Cisco UCS
The Cisco Unified Computing System Difference
Cisco UCS Architecture Comparison

Content

• Data Center Economics
• Blade Architecture and Scaling
• I/O and Virtualization
• Blade Management
• Total Cost of Ownership
• Blade Server Marketplace
# Data Center Economics

Management is the Key Server TCO driver

## Data Center Spending

- Server purchase spending is flat
- Physical server management is down
- Virtual server management costs are way up

### WW Server Management Spend

<table>
<thead>
<tr>
<th>Year</th>
<th>Physical Servers</th>
<th>Virtual Servers</th>
<th>Total Server Related Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>$64</td>
<td>$3</td>
<td>$135</td>
</tr>
<tr>
<td>2007</td>
<td>$74</td>
<td>$28</td>
<td>$191</td>
</tr>
<tr>
<td>2013</td>
<td>$50</td>
<td>$105</td>
<td>$250</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Difference</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$24</td>
<td>-32%</td>
</tr>
<tr>
<td>$77</td>
<td>275%</td>
</tr>
<tr>
<td>$58</td>
<td>31%</td>
</tr>
</tbody>
</table>

### WW Server Related Spend (CapEx + OpEx) - Servers, Power & Cooling, and Mgmt./Administration

- Power & Cooling Expense
- Mgmt. & Admin - Virtual Servers
- Mgmt. & Admin - Standalone Servers
- Server Spending

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
• Reduced complexity
• Physical & virtual port end to end visibility and control with a single tool

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

• Single mgmt tool, single interface
• Highly collaborative roles based control
• Mgmt interface leveraged across multiple servers and domains

Legacy Designs

Complex Mgmt Structure

• Multiple mgmt tools, multiple interfaces
• Every Administrator has multiple tools
• 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

- Unifies physical and virtual infrastructures across data centers.
- Delivered more economically
- No compromise on
  - 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

Blade Chassis Savings at Scale — Blade Slot Solution

- **IBM Flex** is $79,340 more to get ready to add a 14th server.
  - Cisco UCS is 55% less than IBM.
- **HP** is $44,631 more to get ready to add a 17th server.
  - Cisco UCS is 37% less than HP.

**Cisco UCS**:
- UCS 5108 chassis with UCS 6248 FI (two uplinks per FEX)

**HP**:
- HP c7000 Plat chassis w/ 2x VC Flex Fabric and 16x HP IC. Price includes HP VCEM each chassis

**IBM**:
- IBM Flex Chassis with 2x CN4093 switches, one Mgmt Node every 4 chassis, FSM license each chassis

HP is $44,631 more to get ready to add a 17th server.
Cisco UCS is 37% less than HP.

IBM Flex is $79,340 more to get ready to add a 14th server.
Cisco UCS is 55% less than IBM.

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

Cisco pricing MSRP on 02/12/2014. HP pricing publically available on 02/12/2014. IBM pricing publically available 02/12/2014.

All pricing is for blade chassis and networking only. Servers are not included.
Add blades 77% faster

The Cisco UCS solution reduces time (hours: minutes: seconds - lower numbers are better)

- 1 blade scenario: 1:18:35
- 2 blade scenario: 1:23:41

The Cisco UCS solution reduces complexity (number of steps - lower numbers are better)

- 1 blade scenario: 10 steps
- 2 blade scenario: 14 steps

Read the White Paper

Watch the Video
http://www.youtube.com/watch?v=bSSqfNt7SFk

Cisco UCS - Model-based Management with Faster Deployment
More Automation - Fewer Touches Reduces Errors
Faster, More Flexible - UCS Blade to Rack Migration Automation

Migrate servers in **83.3% fewer steps**

**The Cisco UCS solution reduces complexity**
(number of steps - lower numbers are better)

- Cisco UCS solution: 6 steps
- HP solution: 56 steps

**and 34.8% faster**

*Cisco UCS™ B200 M3 Blade Server to a C240 M3 Rack Server*

vs. HP ProLiant BL460c Gen8 server blade to a DL380p Gen8 rack server

**The Cisco UCS solution reduces time**
(minutes:seconds - lower numbers are better)

- Cisco UCS solution: 08:43
- HP solution: 13:22

Read the White Paper

Watch the Video
http://www.youtube.com/watch?v=mN-aLzGCpEI
Blade Architecture and Scaling
Blade Architecture and Scaling

**UCS: Simpler Design, Scale Without Complexity**

**UCS**
- User customizable architecture.
  - Simple to scale at blade, chassis and I/O level
- Constant infrastructure with growth
- Scale in smaller increments,
  - 8 blades/6 RU, lower cost,
  - leveraged architecture
- Scaling is a plug and play operation

