch_wp_co_branded_v1c.pdf



Hyper-Converged Use Cases

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Small Remote Office/Branch Office

Customer Requirements

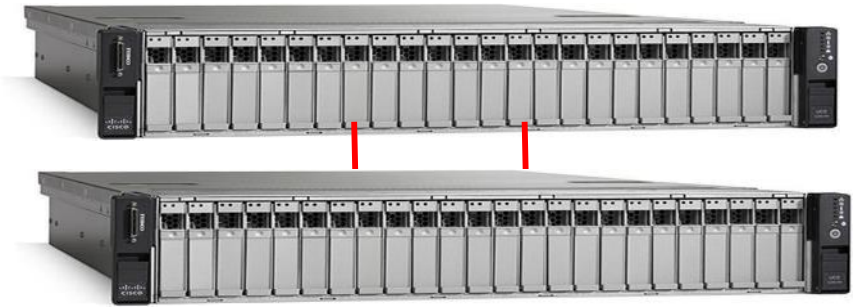
- Simple deployment, setup, and management
- No requirements for advanced storage services
  - Site to Site replication
  - Advanced clone and snapshot
  - Compression, Dedupe not required
- Low cost entry for hardware and software
- Minimum number of nodes per site
  - Often only want 2 or 3 servers per location
  - Most solutions require min of 3 nodes

Cisco UCS C-Series + Compelling Partner

StorMagic

vmware Virtual SAN

DataCore SOFTWARE



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Large Remote Office/Branch Office

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 + Compelling Partner

simplivity

vmware Virtual SAN

StorMagic

maxta

DataCore SOFTWARE

atlantis COMPUTING

springpath

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Data Centre Storage Replacement

Customer Requirements

- Lower Centralised 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 Centralised Management
- Mix of compute and storage nodes

Cisco UCS Blades + C-Series + Compelling Partner

simplivity

EMC ScaleIO

vmware Virtual SAN

maxta

redhat. GLUSTER

ceph

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Data Centre Software Defined Storage

Customer Requirements

- Lower Centralised 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 Centralised Management

Cisco UCS C-Series + Compelling Partner

simplivity

vmware Virtual SAN

atlantis COMPUTING

maxta

springpath

nexenta NexentaStor

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SdS and Hyper-Converged Architecture Types

