Cisco UCS, HP and IBM - A Blade Architecture Comparison

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Data Center and Virtualization
Unified Computing System

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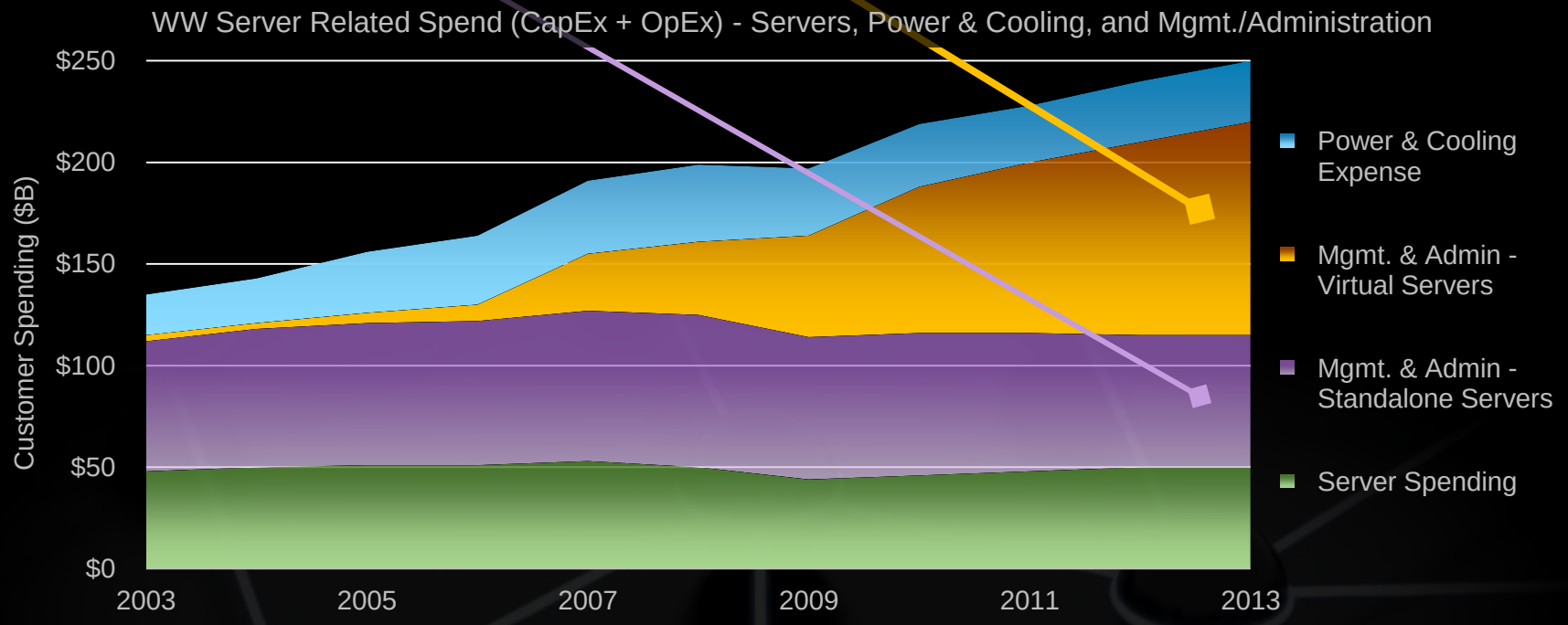
Cisco UCS

The Cisco Unified Computing System Difference

Data Center Economics

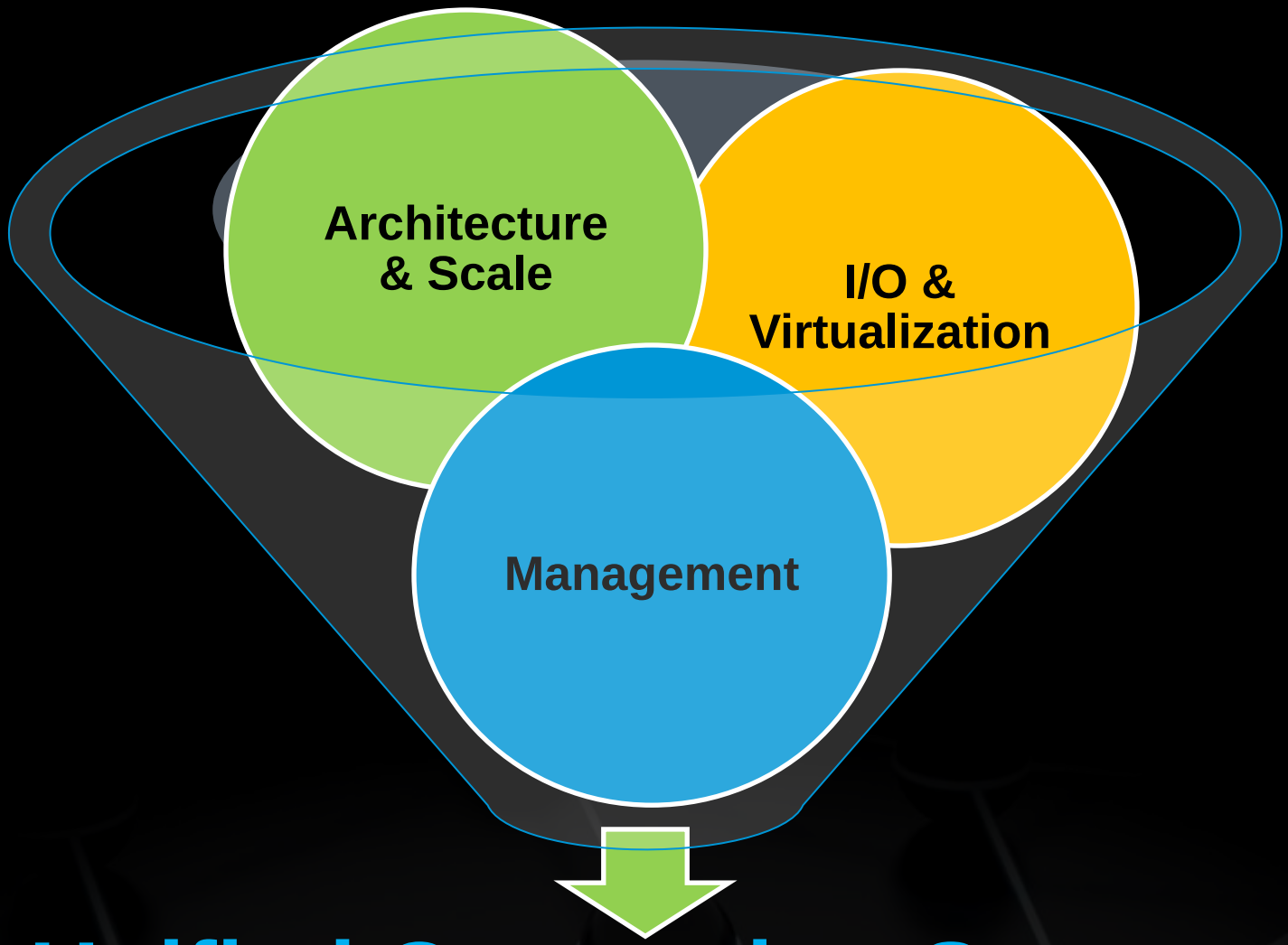
Management is the Key Server TCO driver

Billions of Dollars – WW **Server Management Spend**			Total Server Related Spend
Year	Physical Servers	Virtual Servers	
2003	$ 64	$ 3	$ 135
2007	$74	$ 28	$ 191
2013	**$50** **- $24 - 32%**	**$105** **+ $ 77 275%**	**$250** **+ $ 58 31%**



Source: IDC, "New Economic Model for the Datacenter"

Controlling Data Center Cost



Unified Computing System

Cisco UCS Vs. “New” Legacy

Architecture and Scale

Cisco UCS Architecture

Unified Compute

- Stateless Computing, abstracted identity
- Portable Identities - form factor agnostic, blade to rack server identity transfer
- Physical & virtual functionally combined

Legacy Designs

Scattered, De-centralized Compute

- No truly functional identity abstraction
- Blade and rack servers segregated, no identity portability between form factors
- Physical & virtual identities independent

Cisco UCS Vs. “New” Legacy

I/O and Virtualization

Cisco UCS Architecture

Unified Fabric

- Single port - LAN, SAN, Mgmt path
- Physical & virtual port end to end visibility and control with a single tool
- Physical & virtual management combined

Legacy Designs

Siloed and Complex

- Multiple I/O protocols & stranded capacity
- High port consumption, no design leverage
- Limited & separate physical & virtual port visibility, minimal control, multiple tools.

Cisco UCS Vs. “New” Legacy

Management

Cisco UCS Architecture

Unified Management

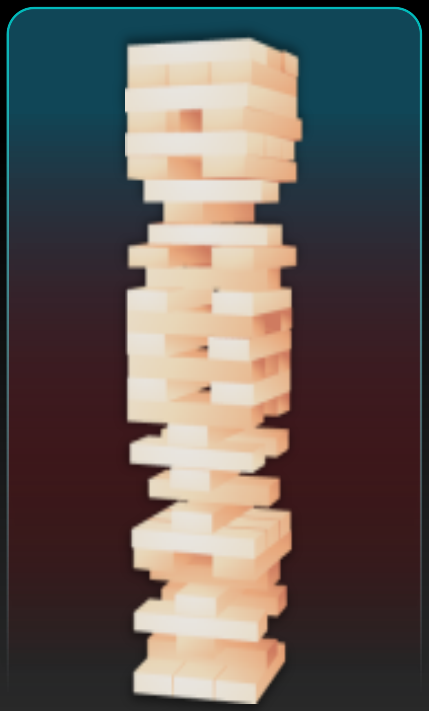
- Highly collaborative roles based control
- Single mgmt tool, single interface
- Physical & virtual management combined
- Reduced complexity - mgmt interface leveraged across multiple servers and domains

Legacy Designs

Complex Mgmt Structure

- Every administrator has multiple tools with no automated collaboration
- Multiple mgmt tools, multiple interfaces
- Duplicative mgmt points and access
- Complicated and inefficient with no scale

Legacy Infrastructure and Management



Legacy Infrastructure Designs

- Infrastructures designed separately – not as a unified system
- Marketed as "*converged*", but really management layers on top of multiple infrastructure silos
- Sprawling patchwork of tools, agents and management points

Complexity Drives Up Management Costs

- Rigid models to upgrade and maintain system-level designs
- Multiple tools means multiple points of configuration
- Brittle design with complex inter-dependencies

Eliminating Silos – Fabric Centric Architecture – Single Point of Mgmt

Cisco UCS
UNIFIED by DESIGN

The Cisco UCS Difference

Cisco's Unified Data Center strategy unifies physical and virtual infrastructures across data centers.

Delivered more economically without compromising functionality, performance, scalability, operational efficiency or security.

Stateless Computing

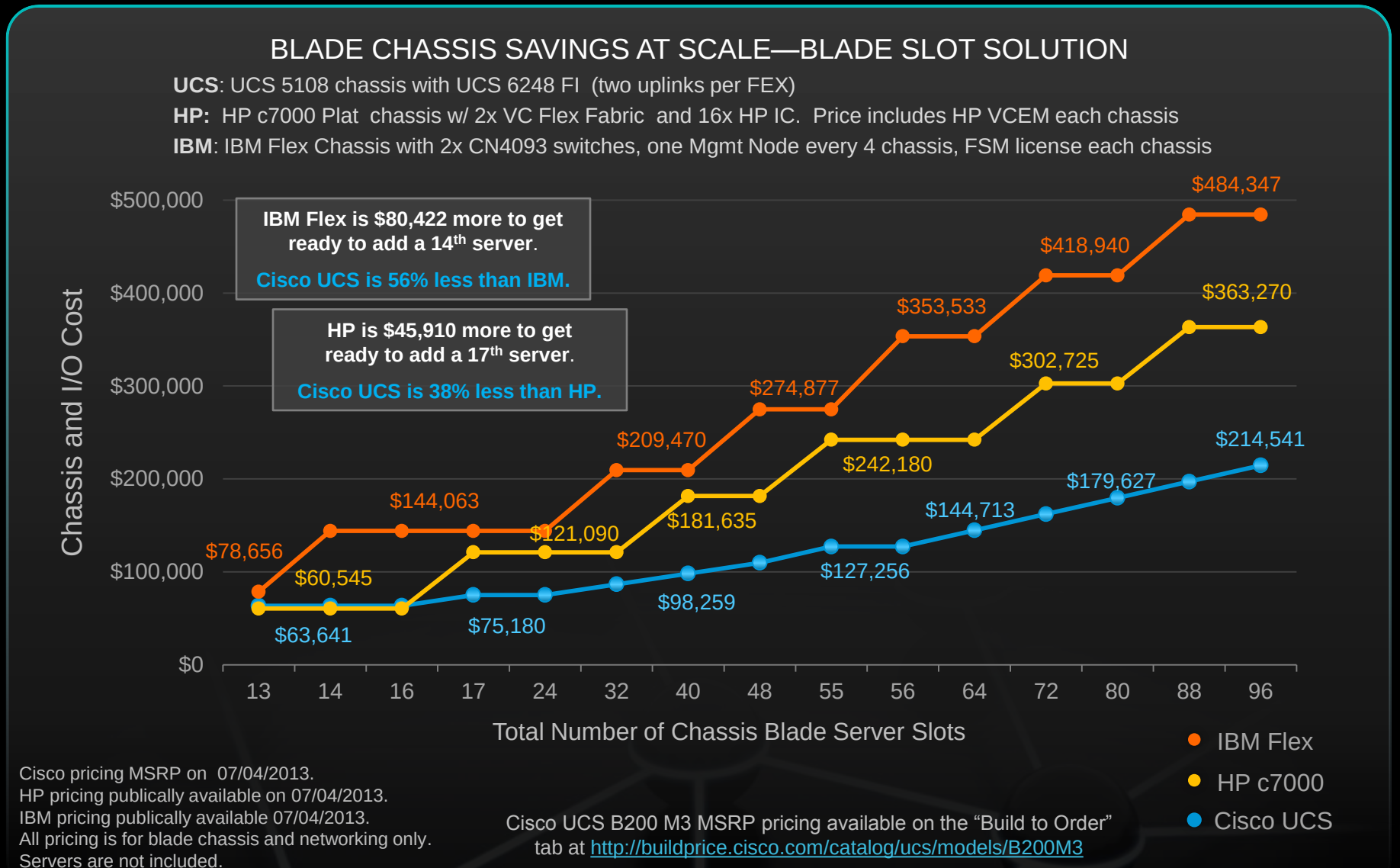
- Identity = Server Settings and Policies, 127+ parameters & policies
- Abstracted Identity = Model-based, GUI driven
  - Service Profiles Portability
  - Portability between blade AND rack servers

Unified Management – Architecture is Key

- Centralized Architecture, not de-centralized legacy design
  - Easy Scaling - Self Aware, Self Integrating, Automated
- Form factor agnostic = rack and blade together
- Reduced Complexity and Roles Based Access
  - Servers, LAN, SAN, Management – one tool, one interface.