**HP**
- Architecture complex and cumbersome at scale
- Growing capacity requires infrastructure change
- Scale requires large increments
  - 16 blades / 10 RU,
  - Larger embedded cost,
  - More management overhead
- High top of rack switch port consumption with increasing scale

**IBM**
- Architecture complex and cumbersome at scale
- Growing capacity requires infrastructure change
- Scale requires large increments
  - 14 blades / 10 RU,
  - Larger embedded cost,
  - Increasing mgmt overhead
- High top of rack switch port consumption with increasing scale

**HP**
- UCS: Simpler Design, Scale Without Complexity
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 Points in EVERY chassis – minimum.

ToR switches are needed to connect multiple chassis. Switches are redundant
- FC Switch
- 10Gb Enet
- 1Gb Enet Mgmt

Mgmt SW host required
HP c7000 Platinum Chassis

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

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.

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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.
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

Front view

FSM License
13 compute slots
& 1 mgmt node

FSM License
14 compute slots

FSM License

Back view

ToR switches are needed to connect multiple chassis. Switches are redundant
FC Switch
10Gb Enet
1Gb Enet Mgmt

Each Chassis has:
2 CN4093 switches per chassis
2 x Mgmt Modules per chassis.
= 4 mgmt points
4 Mgmt Points in EVERY chassis – minimum

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IBM Flex System Chassis 8.6 Gbps Enet / blade (+ 2.3 Gbps FC / blade)

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 (card and SW upgrade);
TOTAL to add switches is $67,950

IBM pricing publicly available on 02/12/2014.
IBM Flex System Chassis 8.5 Gbps Enet / blade (+ 2.3 Gbps FC / blade)

4 chassis / 55 blades ; 4 x 14 blades = 56 – 1 FSM node, (IBM Flex System Manager domain maximum 16 chassis. No redundant mgmt node capability exists at this time.)
- 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

$ $ $ $
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.

Fabric Interconnects Required

- 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 NOT switches.
  They are remote line cards for the Fabric Interconnects
  and are not a mgmt point.

Front view

UCS Fabric Interconnect

8 compute slots

Up to 20 Chassis.
Up to 160 Blade or Rack Servers

Back view

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

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
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.
I/O and Virtualization
I/O and Virtualization  UCS - Unification Reduces Complexity

**UCS**

Unification yields constant, leveraged infrastructure.

Full Port to Port visibility for both physical and virtual servers. No added cost.

Scale in smaller increments, leveraging existing infrastructure. Plug and Play to increase chassis and blade I/O.

UCS Automated Deployment / Provisioning includes I/O mapping, policies and security.

---

**HP**

Growing capacity increases complexity

Limited visibility of virtual server I/O. Added software required.

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.

---

**IBM**

Growing capacity increases complexity

Limited visibility of virtual server I/O. Added software required with additional cost.

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.
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

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Cisco VIC vs. HP FlexFabric Adapter
Cisco VIC is really like a “Flex-256” adapter that includes multiple vHBA support point
VM-FEX Highest Performing 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)

Others

Software Switch

VM-FEX (Hypervisor Bypass)
## Blade Chassis Fabric Comparisons

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

**Cisco UCS™ 6200 and 2200 with Unified Ports**

### UCS Fabric Interconnects

#### Typical Deployments

<table>
<thead>
<tr>
<th>48 Port Fabric Interconnect</th>
<th>UCS-FI-6248UP</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Performance for typical deployments</td>
<td></td>
</tr>
<tr>
<td>• 1TB throughput</td>
<td></td>
</tr>
<tr>
<td>• 48 ports in 1RU</td>
<td></td>
</tr>
<tr>
<td>• Infrastructure agility with Unified Ports</td>
<td></td>
</tr>
</tbody>
</table>

#### High End Deployments

<table>
<thead>
<tr>
<th>96 Port Fabric Interconnect</th>
<th>UCS-FI-6296UP</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High Application performance</td>
<td></td>
</tr>
<tr>
<td>• 2TB throughput</td>
<td></td>
</tr>
<tr>
<td>• High workload density 96 ports in 2RU</td>
<td></td>
</tr>
<tr>
<td>• Infrastructure agility with Unified Ports</td>
<td></td>
</tr>
</tbody>
</table>

### UCS FEX I/O Modules

#### 16 Port I/O Module

<table>
<thead>
<tr>
<th>16 Port I/O Module</th>
<th>UCS-FI-2204XP</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 80G/ chassis</td>
<td></td>
</tr>
<tr>
<td>• 20Gb to the Blade each, 40Gb total per blade</td>
<td></td>
</tr>
<tr>
<td>Improved Utilization with Port Channels</td>
<td></td>
</tr>
</tbody>
</table>