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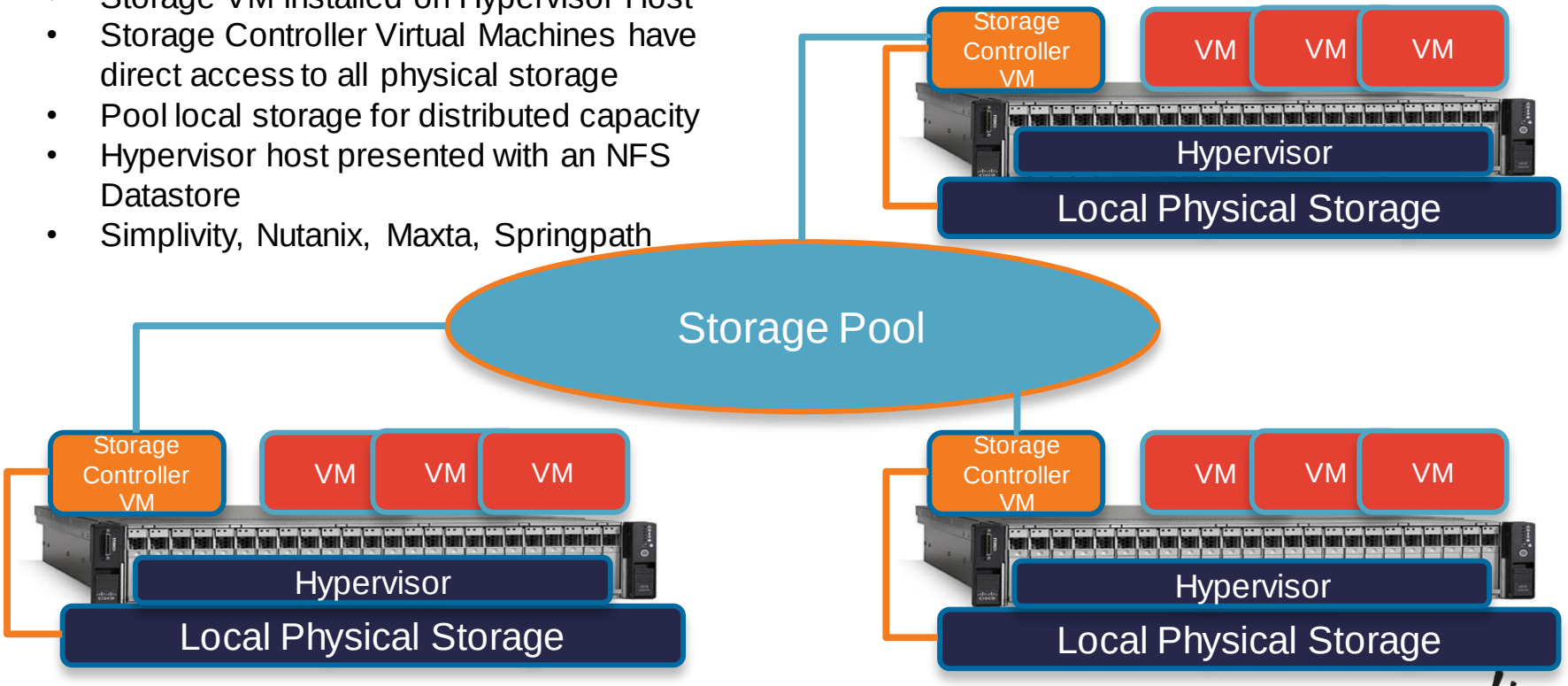
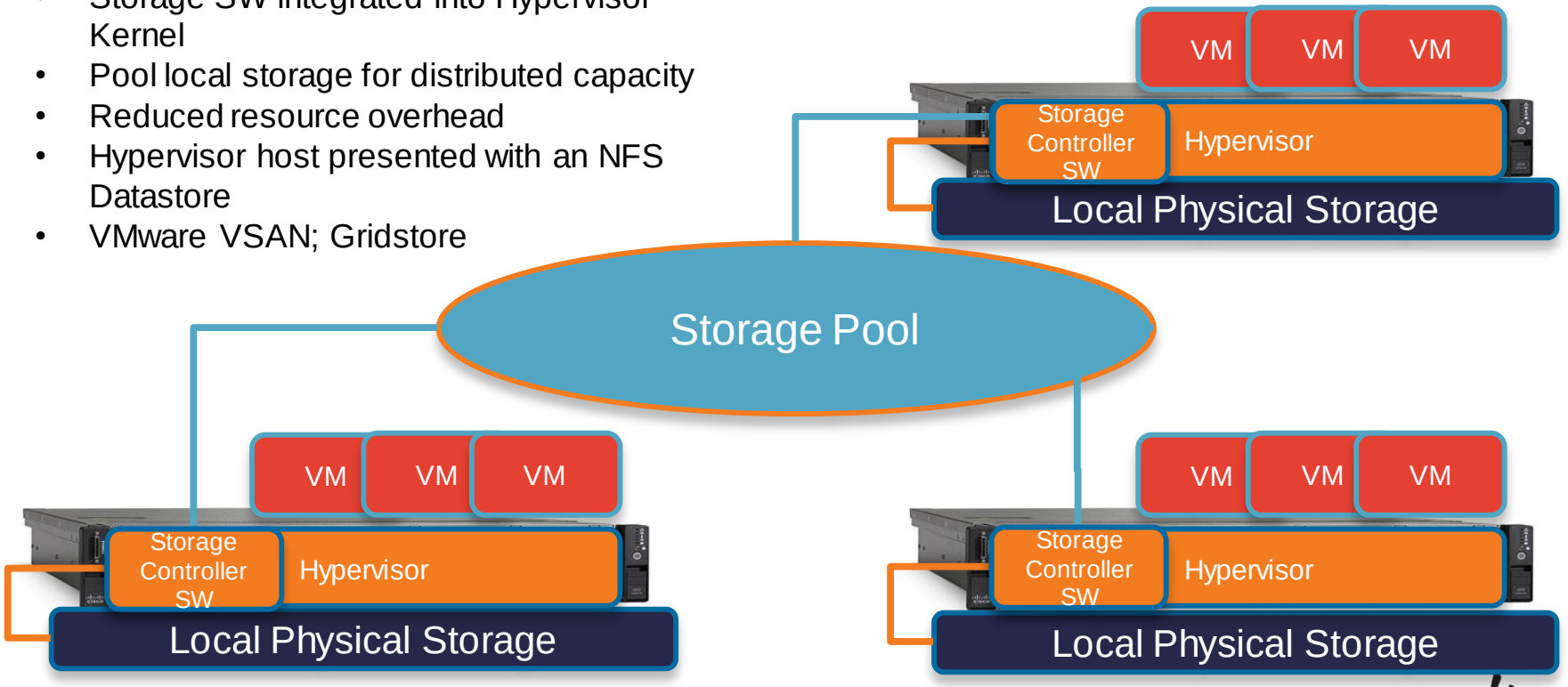
Hyper Converged Architectures

- Storage VM installed on Hypervisor Host
- Storage Controller Virtual Machines have direct access to all physical storage
- Pool local storage for distributed capacity
- Hypervisor host presented with an NFS Datastore
- Simplivity, Nutanix, Maxta, Springpath