UCS = Better, Easier, Simpler Architecture

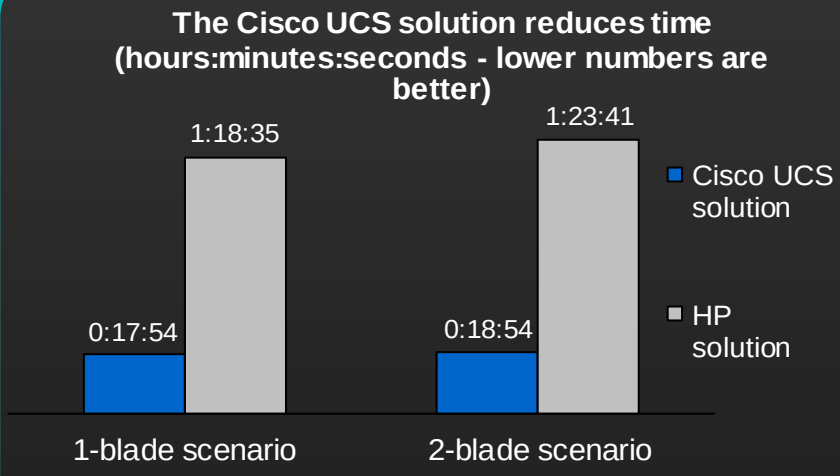
No Infrastructure Penalty to Scale

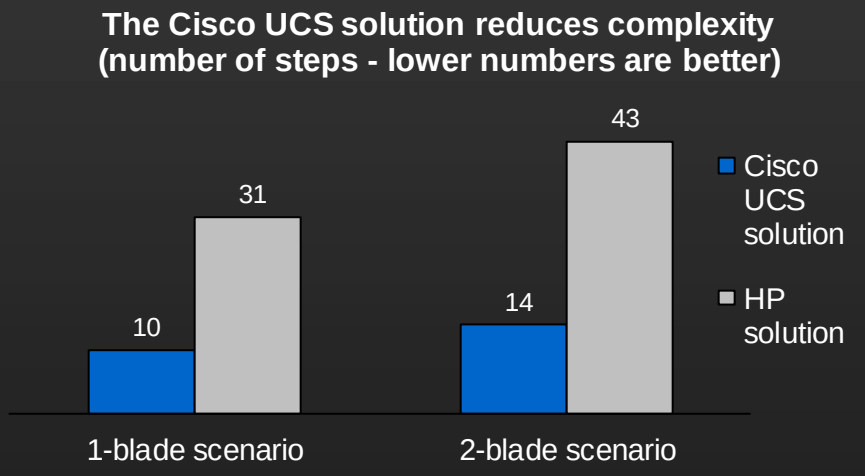


Cisco pricing MSRP on 07/04/2013.
HP pricing publically available on 07/04/2013.
IBM pricing publically available 07/04/2013.
All pricing is for blade chassis and networking only.
Servers are not included.

Cisco UCS B200 M3 MSRP pricing available on the "Build to Order" tab at http://buildprice.cisco.com/catalog/ucs/models/B200M3

Faster, More Flexible
UCS Automated Deployment





Read the White Paper

Watch the Video

Cisco UCS - Model-based management speeds deployment
Fewer touch points reduces errors

http://www.cisco.com/en/US/prod/ps10265/ucs_white_paper.html

http://www.youtube.com/watch?v=bSSQfNt7SFk

Blade Architecture and Scaling

Blade Architecture and Scaling

UCS - Simpler Design, Scale without Complexity

HP	UCS	IBM
Architecture Complex at Scale	User Customizable Architecture. Simple to scale at blade, chassis and I/O level.	Architecture Complex at Scale
Growing Capacity Requires Infrastructure Change	Constant Infrastructure With Growth	Growing Capacity Requires Infrastructure Change
Scale Requires Large Increments, 16 blades / 10 RU, Larger Embedded Cost, More Management Overhead.	Scale In Smaller Increments, 8 blades / 6 RU, Lower Cost, Leveraged Architecture.	Scale Requires Large Increments, 14 blades / 10 RU, Larger Embedded Cost, Increasing Mgmt Overhead
High Top of Rack switch port consumption with increasing scale.	Scaling is a plug and play operation	High Top of Rack switch port consumption with increasing scale.

HP c7000 Platinum Blade Chassis

For UCS Manager parity, you need HP Virtual Connect (VC) Enterprise Manager (VCEM) + HP Insight Control, at the minimum.

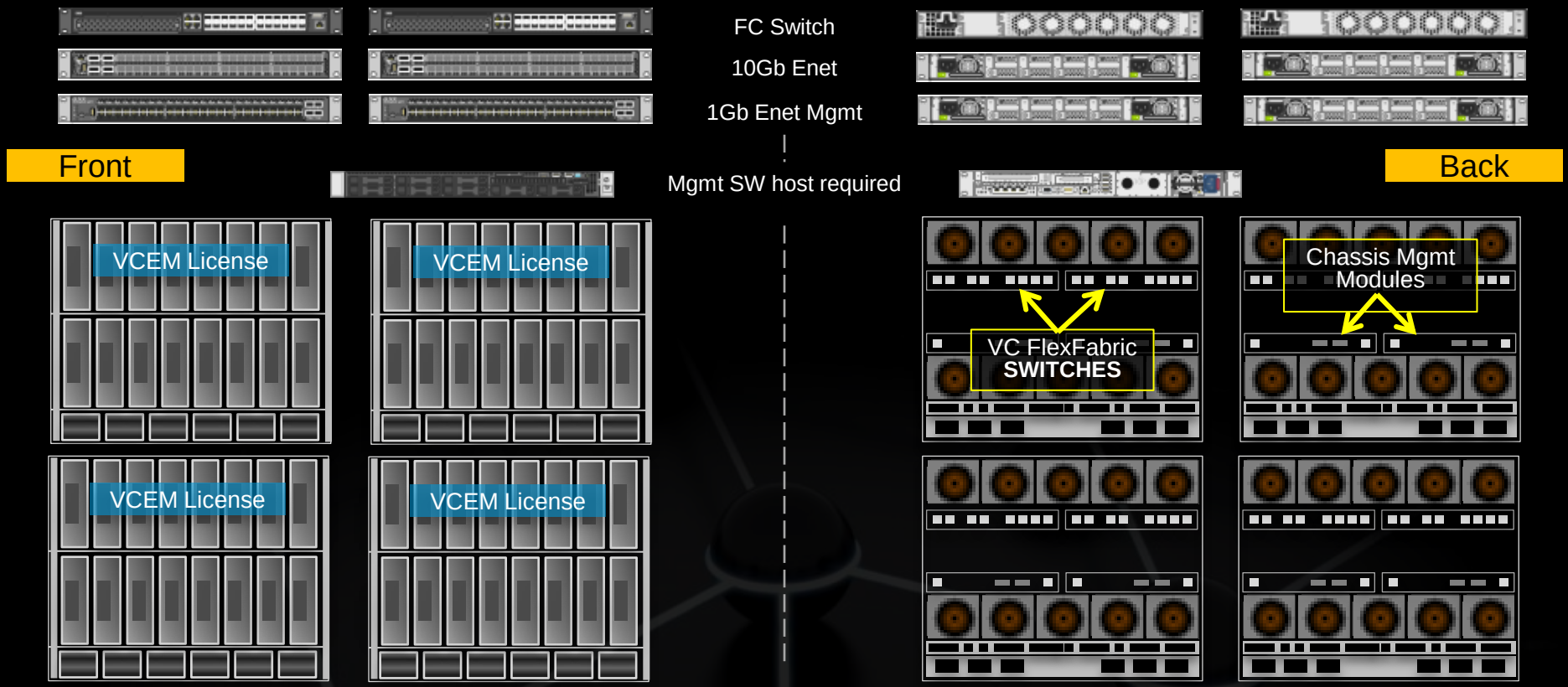
- Mgmt SW host – Required for SIM & VCEM.
- VCEM required on each chassis to move blade identities (server profiles).
- 10 RU chassis. 4 Chassis = 72 slots.

Each Chassis has:

- 2 FlexFabric switches per chassis
- 2 x Mgmt Modules per chassis.
- = 4 mgmt points.

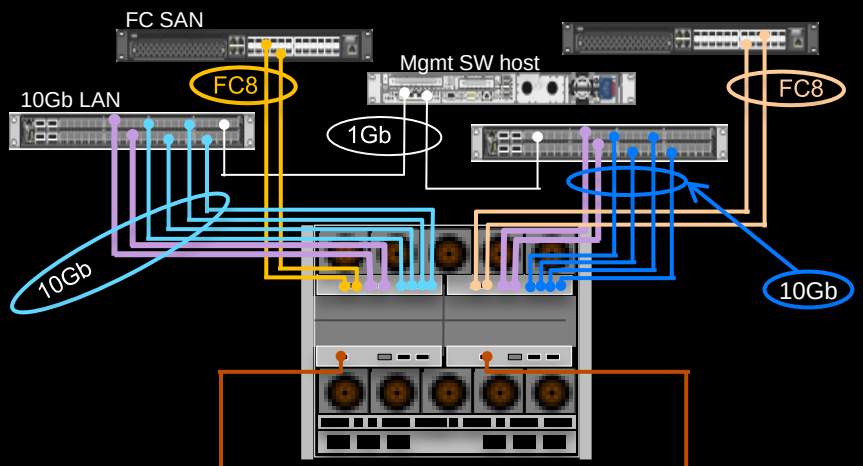
4 Mgmt Ports in EVERY chassis – minimum.

ToR switches are needed to connect multiple chassis.
Switches are redundant



HP c7000 Platinum Chassis

7.5 Gbps Enet / blade (+ 2 Gbps FC / blade)



Chassis Cable Count

12 - 10Gb Enet
4 - FC8
2 - chassis mgmt
18 cables / chassis
16 blades / chassis

5 Gbps of Enet only / blade
2 Gbps FC only / blade
7 Gbps Total I/O per blade leaving chassis

****

You can add 2 more 10 Gb Enet connections per switch, 40 Gbps per chassis

80 (original Enet capacity)
+ 40 (new 2 x 10 Gb per switch "———")
120 Gbps Enet leaving chassis
÷ 16 blades in each chassis
7.5 Gbps / blade

The single pair of FlexFabric switches are maxed out.

If you need I/O, more uplinks, there is only one option:

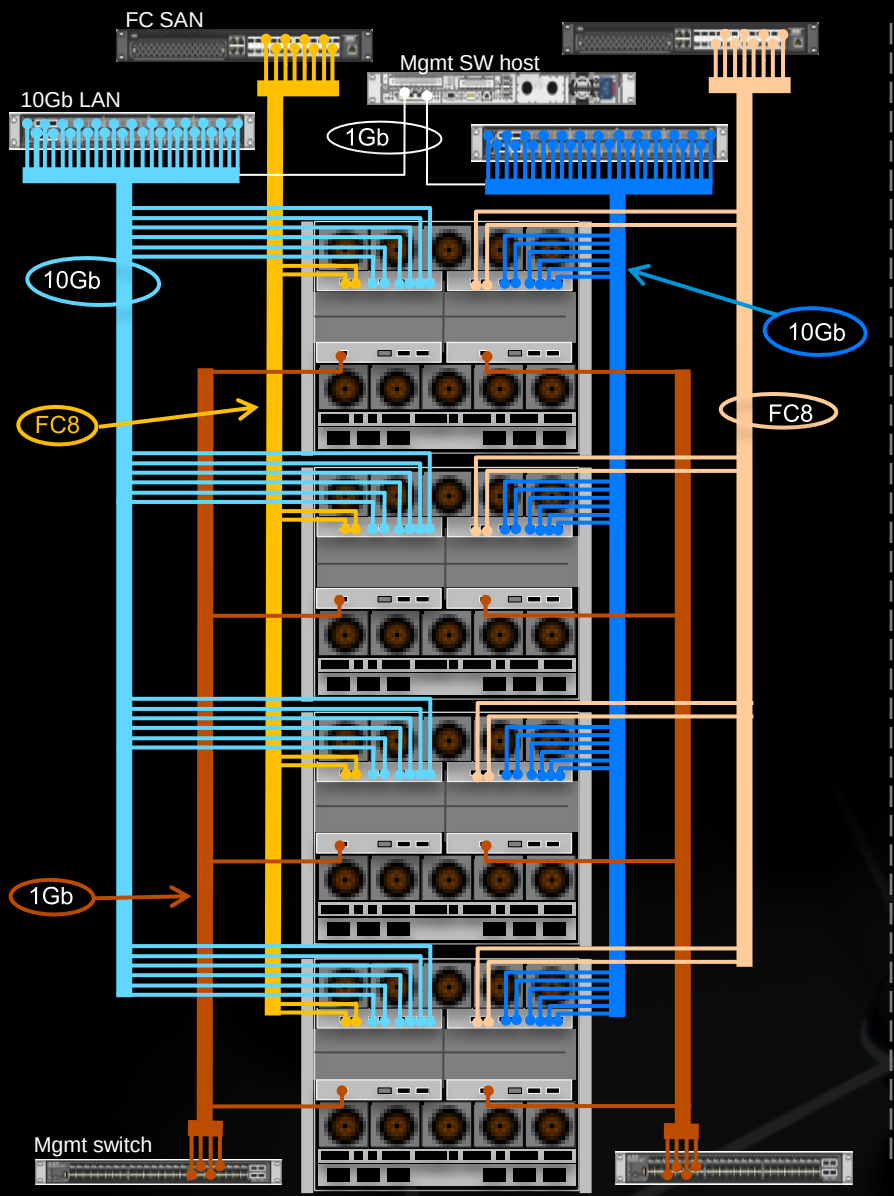
- Buy another pair of switches – retail at $18,499 each = $36,998.
- This option requires more mezz cards as well: $849 x 16 blades = $13,584;
- $50,582 TOTAL to add more uplink I/O, per chassis.

1/10Gb FC Mgmt

HP pricing publically available on 07/04/2013.

HP c7000 Platinum Chassis

7.5 Gbps Enet / blade (+ 2 Gbps FC / blade)



4 chassis – 64 blades

- 2 Gbps of FC / blade – dedicated, inflexible
- 7.5 Gbps of Enet / blade– dedicated, inflexible

****

Even more cables for each chassis:
2 x mgmt cables
4 x FC8 cables
12 x 10Gb Enet cables
18 Cables for each chassis : 16 blades

4 chassis
72 cables
72 ToR switch ports – 48 of them 10Gb ports
$ $ $ $ $

The HP Virtual Connect FlexFabric switches are maxed out.

4 chassis – 64 blades
16 management points – 4 per chassis.
We aren't managing the blades yet.