#### 32 Port I/O Module

<table>
<thead>
<tr>
<th>32 Port I/O Module</th>
<th>UCS-IOM-2208XP</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 160G/ chassis</td>
<td></td>
</tr>
<tr>
<td>• 40Gb to the Blade each, 80Gb total per blade, for burst traffic</td>
<td></td>
</tr>
<tr>
<td>• Improved Resiliency</td>
<td></td>
</tr>
<tr>
<td>• Improved Utilization with Port Channels</td>
<td></td>
</tr>
</tbody>
</table>
Blade Management with UCS  Less Complexity, More Flexibility, Easy Scale

**UCS**
- One infrastructure for multiple blade chassis and racks
- One Management interface for multiple blade chassis AND rack servers
- Low cost FEX integrates Management and I/O (Enet, FC and Mgmt)
- 127+ Server ID Settings — completely automated including firmware and I/O devices

**HP**
- Back of each blade chassis has a “rack’s worth of infrastructure”
- Blade and Rack servers require separate management
- Back of each chassis is a hardware profit center
- Adding chassis adds a “rack’s worth of infrastructure” burden

**IBM**
- Back of each blade chassis has a “rack’s worth of infrastructure”
- Blade and Rack servers require separate management
- Architecture is a Software Profit Center. Back of each chassis is a hardware profit center.
- 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 PROFILES

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

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

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UCS—More Flexible, Less Complexity

**HP c7000**

HP Server Hardware Management
Multiple Layers of Software Required

<table>
<thead>
<tr>
<th>Software Required</th>
<th>Cost ($$$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Insight Control</td>
<td>$10,000</td>
</tr>
<tr>
<td>Virtual Connect Enterprise Manager</td>
<td>$15,000</td>
</tr>
<tr>
<td>System Insight Manager (SIM)</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

Virtual Connect Manager
HP ILO Advanced for BladeSystem
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

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The Cisco UCS Management Difference

Cisco UCS provides a Single Management Tool & Interface (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

"New" Legacy Server Management

```
Enet Switch Mgmt
FC Switch Mgmt
Switch Mgmt
Blade Chassis Management
Separate Management Stack
Blade Server Mgmt - 14 / 16 Blades
Rack Server Mgmt
```

Increment of scale = Chassis
Everything duplicated: management, switches, etc.

Cisco Unified Computing System

```
Fabric Interconnects
Blade Chassis
Fabric Extenders
Rack Servers
```

Scaling leverages architecture. NO duplication.

Increment of Scale = 160 compute nodes (servers)
A single point of management for All Servers (Blade & Rack), Chassis, Networking

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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
Total Cost of Ownership
Total Cost of Ownership (TCO)  

UCS—Effective, Efficient and Easy

**UCS**

- Efficient and Effective, low cost I/O additions
- UCS delivers lower TCO by design with easy, lower cost scaling
- No sacrifice of function for features
- UCS chassis has the future built in today

**HP**

- Costly to add more chassis and I/O
- HP “accidental mini-rack” chassis design has high cost burden to scale
- Through-put trade off for features
- HP just announced a new chassis with no upgrade for older chassis.

**IBM**

- Costly to add more chassis and I/O
- IBM Flex System is more of the same with high cost burden to scale
- Lots of cost adders for limited additional functionality.
- New IBM Flex System chassis is a software selling mechanism.
HP: $3,784 / server

HP No benefit from scale

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

UCS: $2,737 / server

UCS True benefit of scale

- Doubling capacity
- Much Lower Incremental Cost
- Lower infrastructure cost / server
- From $4006 to $2260 / server

Cisco UCS

28% less than HP

32 Servers

28% Less

$33,515 Less

UCS 6248UP Fabric Interconnects, each with:
- All fans, power supplies & cords
- 2 Enclosure Management Modules
- 2 Flex Fabric switches
- HP VC Enterprise Manager

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

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

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

HP: $60,545

32

$121,090

16 server capacity

$60,545

HP c7000 Platinum chassis

UCS: $87,575

32

$23,472

16 server capacity

$64,103

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All pricing is online / retail and publically available on 02/12/2014.
### UCS & HP Infrastructure Scaling Cost

**HP:** $3,784 / server
- Flat per server cost for all capacities.
- 16 servers @ $3,784 / server
- 64 servers @ $3,784
- No benefit of scale