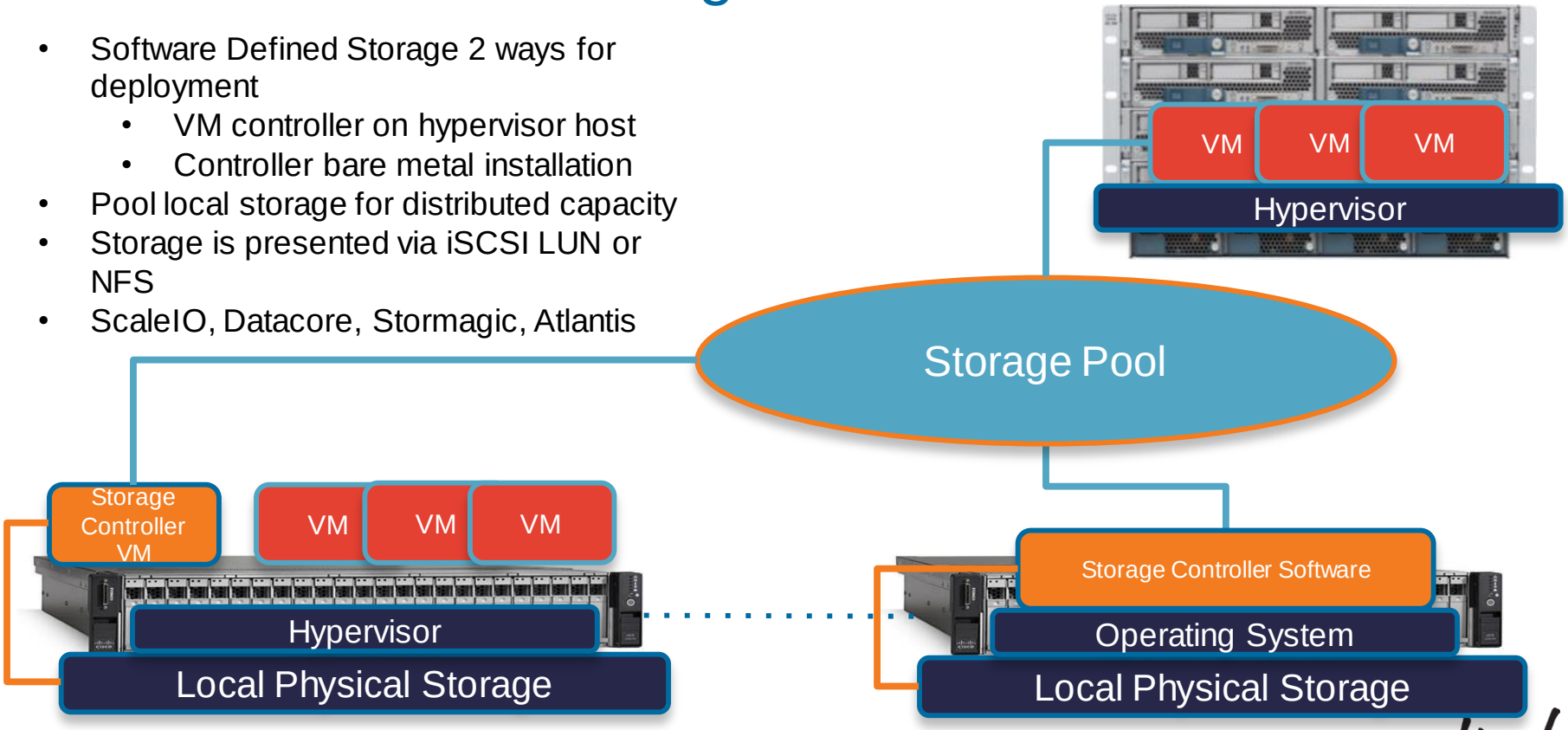
Hyper Converged Architectures – Kernel Based

- Storage SW integrated into Hypervisor Kernel
- Pool local storage for distributed capacity
- Reduced resource overhead
- Hypervisor host presented with an NFS Datastore
- VMware VSAN; Gridstore



Software Defined Storage Architectures

- Software Defined Storage 2 ways for deployment
  - VM controller on hypervisor host
  - Controller bare metal installation
- Pool local storage for distributed capacity
- Storage is presented via iSCSI LUN or NFS
- ScaleIO, Datacore, Stormagic, Atlantis



Cisco SdS and HCI Testing

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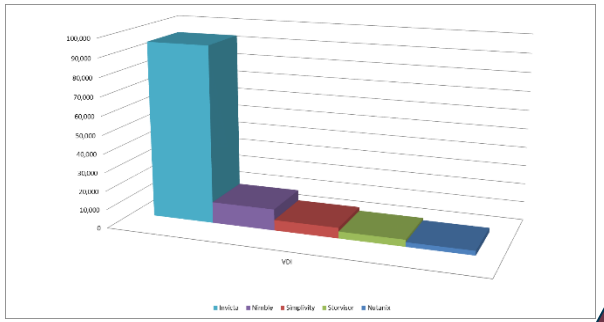
Relative Performance Separation

Cost
Deployment model – SMB, Enterprise features,



UCS+Invicta

UCS+Nimble

Simplivity

Software Storage: VSAN/Nutanix Maxta/StorMagic/Atlantis

Based on Cisco Internal testing

Test Plan Purpose

Purpose:

To analyse Hyper-Converged or Software Defined Storage (SDS) solutions and partnering opportunities. Testing designed to validate functionality, usability and HA. Software solutions are tested using Cisco UCS servers; Appliances (Nutanix, Simplivity) are tested using their compute nodes. Testing is broken down into several objective segments and is meant as a relative comparison to each others and to standard storage expectations.