1/10Gb FC Mgmt

IBM Flex System Blade Chassis

For UCS Manager parity, you need IBM Flex System Manager (FSM) at the minimum.

- FSM Mgmt Node – Required for every 4 chassis.
- FSM Mgmt Node – NOT REDUNDANT.
- FSM license required for every chassis.
- 10 RU chassis. 4 Chassis = 56 slots. Only 55 Compute

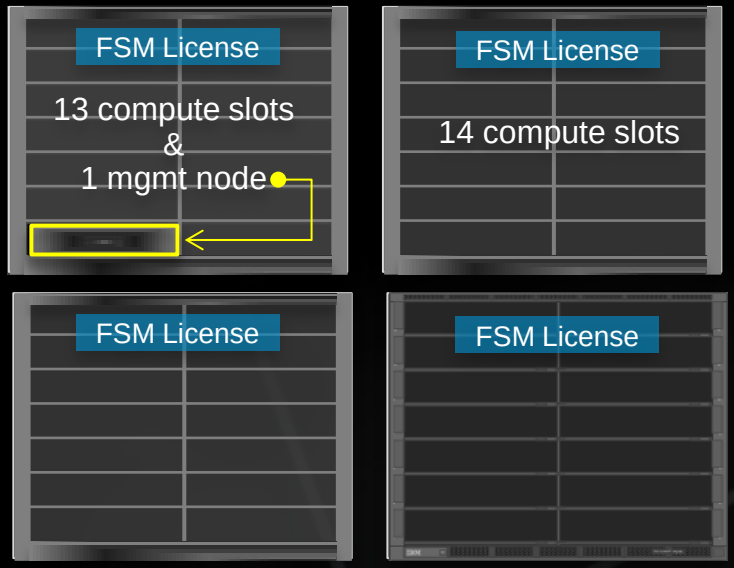
Each Chassis has:

- 2 CN4093 switches per chassis
- 2 x Mgmt Modules per chassis.
- = 4 mgmt points

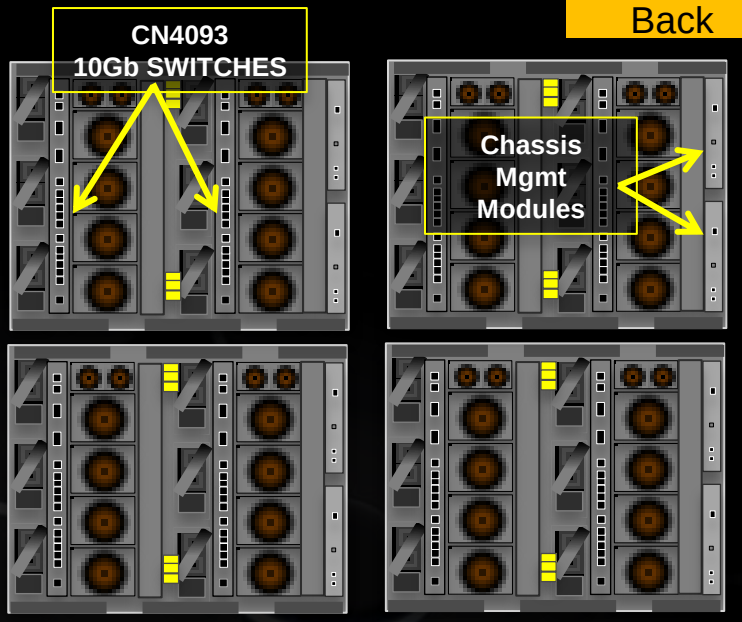
4 Mgmt Ports in EVERY chassis – minimum

Switches are needed to connect multiple chassis.
Switches are redundant

Front

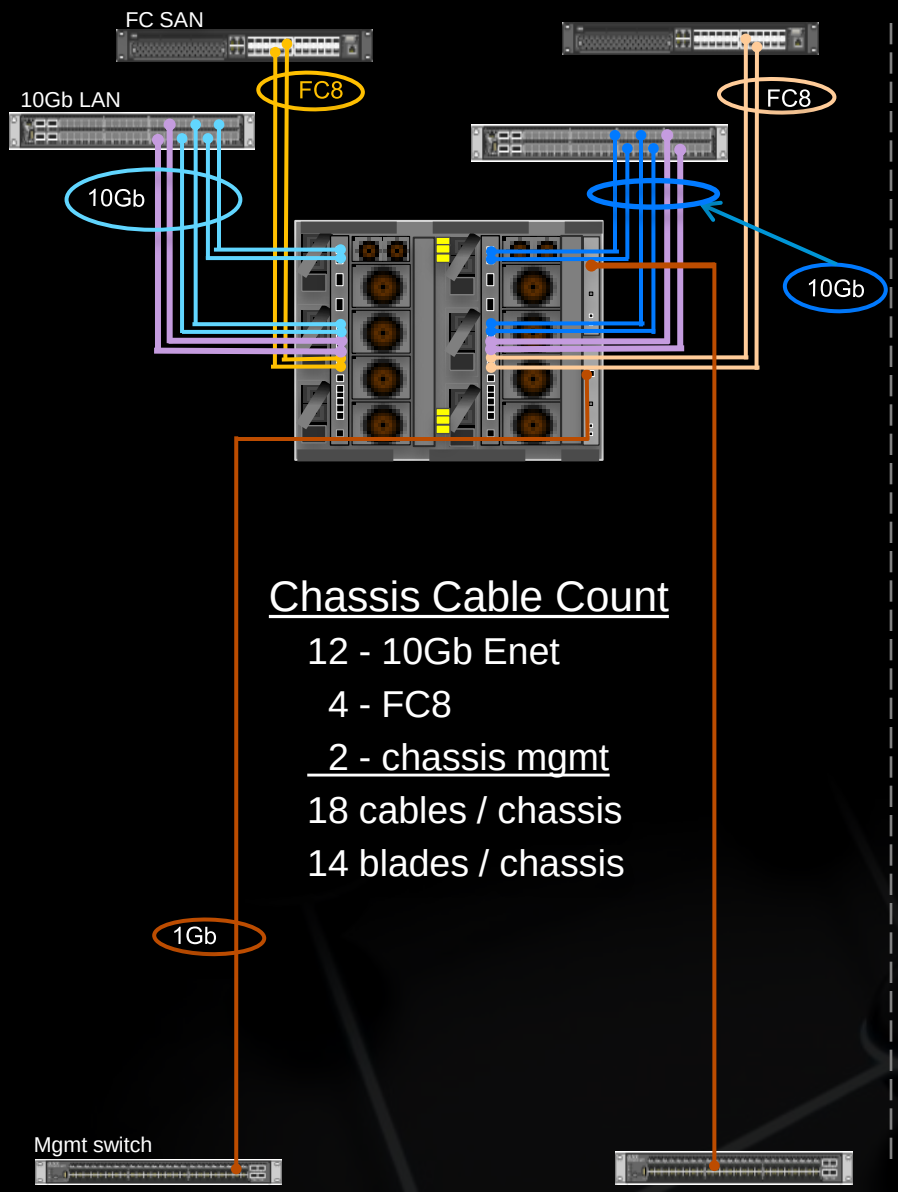


Back



IBM Flex System Chassis

8.6 Gbps Enet / blade (+ 2.3 Gbps FC / blade)



Chassis Cable Count

12 - 10Gb Enet
4 - FC8
2 - chassis mgmt
18 cables / chassis
14 blades / chassis

5.7 Gbps of Enet only / blade
2.3 Gbps FC only / blade
8 Gbps Total I/O per blade leaving chassis

You can add 2 more 10 Gb Enet connections per switch, 40 Gbps per chassis

80 (original Enet capacity)
+ 40 (new 2 x 10 Gb per switch "———")
120 Gbps Enet leaving chassis
÷ 14 blades in each chassis
8.6 Gbps / blade

The native ports on the CN4093 switches are maxed out.

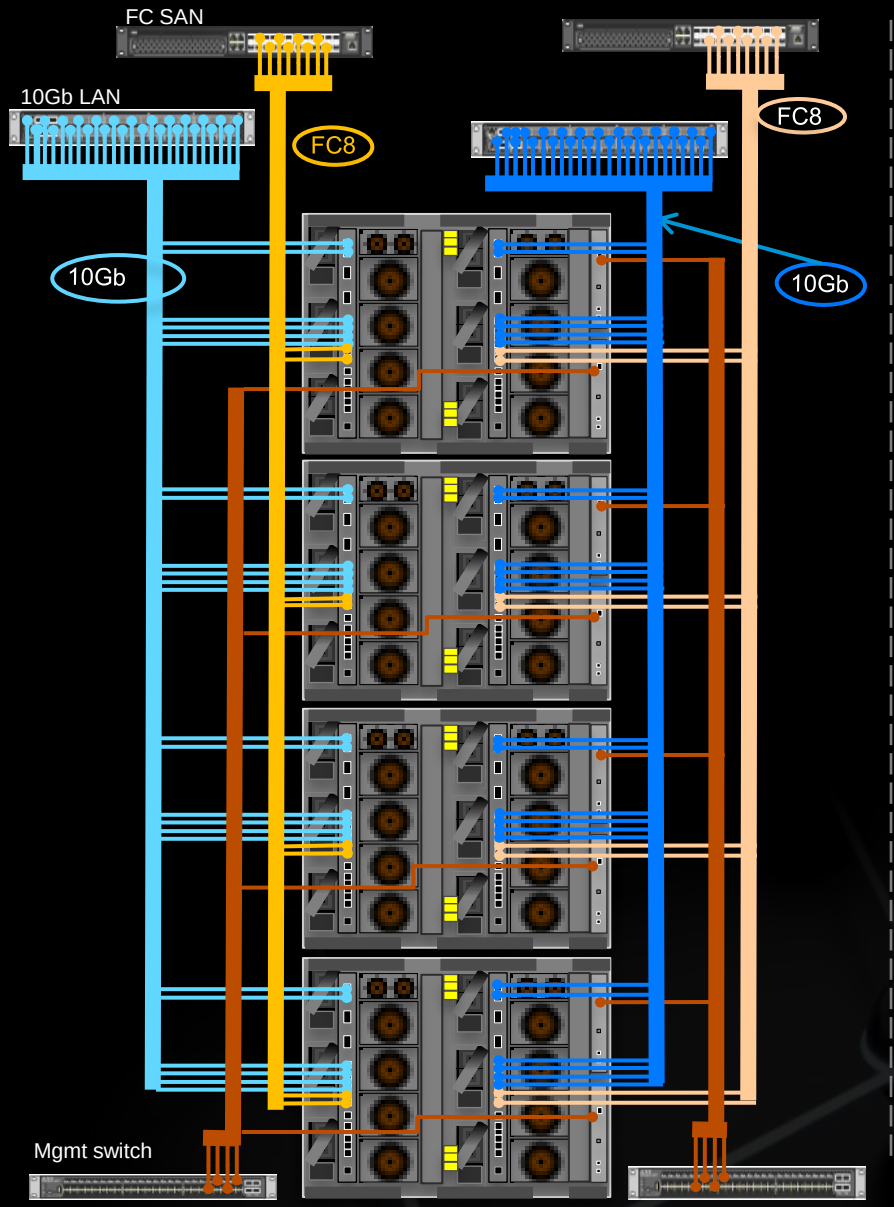
If you need I/O, more uplinks, there are two options:

1. Buy upgrades for both switches – retail at $10,999 each = $21,998
2. Buy another pair of switches – retail at $20,899 each = $41,798. This option requires more mezz cards as well - $1,868 x 14 blades = $26,152; TOTAL to add switches is $67,950

1/10Gb FC Mgmt

IBM Flex System Chassis

8.5 Gbps Enet / blade (+ 2.3 Gbps FC / blade)



4 chassis - 55 blades [13 + (3 x 14)], compute
(IBM Flex System Manager domain maximum)

- 2.3 Gbps of FC / blade
- 7.5 Gbps of Enet / blade

****

This is a lot of cables for 10.8 Gbps of I/O / blade

2 x mgmt cables
4 x FC8 cables
12 x 10Gb Enet cables
18 Cables for each chassis
1.28 cables per blade server

4 chassis

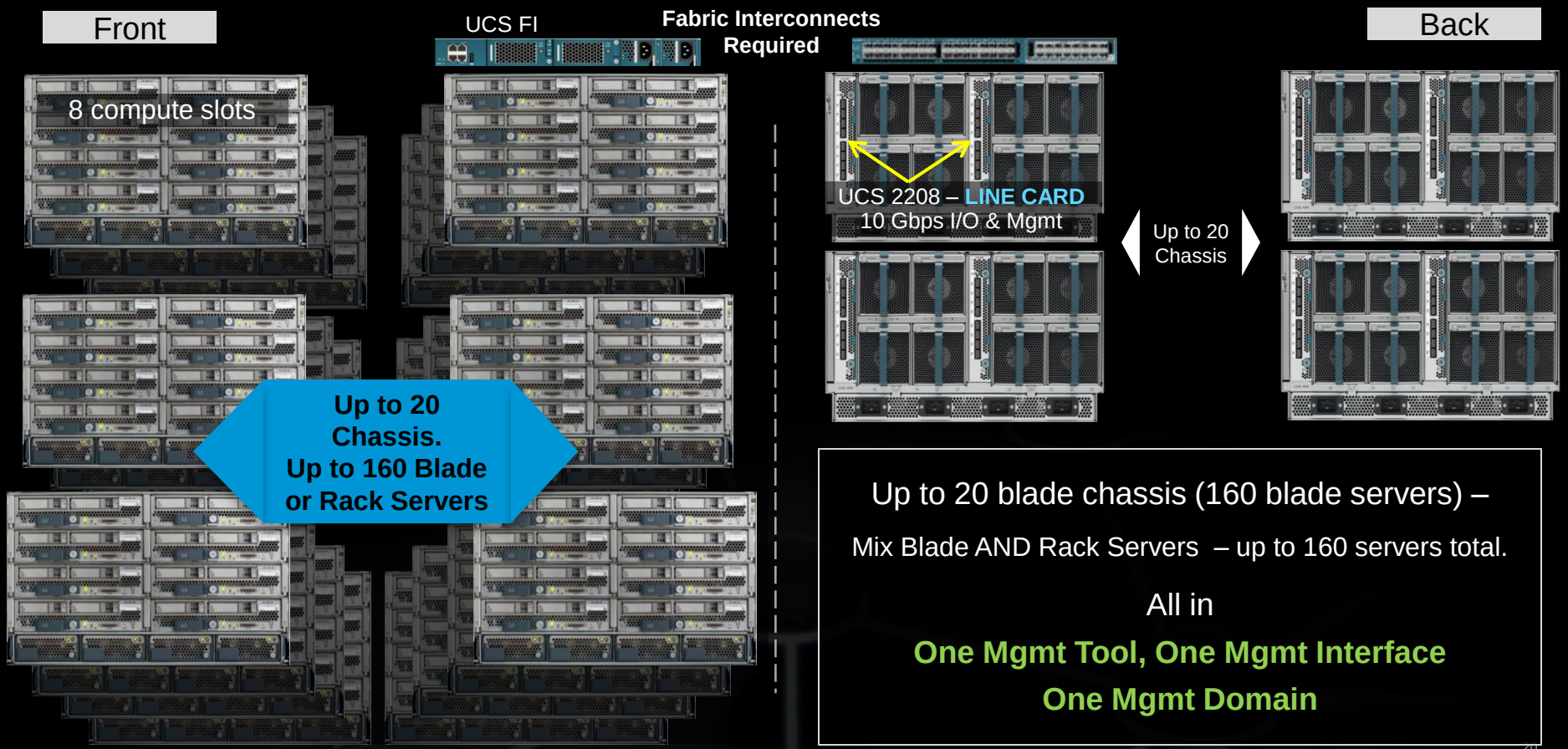
72 cables
72 ToR switch ports
8 management switch ports
$ $ $ $ $

1/10Gb FC Mgmt

Cisco UCS Blade Chassis

- No Extra Mgmt SW / Hardware needed.
- No “per chassis” licensing needed or required.
- UCS Management is FULLY REDUNDANT.
- 1 to 20 chassis or 160 RACK or BLADE servers.
- 2 x UCS Fabric Interconnects (FI) required.
  48 or 96 port models – 10 Gbps FCoE.
- All Mgmt SW (UCS Manager) is included in FIs.

- UCS Fabric Interconnects are Active / Active Cluster
  = 1 mgmt point for ALL chassis & rack servers.
- Each UCS 2208 has 8 x 10Gbps FCoE ports (management path included).
- UCS 2204 version has 4 ports each.
- UCS 2208 / 2204 are **Line Cards are NOT switches**. They are remote line cards for the Fabric Interconnects and are not a mgmt point.



Up to 20 blade chassis (160 blade servers) –

Mix Blade AND Rack Servers – up to 160 servers total.

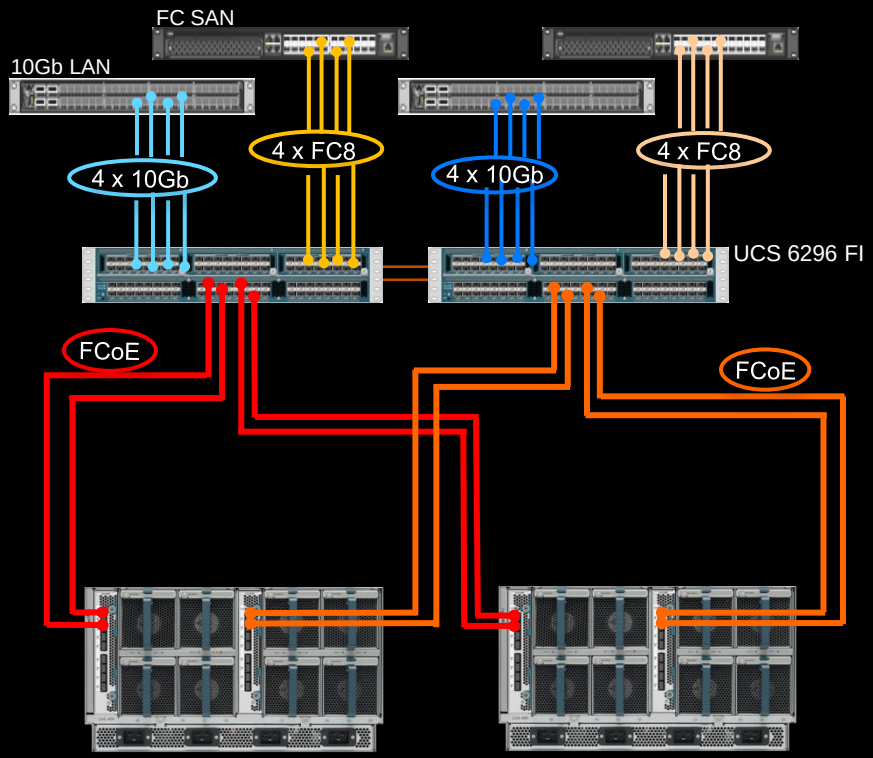
All in

One Mgmt Tool, One Mgmt Interface

One Mgmt Domain

Cisco UCS

Cisco UCS chassis (qty 2)
- All fans
- All power supplies
- 2 – UCS 2208 I/O modules per chassis
- 16 – B200 M3, 8 per chassis.



2 chassis – 16 blades

16 B200 M3 blades, 8 per chassis.
- mLOM UCS 1240 VIC – 4 x 10Gb FCoE ports

UCS 5108 chassis, each with 2 x 2208 I/O modules
Each 2208 has 8 x 10Gb FCoE ports = 80 Gb each

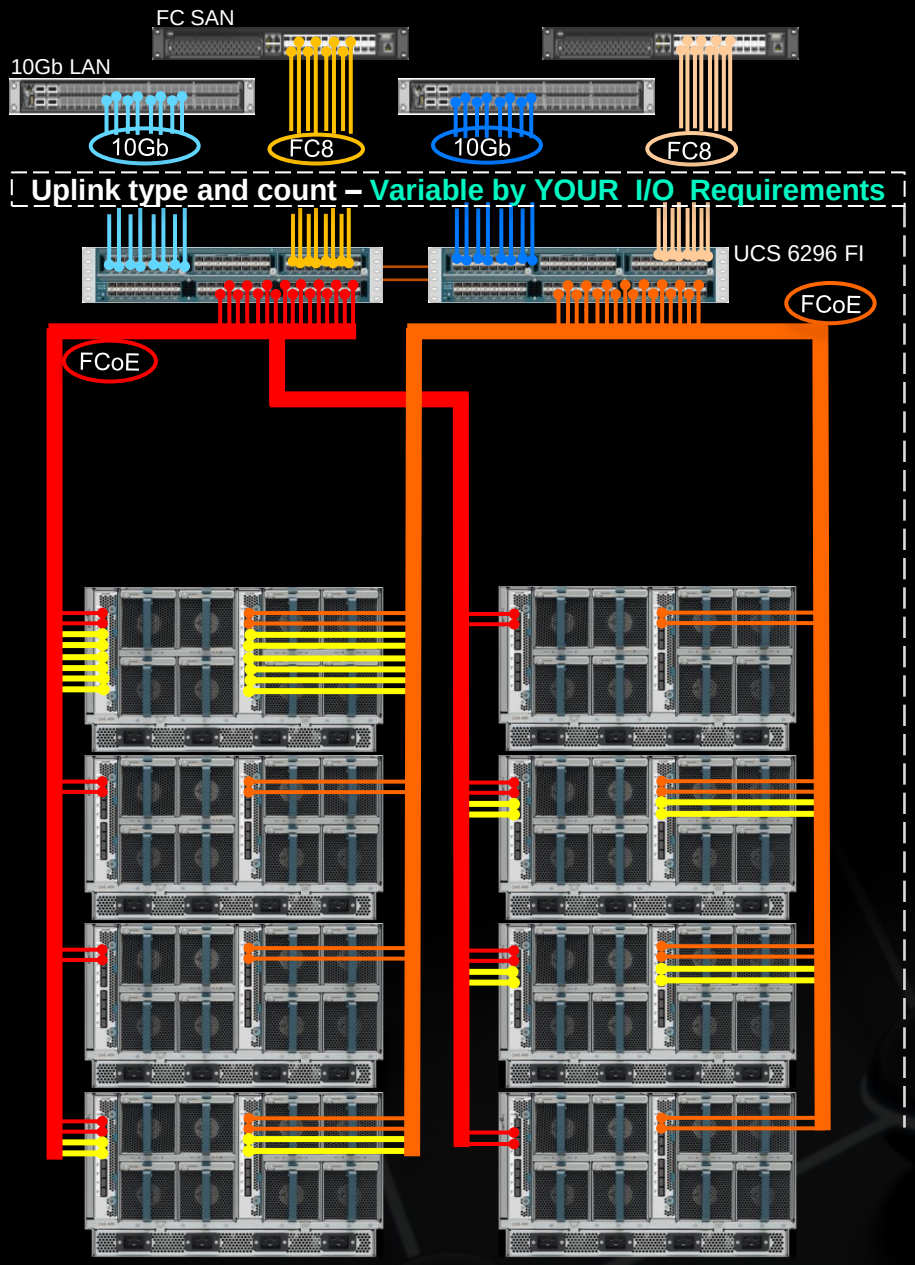
Illustrated here:
40 Gb (2 x 10 Gb ports per module)
÷ 8 blades
5 Gb / blade leaving chassis

2 x UCS 6296UP Fabric Interconnects (FI)
96 Universal Ports each for I/O
Universal ports for 10 Gb / FCoE / FC4/8
Use for Southbound (to chassis) or Northbound

Shown Here: 5 Gbps / blade, 8 blades per chassis
5 Gbps FCoE per blade leaving chassis
All I/O is available to all blades in the chassis
20 Gb minimum available from each blade
FC is prioritized
QoS is set per blade by admins to meet needs

1/10Gb, FCoE 1/10Gb FC

Cisco UCS



8 chassis - 64 Blades
Less than ½ of the UCS Manager Domain limit:

Some chassis / some blades, may need more I/O than others.

Add I/O from the chassis to the FI
= Add cables " ——— "

Get up to 80Gbps per blade – Your choice

Add more Northbound I/O from the FI
= Set the port characteristics, add cables

Uplink type and count –
Variable by YOUR I/O Requirements

Cisco UCS has:

- No requirement for blades to be identically configured.
- No need to add costly "intra-chassis" switches just to have or add more I/O on a few blades.
- No requirement for chassis to be identically configured.

1/10Gb, FCoE 1/10Gb FC

I/O and Virtualization

I/O and Virtualization

UCS - Unification Reduces Complexity

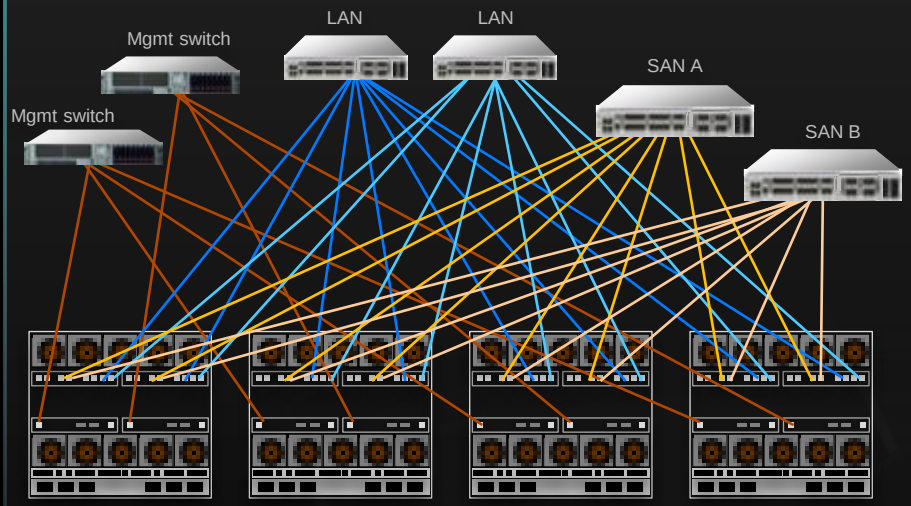
HP	UCS	IBM
Growing capacity increases complexity	Unification yields constant, leveraged infrastructure.	Growing capacity increases complexity
Limited visibility of virtual server I/O. Added software required.	Full Port to Port visibility for both physical and virtual servers. No added cost	Limited visibility of virtual server I/O. Added software required with additional cost.
Scale requires large hardware increments including high ToR switch port consumption.	Scale in smaller increments, leveraging existing infrastructure. Plug and Play to increase chassis and blade I/O.	Scale requires large hardware increments including high ToR switch port consumption.
Only partial I/O identity with deployment. Deploying servers very manual and time consuming.	UCS Automated Deployment / Provisioning includes I/O mapping, policies and security.	Only partial I/O identity with deployment. Deploying servers very manual and time consuming.

Simpler Architecture

HP doubling servers = doubling touches; UCS = 1 touch point

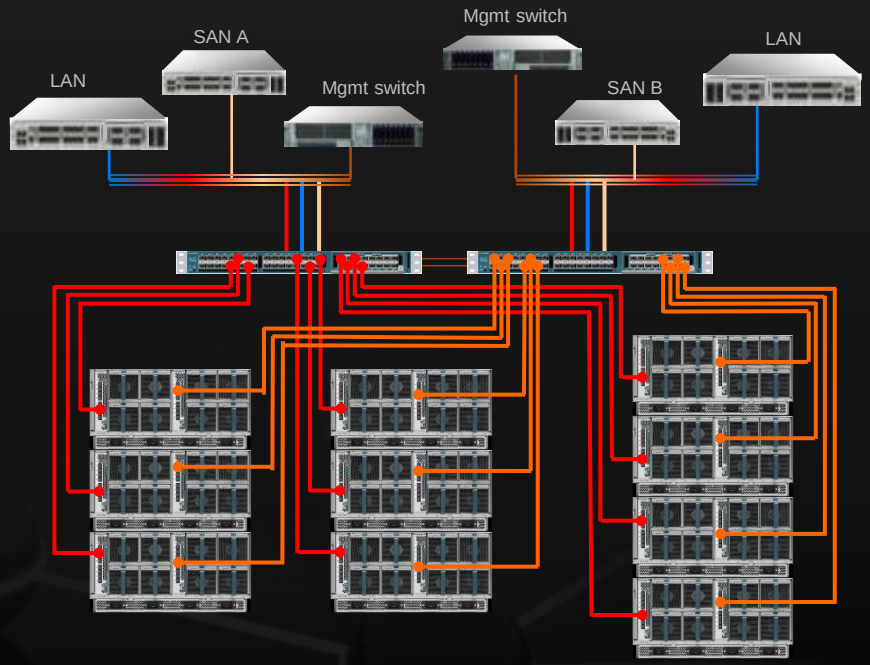
64 Blades – 4 x HP c7000

Fabric Interconnects	0
Intra Chassis Switches	8
Chassis Mgmt Module	8
Total Mgmt Points	**16**