Hyper-Converged Test Plan Summary

Day 1 Implementation

Get it up and running out of box; configuration; setup; ease; set up documentation, deployment into existing environment

Day 2 Operations

How do you use it? Dashboards, Plug-ins to mgmt. tools; How does own mgmt. tool work; How are failure events tracked; How are things logged , historical performance reporting, dedup/compression reporting, programming capabilities

Managing Storage

Creating storage blocks/volumes/disks/etc.; Deleting storage; Growing/Shrinking storage. Snapshot/Clone creation etc. connecting external arrays, migrating VMs, backups and schedules, snapshot limits

Usage/Performance

Using application performance profiles, perform multiple tests such as: new filesystem perf capture; run exercises to age filesystem (snapshots/cloning/continuous VM filesystem write/deletes) – Then rerun the performance tests. Not meant as application benchmarking but relative performance to one-another.

High-Availability

Stress the system to crash with application running (jetstress); look for DB corruption, massive vMotion to look for any corruption; go through power failures of nodes to 'hard' shut down nodes in various states of load to look for corruption. Network HA – does filesystem get corrupted if switch or adaptor failures occur.

Scalability/Upgrade

How difficult is it to scale environment; add/remove nodes, add/remove storage; upgrade software, add/remove compute only nodes

Storage Software Comparison

	Simplivity	Maxta	vMWare VSAN	vMWare RAIL	Nutanix	Nexenta	StorMagic	Scale IO EMC	Atlantis USX
Required # Nodes	2	3	3	3	3	2	2	3 (Best practice for more nodes)	3 and subsequent 3 or 4 at a time
Block or File/Object	Filesytem	Block	Filesystem/Object	File/Object	Filesystem	Block	Block	Block	Block
Max # Nodes	12	64	16	16	No documented max	2 with JBOD storage req for HA	2 in a mirrored pair	1024	4
Appliance or SW Only	Appliance	Software	Software	Appliance	Appliance	Software	Software	Software	Software
Target Application/Market	Enterprise Apps, ROBO, HA/DR	Enterprise Apps, ROBO, VDI, TestDev	VDI, ROBO, Virtual Clouds	VDI, , ROBO, Virtual Clouds	VDI, trying to do enterprise apps	Enterprise Block and file, openstack	ROBO	Enterprise Apps	VDI
Site to site replication	Y	Y	N	N	Y	N	N	--	N
Compression	Y	Y	N	N	Y	Y	N	Y	N
Deduplication	Y	Y	N	N	Y	Y	N	Y	Y
Compute only node support	Y	Y	Y	N	N	Y	Y	Y	Y
Special Features	Excellent Performance with IO Accelerator, Backup recovery inline compression forever	Works with any HW and drive types	Embedded in Hypervisor, easy install/configuration	Embedded in Hypervisor, easy install/configuration	Appliance fast OOB	Based on open source ZFS, does not work with VIC	Easy install, inexpensive excellent ROBO solution	Detailed dashboard of storage data. GUI undesirable most functions must be done in CLI	Works with any storage including RAM

Software Defined Storage Benefits

- Most solutions offer quick deployment and cluster setup
- Simple to scale clusters
- Easy for VM administrators to use – no prerequisite SAN expertise needed
- Dashboards and built-in analytics are comprehensive and easy to understand
- Built in VM storage utilisation visibility and control
- Most offerings have all required advanced storage services
  - Dedupe, compression, backup, replication, VAAI clone, optimised snapshots

Software Defined Storage Considerations

- Emerging market space does not have the maturity yet for confidence in deploying enterprise applications
- Independent compute and storage scaling, many solutions require purchase of compute, storage and more software as an appliance
- Mixed workloads with larger active VMs results in dramatic drops in performance levels
- In order to make up for performance drops more appliance nodes are added to the cluster
- Traditional SAN arrays offer much higher performance levels and are changing as well
- As cluster grows the TCO and acquisition cost surpass most converged infrastructure offerings

Cisco Based Solutions

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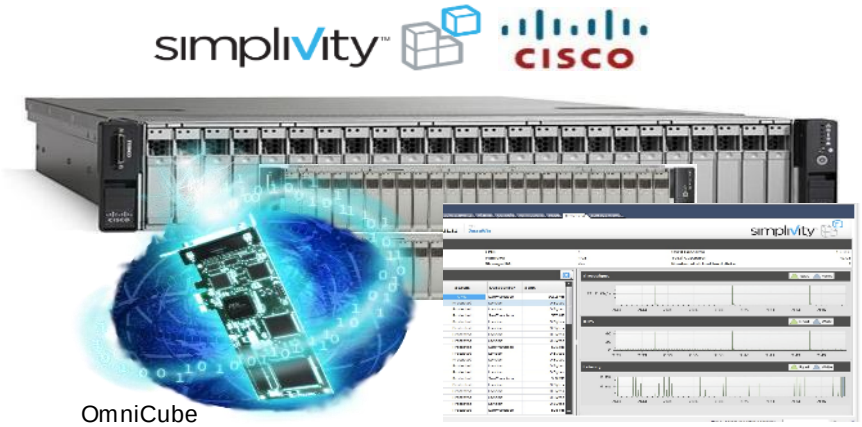
OmniStack Integrated Solution with Cisco UCS Product Differentiation

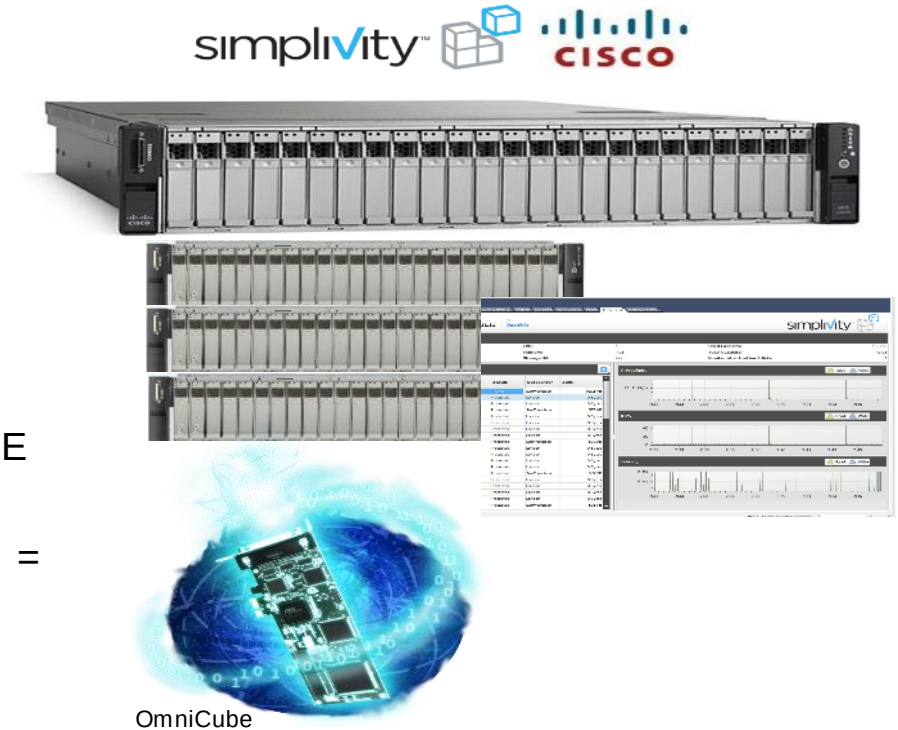
- Highly Available VM Infrastructure
- Scale Out Architecture in 2U modular increments
- Data Virtualisation Platform, powered by the OmniStack Accelerator Card: Dedupe, Compress, Optimise, At Ingest, Inline, In Real-Time, Once and Forever: Primary, Backup, Archive, WAN, Cloud
- VM-Centricity & Mobility: 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™