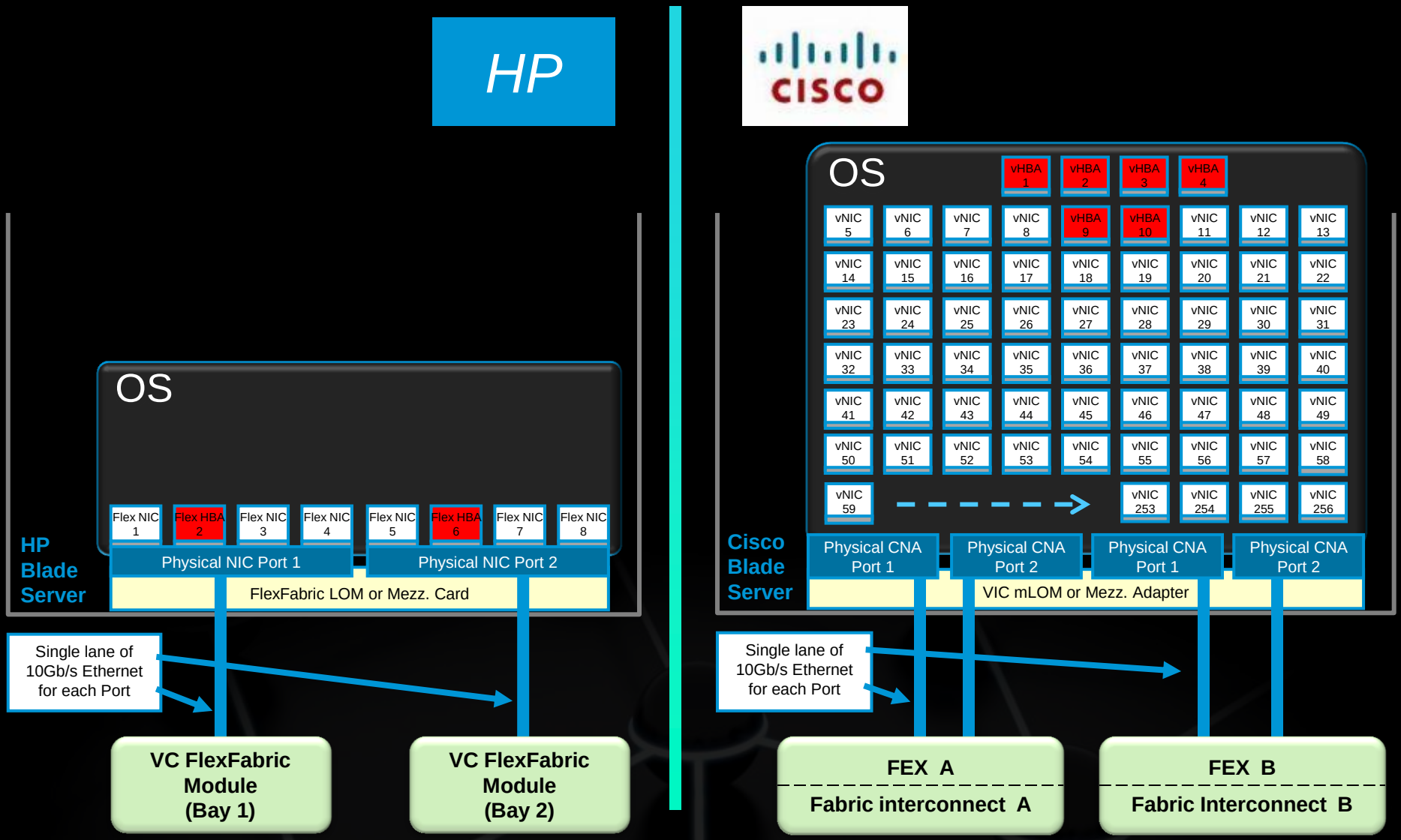
80 Blades – 10 x Cisco UCS 5108

Fabric Interconnects	2
Intra Chassis Switches	0
Chassis Mgmt Module	0
Total Mgmt Points	**1**



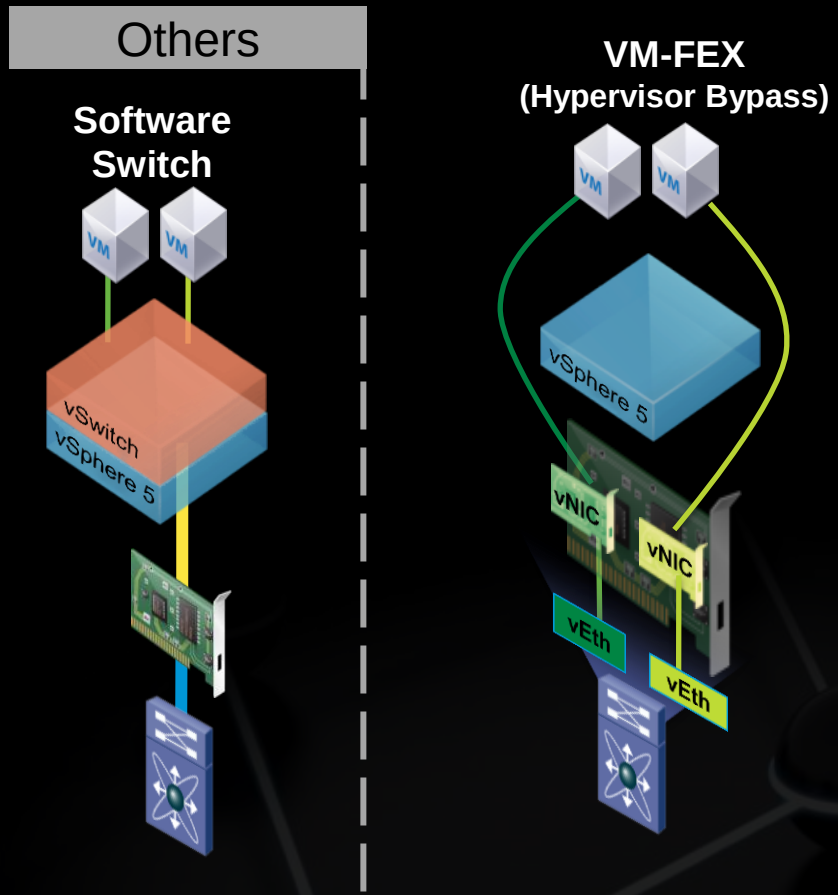
Cisco VIC vs. HP FlexFabric Adapter

Cisco VIC is really like a “Flex-256” adapter that includes multiple vHBA support



VM-FEX
Highest Performance Virtual Networking

Cisco UCS Delivers Enhanced Performance



Latency — Up to **40% lower** end-to-end latency

Throughput — Up to **10% more** At 30% lower CPU utilization

Application Performance — Up to **15% more** (Database workload)

Blade Chassis Fabric Comparisons

Product Features and Specs – qty. per switch	Cisco UCS 6248UP	Cisco UCS 6296UP	HP Virtual Connect FlexFabric	IBM Flex System Fabric CN4093
Switch Management	Built-in; Full Featured	Built-in; Full Featured	VC Mgr – Limited; VC EM - $$	Yes
Switch Fabric Throughput	960 Gbps	1.92 Tbps	240 Gbps	1.28 Tbps
Maximum Chassis Attached	20	20	1	1
Maximum Server Population	160 blade or rack	160 blade or rack	16 blade only	14 blade only
Switch Footprint	1RU	2RU	Intra-chassis	Intra-chassis
Maximum Available Ports	48	96	8	16
1 Gb Ethernet Port Density – max	48	96	4	14
10 Gb Ethernet Port Density - max	48	96	8	8 w/ base; 6 more $$
8 Gb FC Port Density – maximum	48	96	4	6 w/ base; 6 more $$
Chassis: 40 Gigabit Ethernet Ready Chassis	✔	✔	Just launched, no retrofit available at this time.	Just launched in completely new chassis.

Cisco UCS Fabric Infrastructure Portfolio

Cisco UCS™ 6200 and 2200 with Unified Ports

	Typical Deployments	High End Deployments
UCS Fabric Interconnects	**48 Port Fabric Interconnect**  UCS-FI-6248UP • Performance for typical deployments, • 1TB throughput, • 48 ports in 1RU, • Infrastructure agility with Unified Ports.	**96 Port Fabric Interconnect**  UCS-FI-6296UP • High Application performance , • 2TB through put, • High workload density 96 ports in 2RU, • Infrastructure agility with Unified Ports.
UCS FEX I/O Modules	**16 Port I/O Module**  UCS-FI-2204XP • 80G/ chassis, • 20Gb to the Blade each, 40Gb total per blade, • Improved Utilization with Port Channels.	**32 Port I/O Module**  UCS-IOM-2208XP • 160G/ chassis, • 40Gb to the Blade each, 80Gb total per blade, for burst traffic, • Improved Resiliency , • Improved Utilization with Port Channels.

Blade Management

Blade Management with UCS

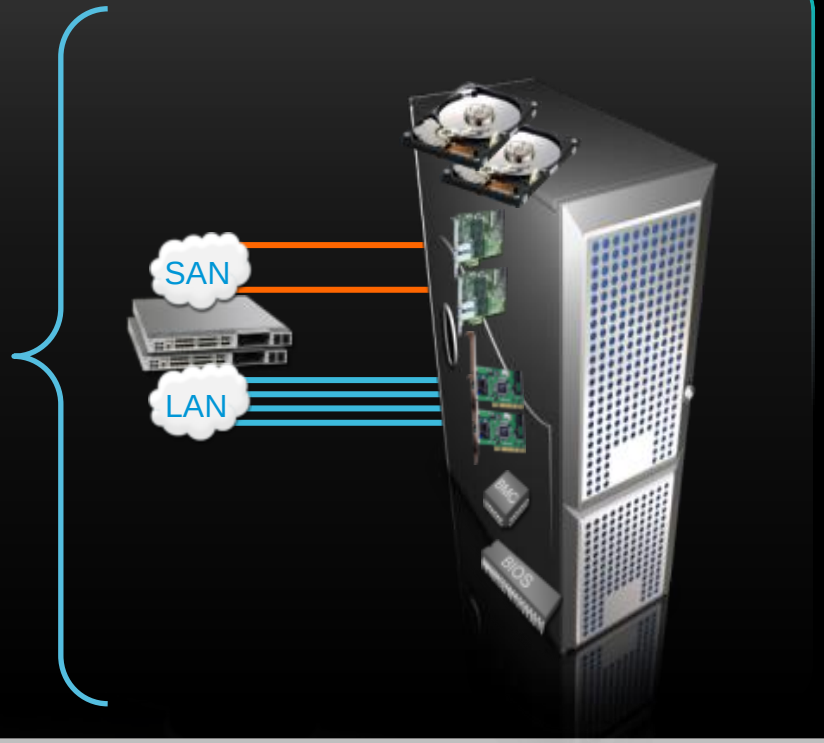
Less Complexity, More Flexibility, Easy Scale

HP	UCS	IBM
Back of each blade chassis has a "rack's worth of infrastructure"	One infrastructure for multiple blade chassis and racks	Back of each blade chassis has a "rack's worth of infrastructure"
Blade and Rack servers require separate management	One Management interface for multiple blade chassis AND rack servers	Blade and Rack servers require separate management
Back of each chassis is a hardware profit center	Low cost FEX integrates Management and I/O (Enet, FC and Mgmt)	Architecture is a Software Profit Center. Back of each chassis is a hardware profit center
Adding chassis adds a "rack's worth of infrastructure" burden	127+ Server ID Settings—Completely Automated Including Firmware and I/O Devices	Adding chassis adds management software burden and a "rack's worth of infrastructure" burden

Cisco Service Profiles: Heart of Unified Model-Based Management

CISCO UCS SERVICE PROFILE

NIC MACs	Template Association
HBA WWNs	Org & Sub Org Assoc.
Server UUID	Server Pool Association
VLAN Assignments	Statistic Thresholds
VLAN Tagging	BIOS scrub actions
FC Fabrics Assignments	Disk scrub actions
FC Boot Parameters	BIOS firmware
Number of vNICs	Adapter firmware
Boot order	BMC firmware
PXE settings	RAID settings
IPMI Settings	Advanced NIC settings
Number of vHBAs	Serial over LAN settings
QoS	BIOS Settings
Call Home	More….



- Allows YOU to define the “to-be” server, NOT settle for the “as is” server
- Created through Cisco UCS Manager
- Configure once then reuse
- Templates as Best practices
- Blade and Rack Servers – Service Profiles are Form Factor Agnostic

BIOS Server Setting Capabilities

This table details the BIOS settings that can be managed by UCS Manager, HP VC and IBM FSM. All BIOS settings for Cisco UCS servers may be defined and set within the Service Profile. IBM has limited BIOS configuration support and each solution is only applicable to their newest generation of blade servers. Cisco Service Profiles may be applied to any generation and any server platform: **Rack or Blade**.

HP Virtual Connect Server Profile Added Cost - $	IBM Flex System Manager Added Cost - $	Cisco UCS Service Profiles NO ADDED COST
0 Settings	12 Settings	48 Settings
	BIOS – Processor Hyper Threading	**BIOS** **All BIOS Settings** **Blade and Rack server**
	BIOS – Processor OPI Link Frequency Plan	
	BIOS – Memory Speed Plan	
	BIOS – Memory Channel Mode	
	BIOS – Memory Socket interleave	
	BIOS – Patrol Scrub	
	BIOS – POST watchdog timer	
	BIOS – OS watchdog timer	
	BIOS – LAN over USB	
	BIOS – Reboot system on NMI	
	BIOS – Power off delay	
	BIOS – Halt on server error	

UCS—More Flexible, Less Complexity

HP c7000

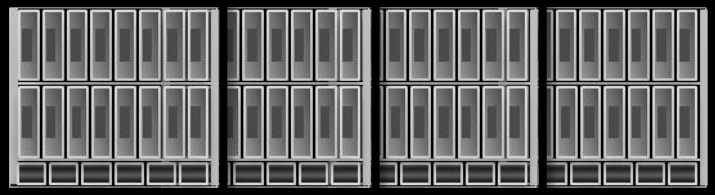
HP Server Hardware Management
Multiple Layers of Software Required

HP Insight Control $$$$

Virtual Connect Enterprise Manager $$$$

System Insight Manager(SIM)

Virtual Connect Manager	Virtual Connect Manager	Virtual Connect Manager	Virtual Connect Manager
HP iLO Advanced for BladeSystem	IP iLO Advanced or BladeSystem	IP iLO Advanced or BladeSystem	IP iLO Advanced or BladeSystem
Onboard Administrator	Onboard Administrator	Onboard Administrator	Onboard Administrator



64 blade servers
0 rack servers

Separate Management - Every Chassis, All Software
Separate Enet & Fibre Channel I/O leaving the chassis