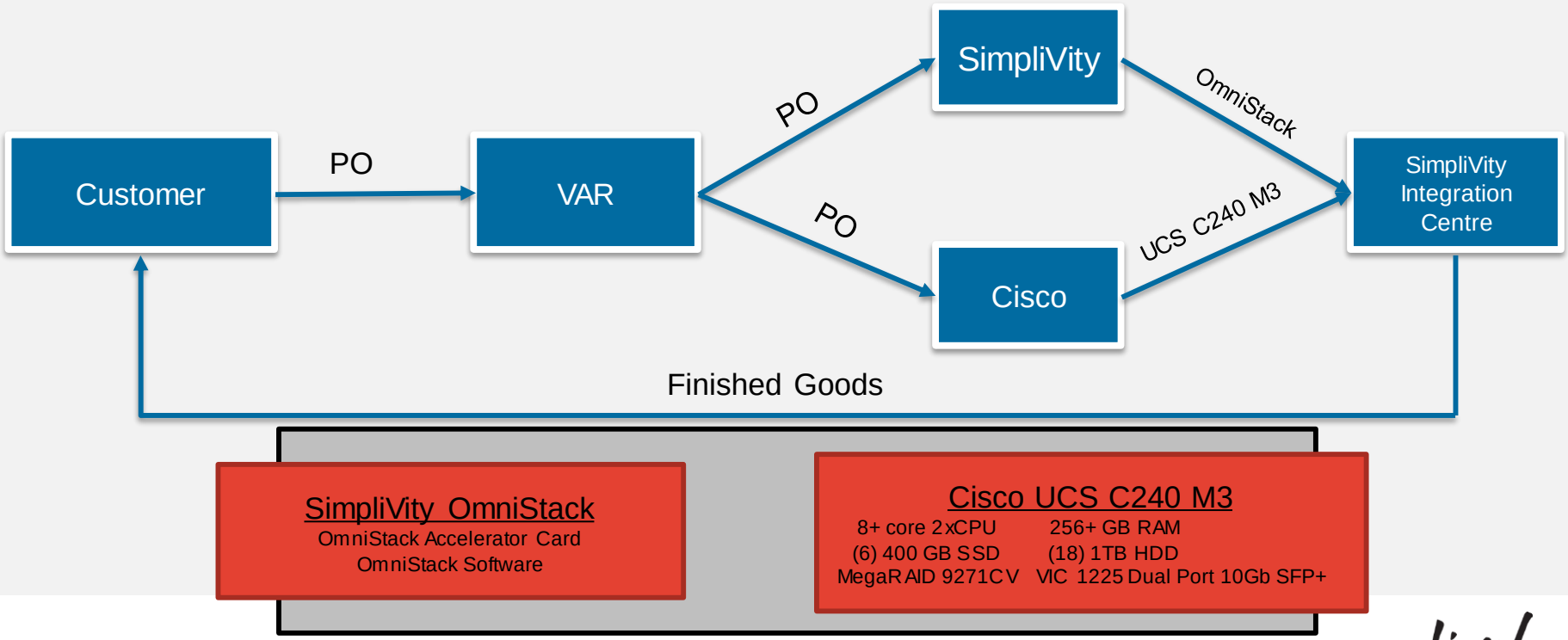
OmniStack Integrated Solution with Cisco UCS Technical Details

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



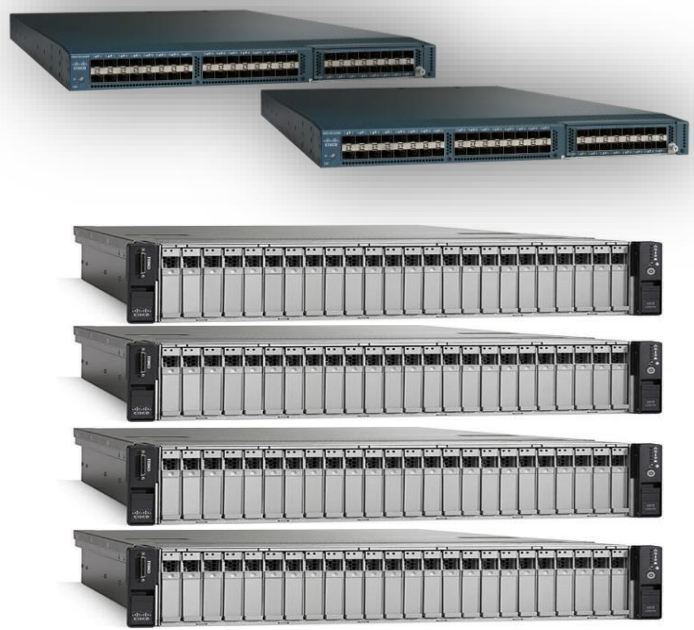
OmniCube Accelerator™

Cisco Order Flow

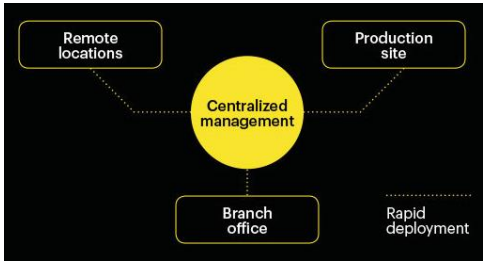


Cisco VMware VSAN Ready Node Solutions

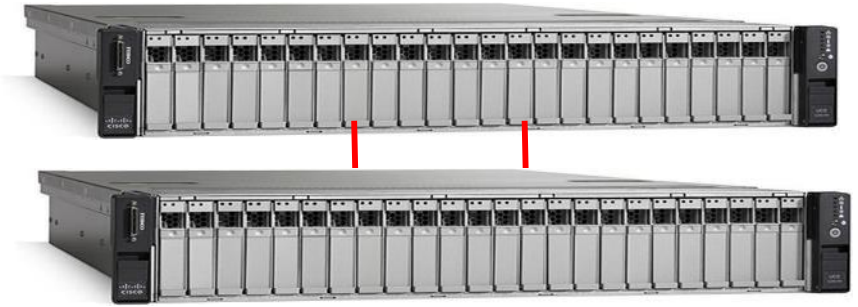
- Cisco Validated server configurations remove the guesswork and risk
- Simple ordering with a single SKU
- Cisco UCS offers (4) VSAN Ready Nodes based on the C240 M3
  - Med and High general workloads
  - VDI linked clone and full clone
  - Bundle pricing with Fabric Interconnect
- Cisco UCS Programmatic capabilities and Operational Benefits
  - Unified Management (UCSM and UCS Director)
  - Unified Fabric