Cisco UCS

UCS Manager
1 Console
No Added Cost
Rack and Blade Together

Up to 160 servers
Blade or Rack mount

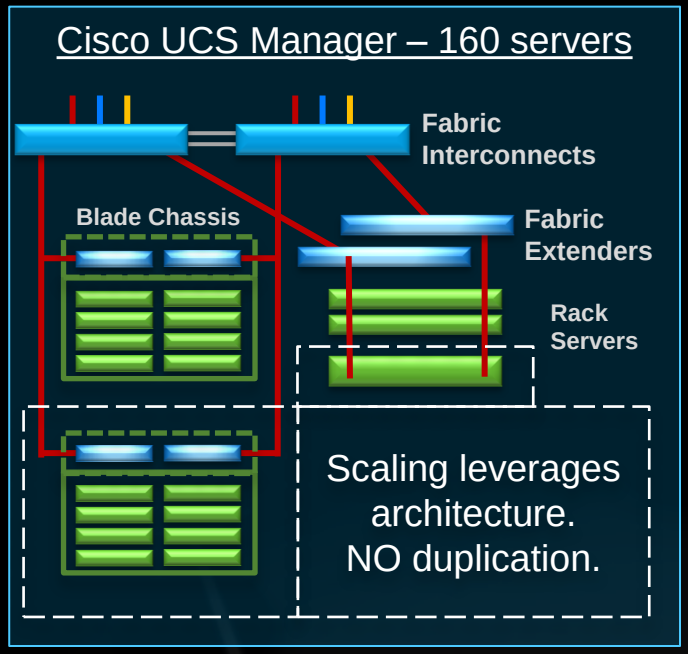
Unified Compute Unified Management
Unified Fabric

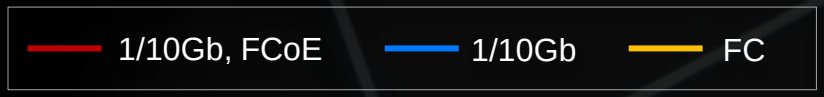
The Cisco UCS Management Difference

Cisco UCS provides a single management tool (UCS Manager)

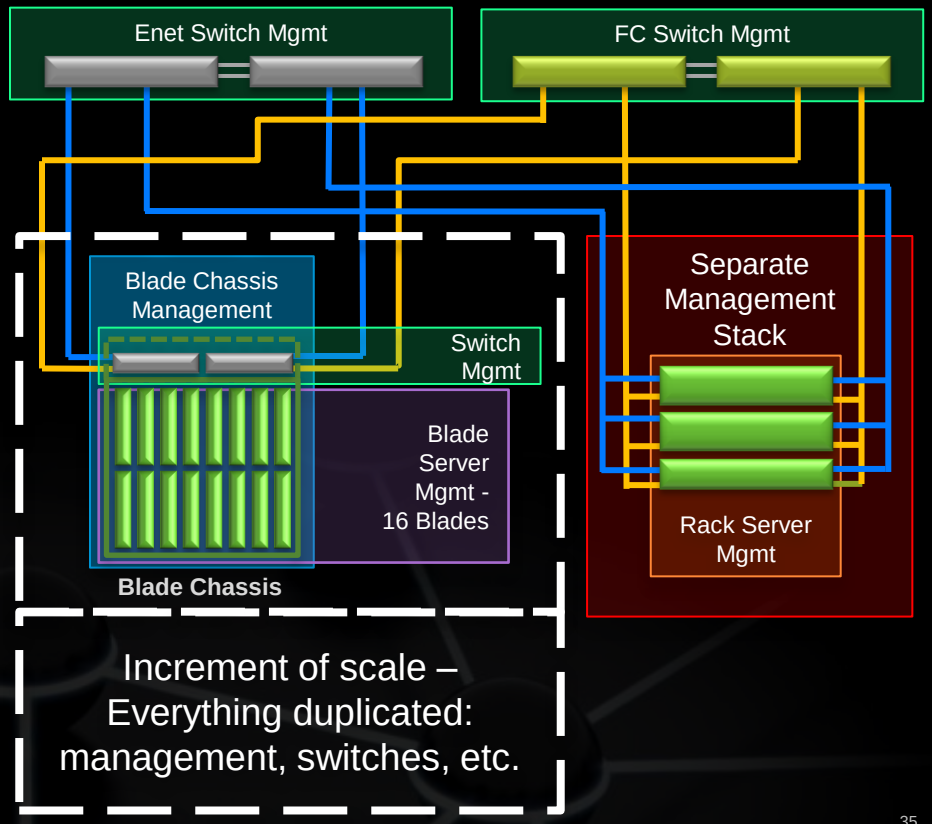
- Unified Compute – Abstracted Server Identities to Service Profiles 127+ identity settings
  Form Factor agnostic – blade or rack – with portability back and forth
- Unified Fabric – Server, LAN, SAN and Management into one interface
- Unified Management – unified across a distributed environment

Cisco Unified Computing System



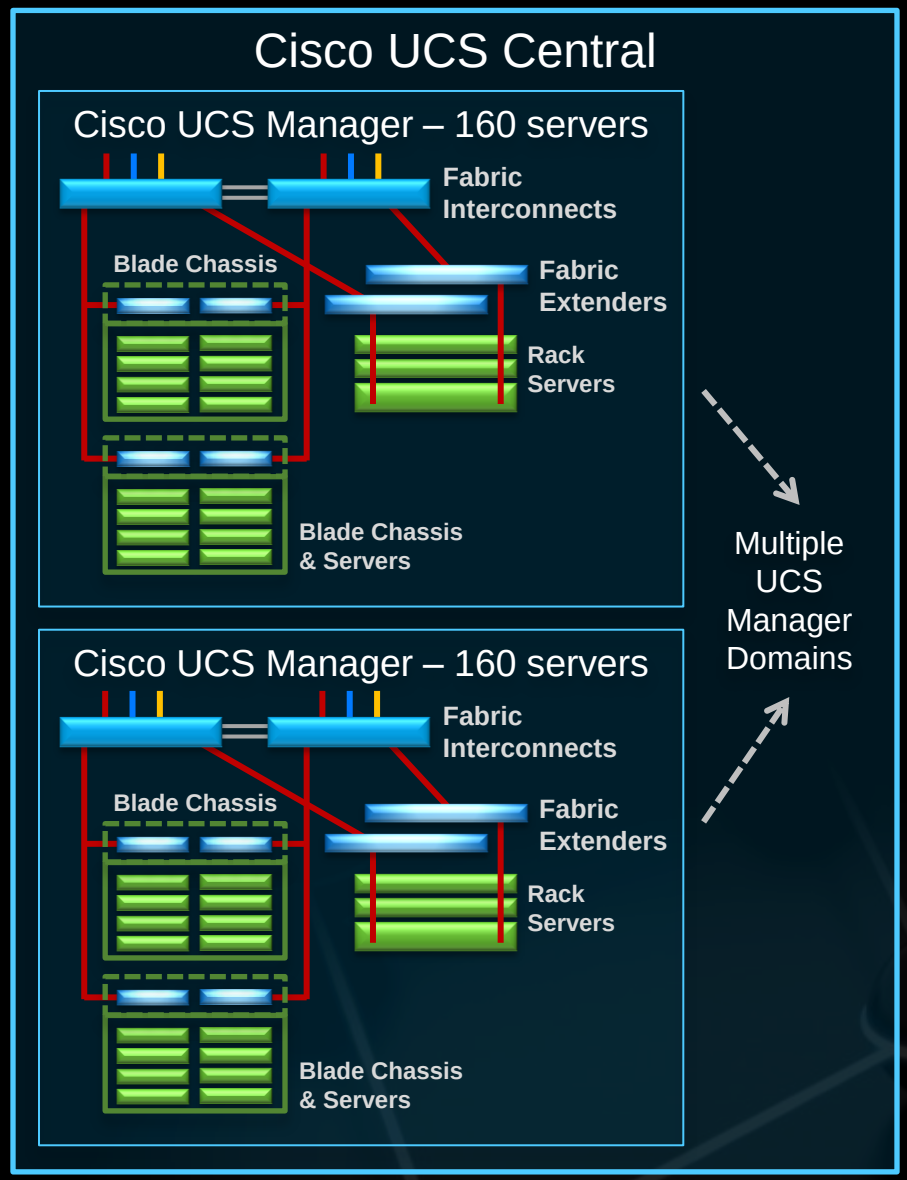


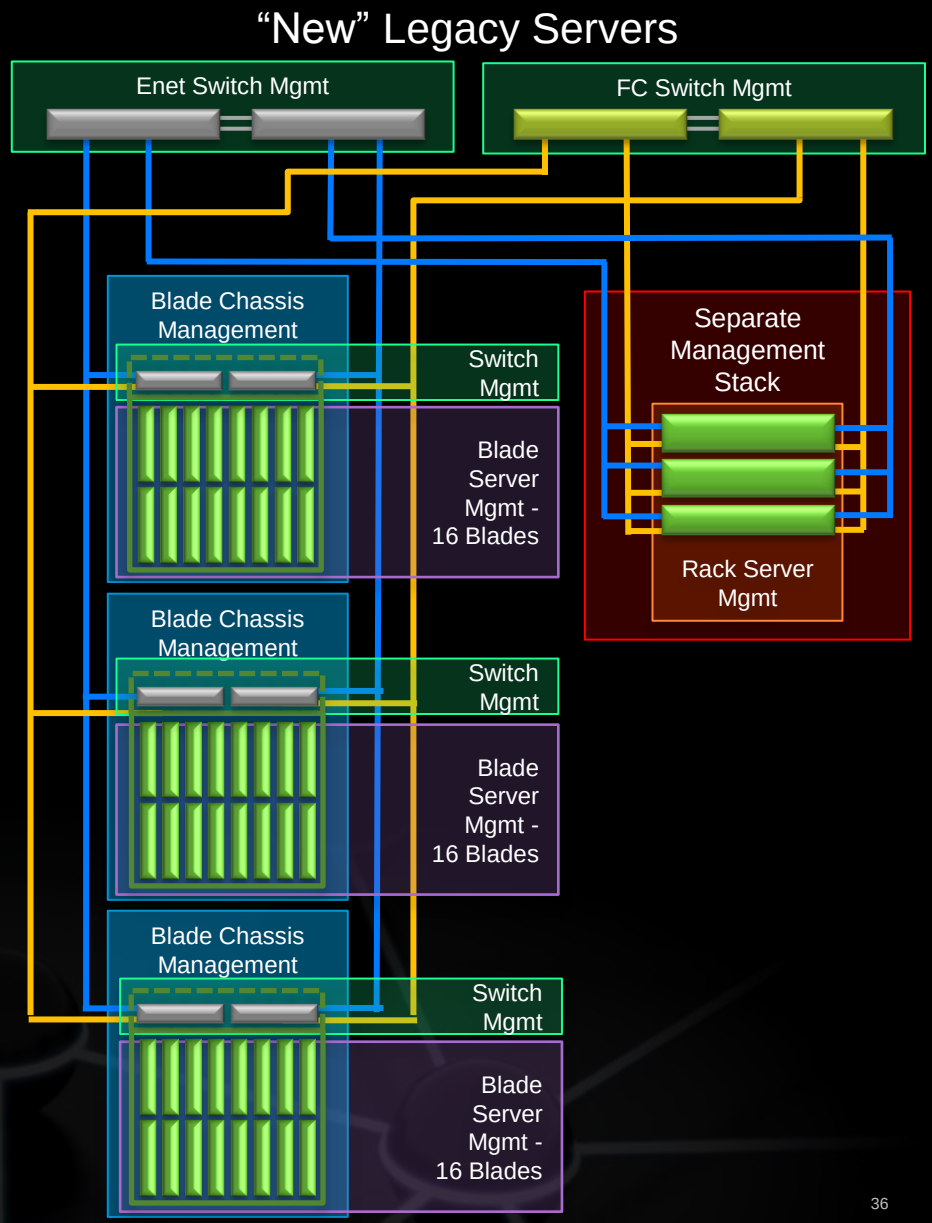
"New" Legacy Servers



Increasing Scale

UCS has 160 server increments, not 16 blades (only blades)

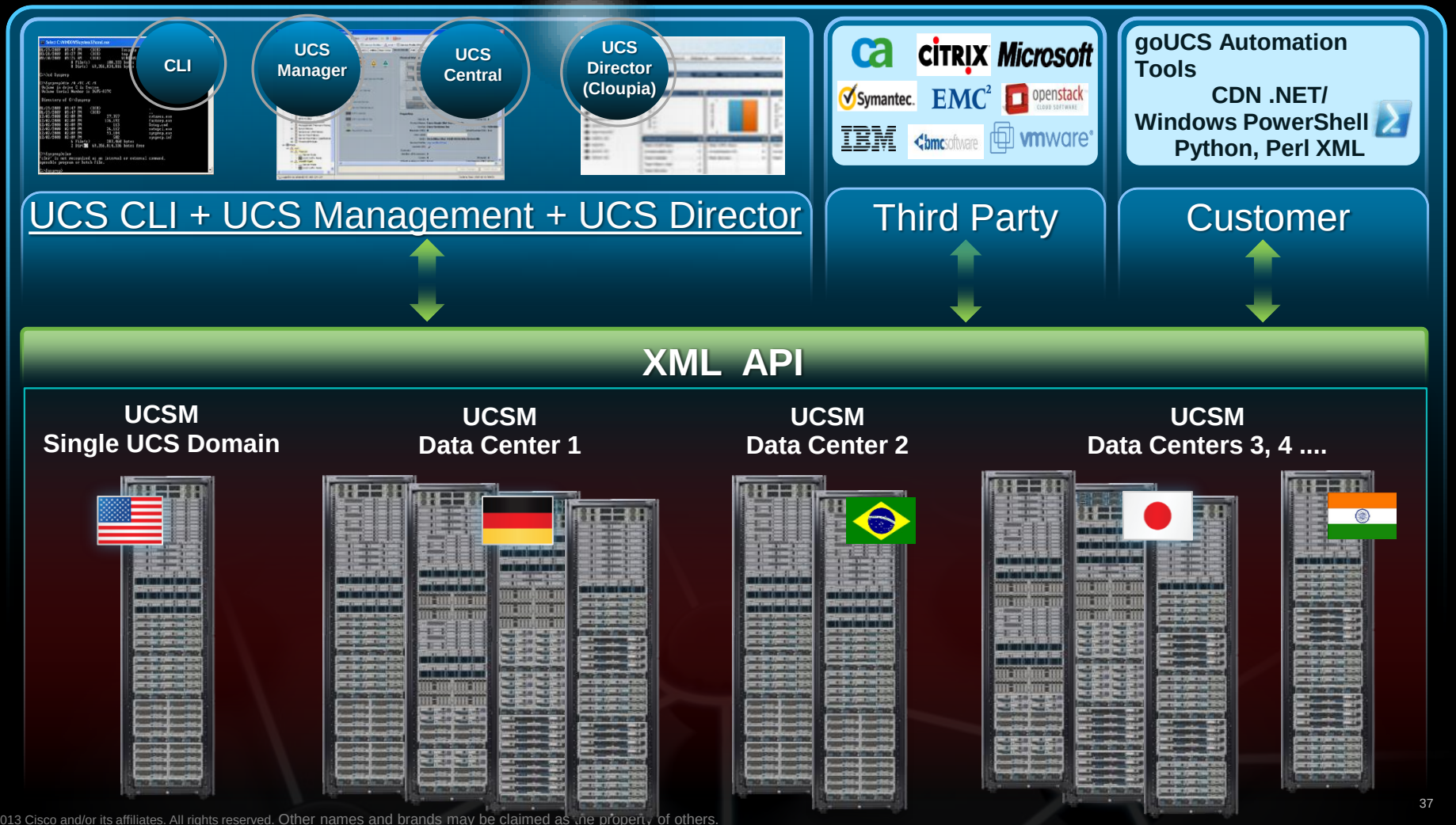




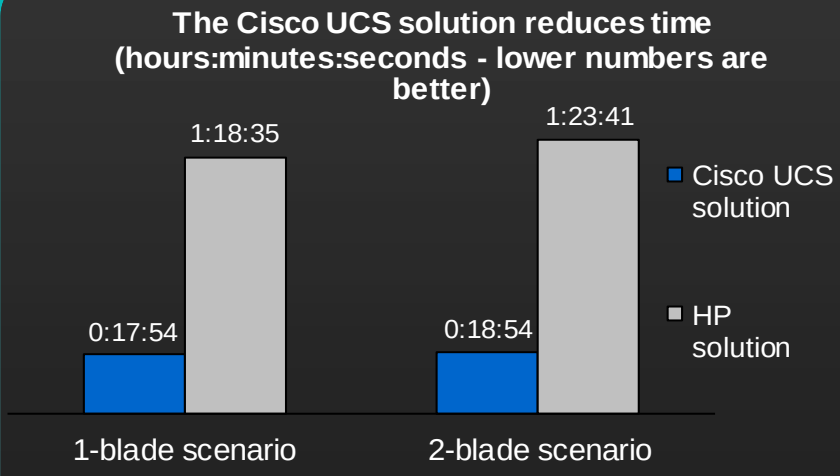
UCS Is Redefining Server Management

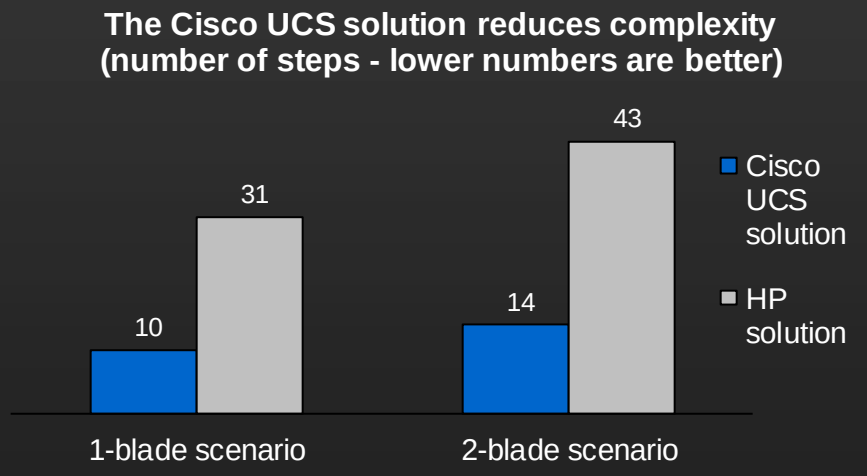
10,000 UCS SERVERS - MONITOR and MANAGE - SEAMLESSLY

- Blade and Rack Servers in the same domain – Form Factor Agnostic
- Standards-based XML API presents bidirectional single interface to entire solution
- UCS offers the customers the broadest choice of Cisco or 3rd party management tools



Faster, More Flexible
UCS Automated Deployment





Read the White Paper

Watch the Video

Cisco UCS - Model-based management speeds deployment
Fewer touch points reduces errors

http://www.cisco.com/en/US/prod/ps10265/ucs_white_paper.html

http://www.youtube.com/watch?v=bSSQfNt7SFk

Total Cost of Ownership

TCO - Total Cost of Ownership

UCS – Effective, Efficient and Easy

HP	UCS	IBM
Costly to add more chassis and I/O	Efficient and Effective, low cost I/O additions	Costly to add more chassis and I/O
HP “accidental mini-rack” chassis design has high cost burden to scale	UCS delivers lower TCO by design with easy, lower cost scaling	IBM Flex System is more of the same with high cost burden to scale
Through-put trade off for features	No sacrifice of function for features	Lots of cost adders for limited additional functionality.
HP just announced a new chassis with no upgrade for older chassis.	UCS chassis has the future built in today	New IBM Flex System chassis is a software selling mechanism.

UCS & HP: Infrastructure Scaling Cost

HP c7000 Platinum chassis, each with:
- 10 fans, 6 power supplies & cords
- 16 Insight Control Licenses
- 2 Enclosure Management Modules
- 2 FlexFabric switches
- HP VC Enterprise Manager

Cisco UCS
45% less than HP

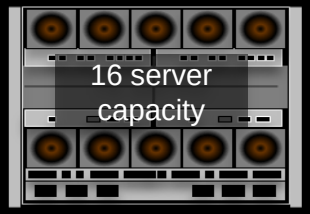
UCS 6248UP Fabric Interconnects , each with:
- All fans, power supplies & cords, and acces kits

Cisco UCS chassis, each with:
- 8 fans, 4 power supplies & cords
- 2 – UCS 2208 I/O modules per chassis
- 4 – 10Gb SFP+ cables

$ 3,784 / server

32 Servers

$ 2,694 / server



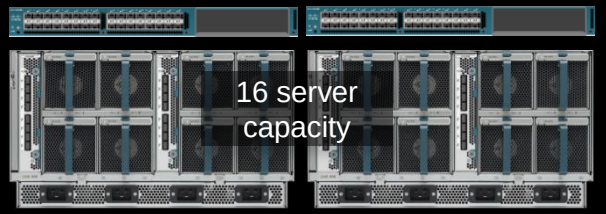
$60,545

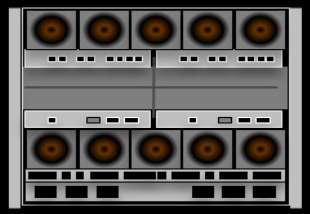
$60,545
HP c7000 chassis

16

$63,124

$63,124
2 x UCS 6248UP FI
2 x UCS 5108 chassis





$121,090

$60,545
HP c7000 chassis

32

$86,203

$23,079
2 x UCS 5108 chassis

HP: No benefit from scale

Doubling capacity
Doubles Incremental Cost.
No leverage.
Flat infrastructure cost / server
$3,784 / server

UCS: True benefit of scale

Doubling capacity
Much Lower Incremental Cost
Lower infrastructure cost / server
From $3945 to $2694 / server

Cisco UCS B200 M3 MSRP pricing available on the "Build to Order" tab at http://buildprice.cisco.com/catalog/ucs/models/B200M3

All pricing is online / retail and publically available on 07/04/2013.

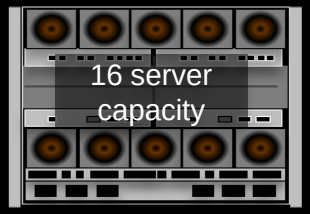
UCS & HP: Infrastructure Scaling Cost

HP: $ 3,784 / server
Flat per server cost for all capacities. No benefit of scale

Cisco UCS
45% less than HP

UCS: $ 2,068 / server
Adding capacity leverages UCS architecture.
32 servers @ $2,694 / server
64 servers @ $2,068 / server

64 Servers



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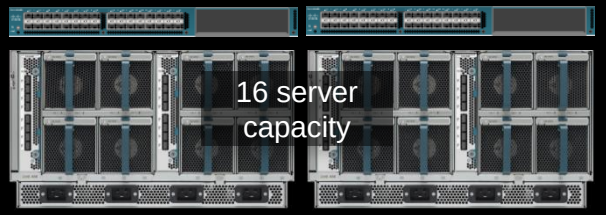

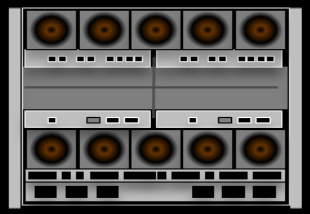

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HP c7000 chassis

$121,090

32

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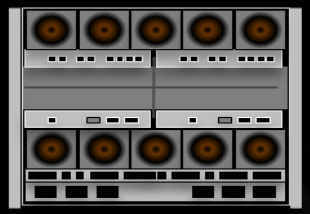


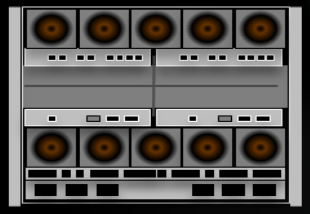
$60,545
HP c7000 chassis

$181,635

48

$ 109,282

$23,079
2 x UCS 5108 chassis



$60,545
HP c7000 chassis

$242,180

64

$132,362

$23,079
2 x UCS 5108 chassis

All pricing is online / retail and publically available on 07/04/2013.

UCS & IBM: Infrastructure Scaling Cost

IBM Flex System chassis, each with:
- All fans, power supplies & cords
- 2 – chassis management modules
- 2 – CN4093 10Gb switches
- 1 – Flex System Manager license
- 1 – IBM FSM Mgmt Node – Chassis 1 only

Cisco UCS
52% less than IBM

27 UCS 32
9 more servers
$142,000 less

UCS 6248UP Fabric Interconnects, each with:
- All fans, power supplies & cords, and acces kits

Cisco UCS chassis, each with:
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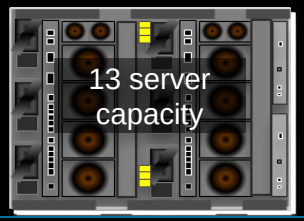
- 2 – UCS 2208 I/O modules per chassis
- 4 – 10Gb SFP+ cables

$ 4,998 / server

$ 2,068 / server



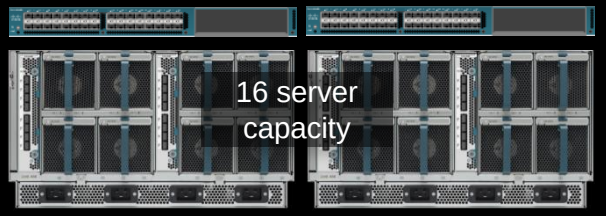
$78,656

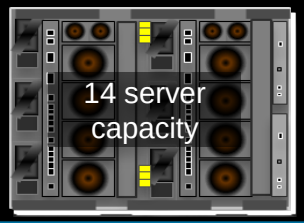
$78,656
IBM Flex System chassis
13 servers (14 – 1 FSM node)
All other chassis = 14 slots

13 16

$63,124

$63,124
2 x UCS 6248UP FI
2 x UCS 5108 chassis





$144,083

$65,407
IBM Flex System chassis
14 slots

27 32

$86,203

$23,079
2 x UCS 5108 chassis

IBM: No benefit from scale

Doubling capacity
Doubles Incremental Cost.
No leverage.
Flat infrastructure cost / server
$4,998 / server

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Cisco UCS B200 M3 MSRP pricing available on the "Build to Order" tab at http://buildprice.cisco.com/catalog/ucs/models/B200M3

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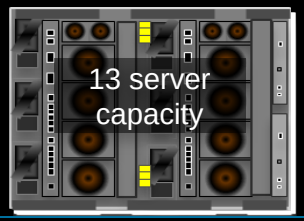
UCS & IBM: Infrastructure Scaling Cost

IBM: $ 4,998 / server
Flat per server cost for all capacities. No benefit of scale

Cisco UCS
52% less than IBM

55 UCS **64**
9 more servers
$142,000 less

UCS: $ 2,068 / server
Adding capacity leverages UCS architecture.
16 servers @ $3,945 / server
64 servers @ $2,068 / server



$78,656

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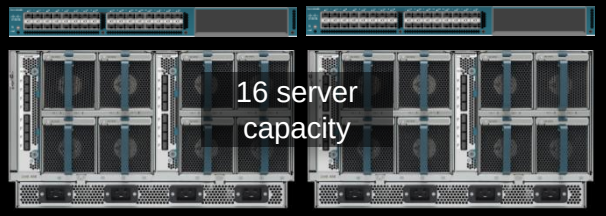
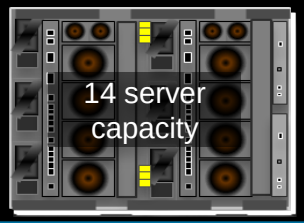
IBM Flex System chassis
13 servers (14 – 1 FSM node)
All other chassis = 14 slots

13 **16**

$63,124

$63,124
2 x UCS 6248UP FI
2 x UCS 5108 chassis





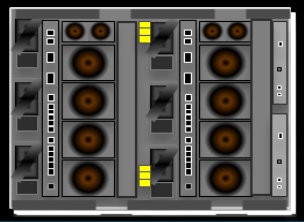
$144,083

$65,407
IBM Flex System chassis
14 slots

27 **32**

$86,203

$23,079
2 x UCS 5108 chassis



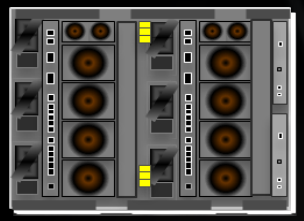
$209,470

$65,407
IBM Flex System chassis

41 **48**

$ 109,282

$23,079
2 x UCS 5108 chassis



$274,877 **$132,362**

$65,407
IBM Flex System chassis

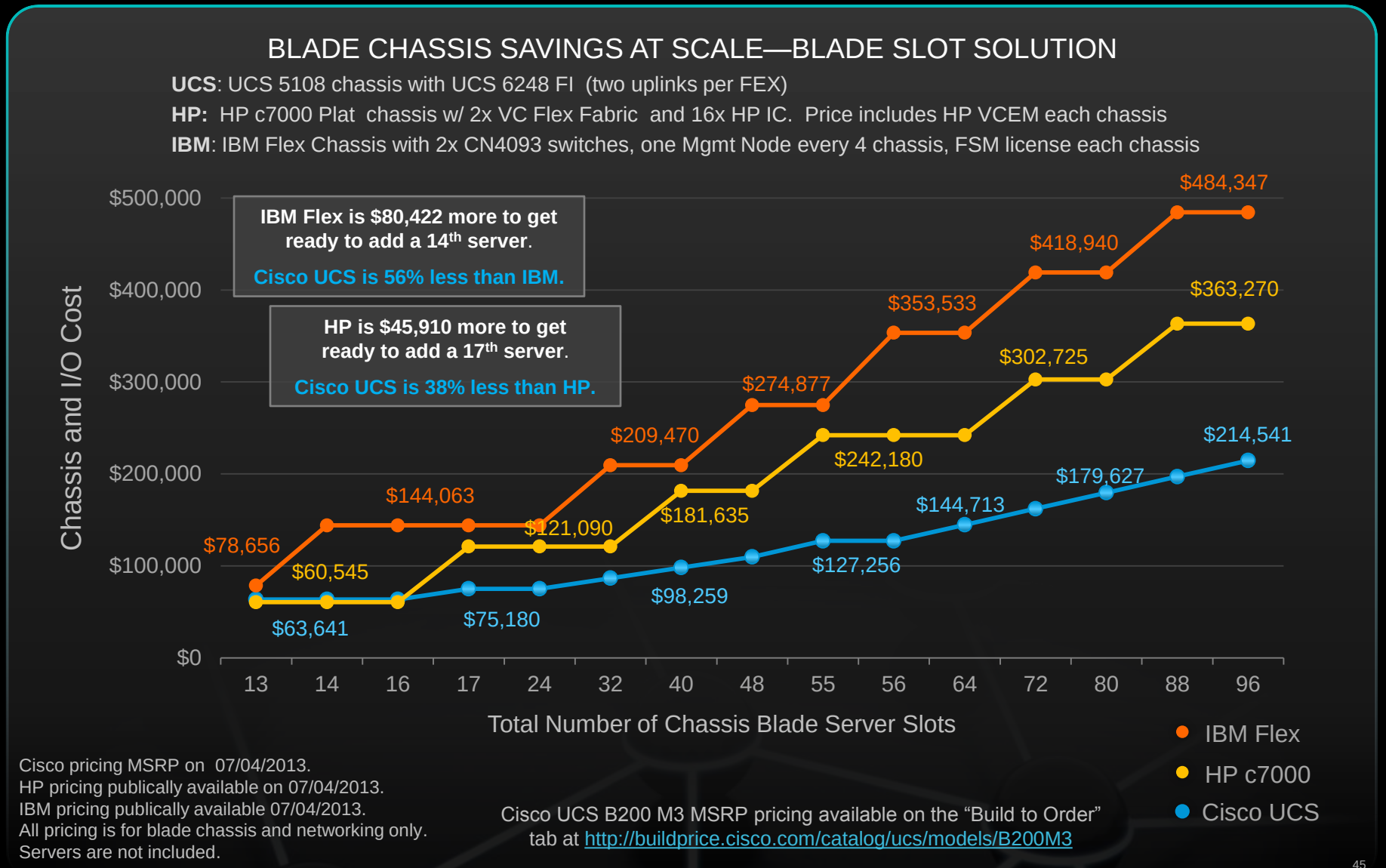
55 **64**

$23,079
UCS 5108 chassis

All pricing is online / retail and publically available on 07/04/2013.