StorMagic Overview



- Storage software solution for the distributed environment
- Supports VMware and Hyper-V
- Requires minimal server resources to provide highly available shared storage
  - Only requires 2 nodes
- Mirror replication between nodes
  - Can be direct connect for simplicity



ISV Reference Architecture Guides

- UCS and VMware VSAN
  - http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/desktop-virtualization-solutions-vmware-horizon-view/whitepaper_C11-732332.html
- UCS and Simplivity
  - http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/unified-computing/whitepaper_c11-733376.pdf
  - http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/unified-computing/whitepaper_c11-733463.html
- UCS and StorMagic
  - https://s3.amazonaws.com/cisco-partnerpedia-production/product_files/78929/original/SvSAN%20%20%20Cisco%20C-Series%20Solution%20Brief.pdf?AWSAccessKeyId=AKIAIXDZHQFL74PEDBPA&Expires=1425080874&Signature=MZaAPtcHgnSFvQSp0s%2BaXqB6Zsw%3D
- UCS and Maxta
  - http://go.maxta.com/hyperconvergence-MaxDeploy-CiscoUCS
- UCS and EMC ScaleIO
  - http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/solutions-vspex/whitepaper-c11-733544.html

UCS Rack Server Innovation

Unified Management

- Only vendor to manage blades and rack servers consistently
- Wire once rack server management reduces cost

Or

- Scale rack and blade servers with Unified Fabric and UCS Manager
- Form-factor agnostic, policy-driven compute with service profiles

Programmatic Configuration

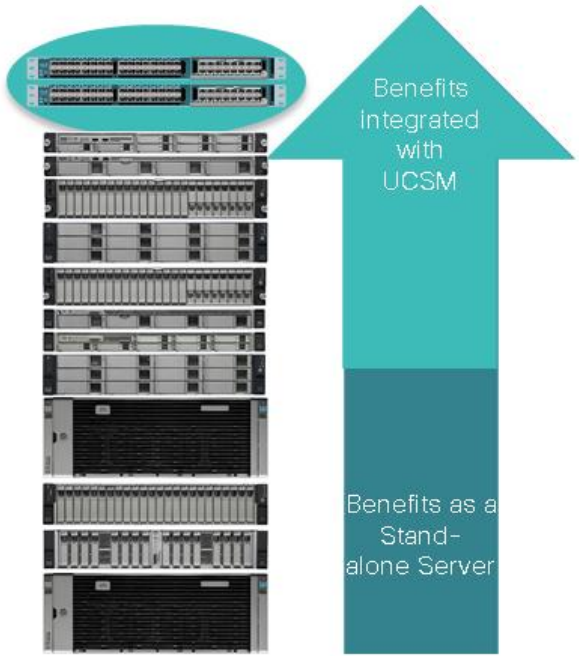
- API management through Standalone Cisco IMC and UCSM
- Advanced Cisco IMC features; no additional fees or licensing required

Virtual Interface Cards (VIC 1225, VIC 1285, VIC 1385)

- Speed: Delivering 80Gbps to the server
- Reliability: Hardware based NIC Teaming with Fabric Failover
- Consolidation: Dynamic configuration of virtual interfaces and VM FEX

World Class Performance

- Over 94 World Record benchmarks, over 40 on UCS C-Series rack servers



Cisco Integrated Management Controller (CIMC)

Feature-Rich Management at No Cost

Cisco Features & Capabilities

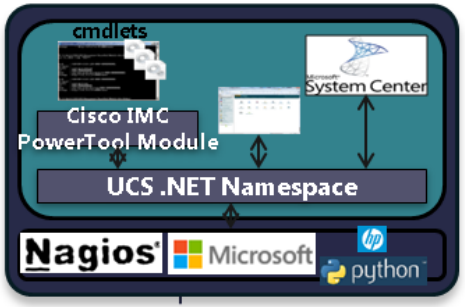
- Precision Boot order control - CLI, Web UI, XML API
- Cisco IMC IPv6 Support
- Dynamic DNS
- Secure CIMC Support (Signed Update Checking)
- BIOS Signing (Signed Update Checking)

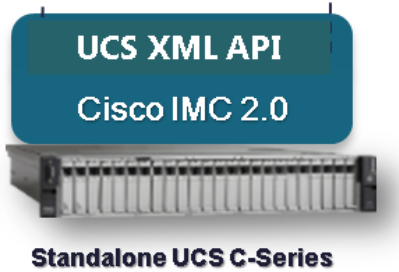
Powerful API for Customisation & Control

- ISV & 3rd party Integration: MSFT SCOM/SCCM, HP OM, Nagios, PowerTool/Python/Perl SDK

Enhanced Cisco Capabilities

- KVM Enhancements (Power Controls, Last Boot Capture, Digital Video Recorder Capability, Chat Capability)
- Local storage management using XML API
- Advanced RAID Configuration Options
- SNMP Phase4 (+storage changes)
- Syslog Enhancements
- DIMM Blacklisting: Phase2
- Fault Engine History
- Import/Export Enhancements