UCS = Better, Easier, Simpler Architecture

No Infrastructure Penalty to Scale



Cisco pricing MSRP on 07/04/2013.
HP pricing publically available on 07/04/2013.
IBM pricing publically available 07/04/2013.
All pricing is for blade chassis and networking only.
Servers are not included.

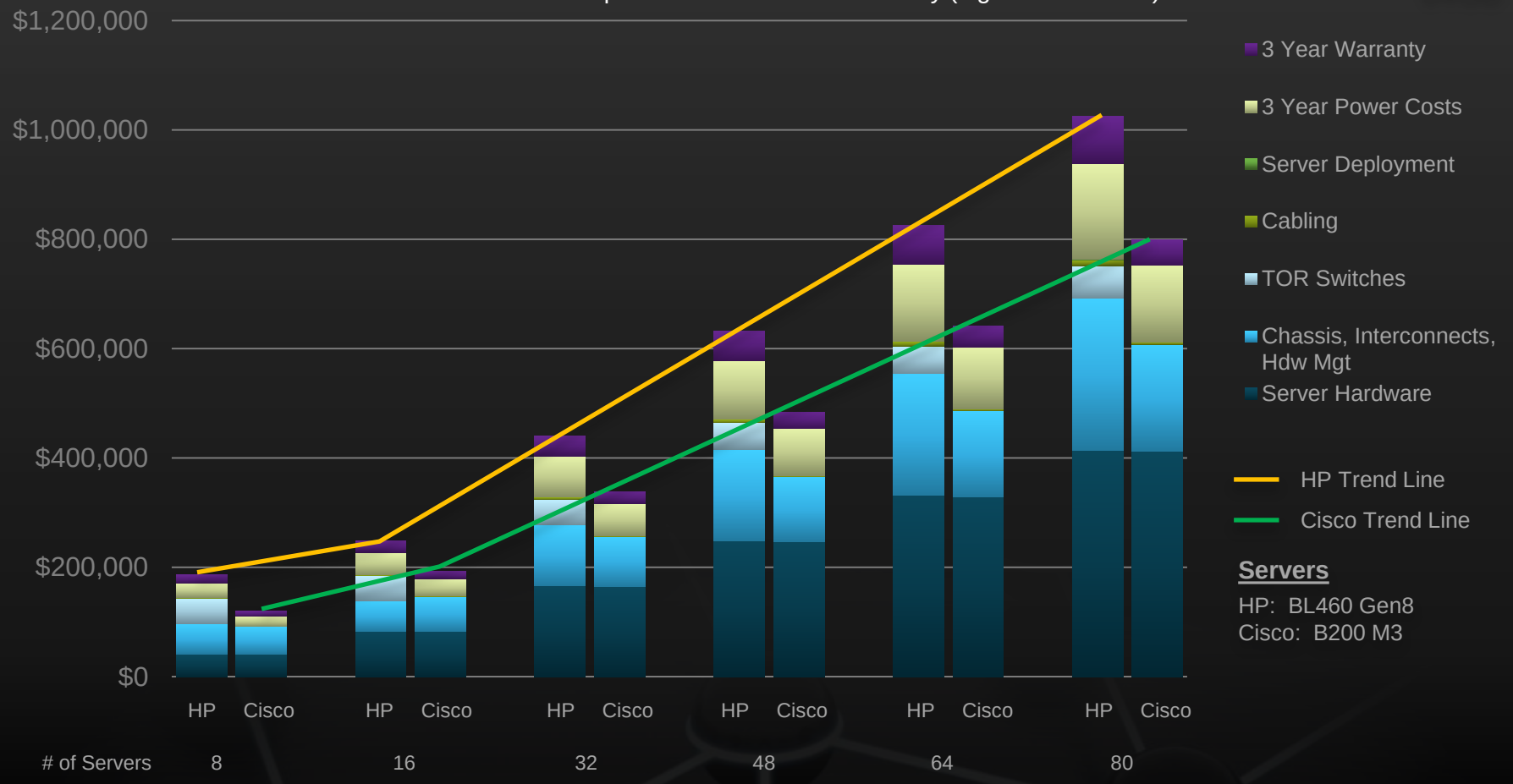
Cisco UCS B200 M3 MSRP pricing available on the "Build to Order" tab at http://buildprice.cisco.com/catalog/ucs/models/B200M3

No Compromise – full chassis adds

Cisco Solution TCO advantage increases at scale

All chassis fully populated with servers (starting at qty 16)

Each server has two E5-2620 Intel Xeon processors with 64GB memory (eight 8GB DIMMs)



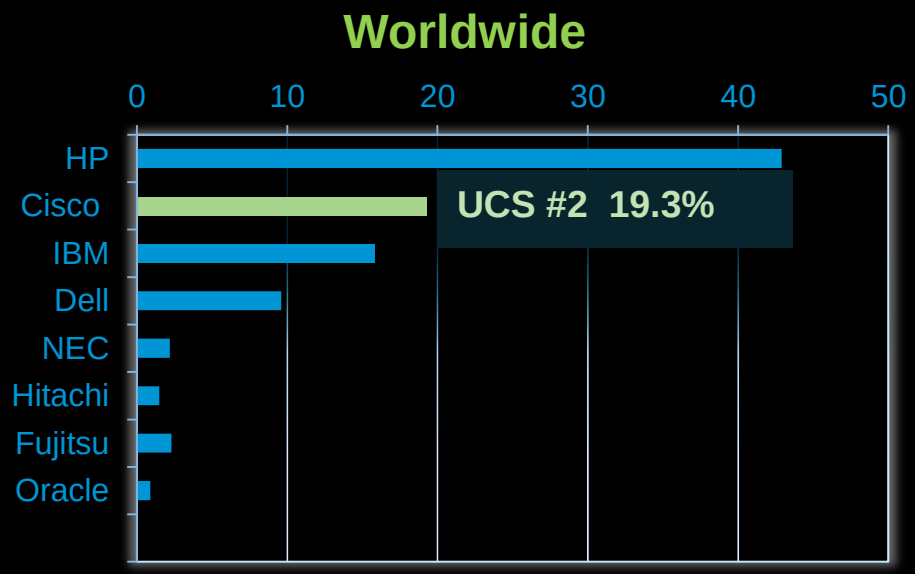
HP retail and Cisco MSRP pricing on 4/3/2013

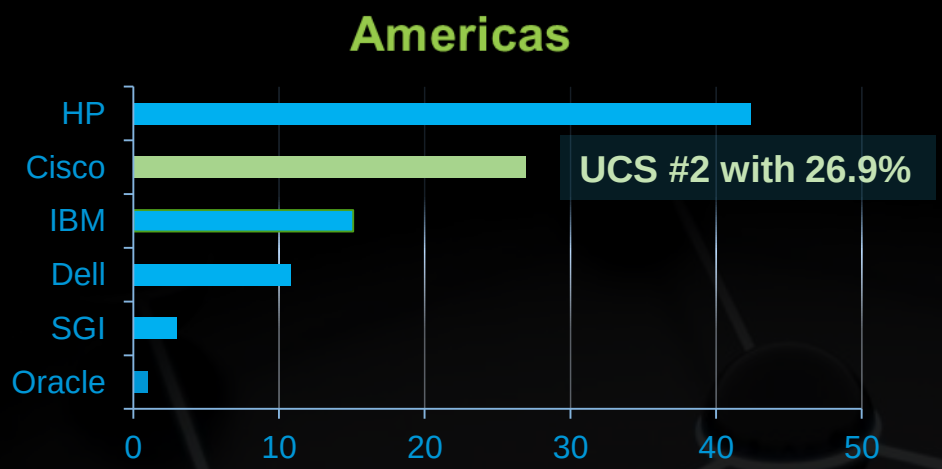
Cisco UCS B200 M3 MSRP pricing available on the "Build to Order" tab at http://buildprice.cisco.com/catalog/ucs/models/B200M3

Blade Server Marketplace

Customers Have Spoken

X86 Server Blade Market Share, Q1CY13[1]





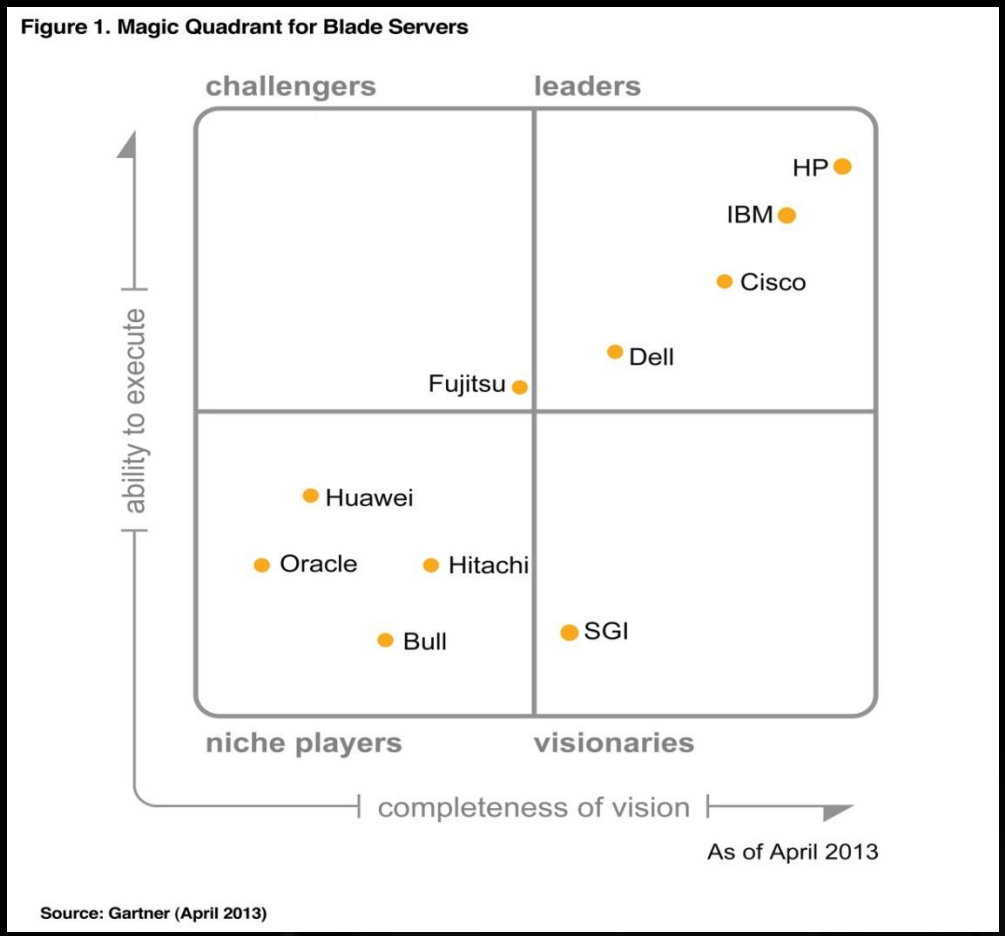
- UCS momentum is fueled by game-changing innovation; Cisco is quickly passing established players
- UCS x86 Blade servers revenue grew 35% Y/Y in Q1CY13[1]

UCS #2 in Only Four Years

- Maintained #2 in N. America (27.9%) and #2 in the US (28.3%)[1]
- Advanced to #2 worldwide in x86 Blades with 19.3%

Source: [1] IDC Worldwide Quarterly Server Tracker, Q1 2013, May 2013, Revenue Share

Cisco is a Leader in the 2013 Gartner Magic Quadrant for Blade Servers



Read the Full Report here:

Gartner 2013 Magic Quadrant for Blade Servers

By Andrew Butler and George J. Weiss, G00250031, April 29, 2013, © 2013 Gartner Inc

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Market Share Changes – Q1'12 to Q1'13
Customers are voting for UCS

X86 Blade Market Share Numbers – WW and US
Q1 2012 to Q1 2013 Share Changes

Worldwide	Market Share of WW x86 Blade Total Factory Revenue	Market Share of WW x86 Blade Total Units
	Revenue Share Change	Unit Share Change
Cisco	**+ 5.3%**	**+ 6.0%**
Dell	**- 0.2%**	+ 0.6%
HP	**- 1.5%**	+ 1.1%
IBM	**- 2.2%**	**- 6.0%**
All Others	**- 1.4%**	**- 1.7%**

USA	Market Share of USA x86 Blade Total Factory Revenue	Market Share of USA x86 Blade Total Units
	Revenue Share Change	Unit Share Change
Cisco	**+ 5.6%**	**+ 8.6%**
Dell	**- 1.2%**	+ 1.7%
HP	**- 0.3%**	+ 2.8%
IBM	**- 3.0%**	**- 12.0%**
All Others	**- 1.1%**	**- 1.0%**

Source: IDC Worldwide Quarterly Server Tracker, Q1 2013, May 2013,

Thank you.