Standalone UCS C-Series

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Why Approved Vendors/Suppliers Matters To You

- **Reject Lots** - Cisco rejects end up being purchased by brokers and sold through back channels to other vendors to sell them for less
- These parts did not meet certain Cisco specifications and were rejected for a reason – They didn't make the cut and you don't want them in your whitebox servers running in production
- **Component drift** – vendors looking for the cheapest parts will switch components continuously to maintain the lowest possible cost. Result - systems purchased rarely look the same, and failures become virtually impossible to track and RCA
- **Subcomponent "Last Buys"** – customers can be affected as components go end of life and are replaced with parts that may affect not just performance but fundamental behaviour – Who will coordinate with customers?
- Cisco ran ODM servers internally and via acquisitions for many years, including both whitebox and "tier 1" vendors for years before converting to Cisco UCS. Quality and failure rates are well tracked and have been improved measurably since converting to UCS


Q & A
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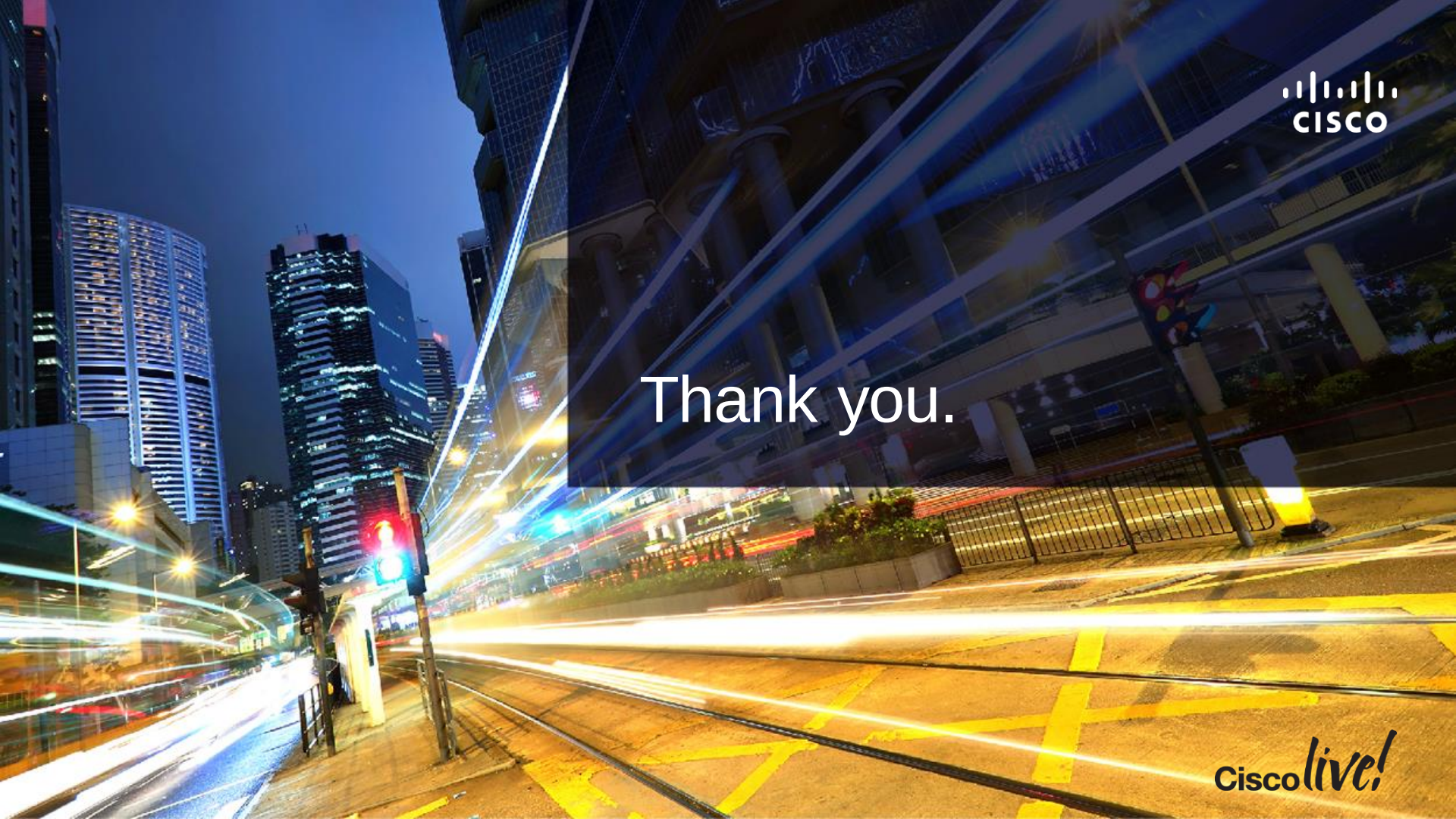
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