**Cisco UCS:**
- 40% less than HP
- 64 Servers
- 40% Less, $95,826 Less

<table>
<thead>
<tr>
<th>Capacity</th>
<th>HP Cost</th>
<th>Cisco UCS Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 servers</td>
<td>$60,545</td>
<td>$242,180</td>
</tr>
<tr>
<td>32 servers</td>
<td>$181,635</td>
<td>$146,354</td>
</tr>
<tr>
<td>48 servers</td>
<td>$121,090</td>
<td>$23,472</td>
</tr>
<tr>
<td>64 servers</td>
<td>$60,545</td>
<td>$64,103</td>
</tr>
</tbody>
</table>

**UCS:** $2,287 / server
- Adding capacity leverages UCS architecture
- 32 servers @ $2,737 / server
- 64 servers @ $2,287 / server

All pricing is online / retail and publicly available on 02/12/2014.
Cisco UCS
39% less than IBM

27
UCS
More server capacity
$56,000 less

32

IBM: $5,336 / server
IBM No Real Benefit from Scale

- Doubling capacity.
- Adds Incremental Cost.
- No real leverage.
- Large infrastructure cost / server
- From $6,050 to $5,336 / server

$65,407
IBM Flex System chassis
14 Compute slots

$144,063
2 x UCS 6248UP FI
2 x UCS 5108 chassis
16 server capacity

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

$64,103
$23,472
2 x UCS 5108 chassis

UCS: $2,737 / server
UCS True benefit of scale

- Doubling capacity
- Much Lower Incremental Cost
- Lower infrastructure cost / server
- From $4,006 to $2,260 / server

UCS 6248UP Fabric Interconnects, each with:
- All fans, power supplies & cords, and access kits
Cisco UCS chassis, each with:
- 8 fans, 4 power supplies & cords
- 2 – UCS 2208 I/O modules per chassis
- 4 – 10Gb SFP+ cables

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Cisco UCS
47% less than IBM

UCS: $2,287 / server
Adding capacity leverages UCS architecture
16 servers @ $4,045 / server
32 servers @ $2,756 / server
64 servers @ $2,296 / server

IBM: $4,998 / server
No Real Benefit of Scale
13 servers @ $6,050 / server
27 servers @ $5,336
55 servers @ $4,998 / server

UCS
9 more servers
$128,000 less

$274,877
$209,470
$144,063
$78,656

$146,354
$111,047
$87,575
$64,103

$65,407
IBM Flex System chassis
14 compute slots

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IBM Flex System chassis
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16 server capacity

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Blade Server Marketplace
Customers Have Spoken

UCS momentum is fueled by game-changing innovation; Cisco is quickly passing established players.

Q3CY13 – UCS x86 Blade Server revenue WW grew 46% Y/Y, and USA grew 55%.1

UCS #2 in Only Four Years

- Maintained #2 in Americas (28.7%), #2 in N. America (29.9%, and #2 in the US (30.4%)1
- Maintained to #2 worldwide in x86 Blades with 22%1

1 Source: IDC Worldwide Quarterly Server Tracker, Q3 2013, December 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

This graphic was published by Gartner, Inc. as part of a larger research document and should be evaluated in the context of the entire document. The Gartner document is available upon request from Gartner 2013 Magic Quadrant for Blade Servers

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# Market Share Changes – Q3’11 to Q3’13

Customers are Voting for UCS

## X86 Blade Market Share Numbers

WW and US Q3 2011 to Q3 2013 Share Changes

<table>
<thead>
<tr>
<th>Worldwide</th>
<th>Market Share of WW x86 Blade Total Factory Revenue</th>
<th>Market Share of WW x86 Blade Total Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue Share Change</strong></td>
<td><strong>Unit Share Change</strong></td>
<td></td>
</tr>
<tr>
<td>Cisco</td>
<td>+ 10.1%</td>
<td>+ 7.2%</td>
</tr>
<tr>
<td>Dell</td>
<td>+ 1.7%</td>
<td>+ 3.0%</td>
</tr>
<tr>
<td>HP</td>
<td>- 7.1%</td>
<td>- 4.4%</td>
</tr>
<tr>
<td>IBM</td>
<td>- 1.0%</td>
<td>- 3.5%</td>
</tr>
<tr>
<td>All Others</td>
<td>- 3.7%</td>
<td>- 2.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>USA</th>
<th>Market Share of USA x86 Blade Total Factory Revenue</th>
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</tr>
<tr>
<td>HP</td>
<td>- 13.1%</td>
<td>- 9.4%</td>
</tr>
<tr>
<td>IBM</td>
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<td>- 2.5%</td>
</tr>
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</tr>
</tbody>
</table>

Source: IDC Worldwide Quarterly Server Tracker, Q3 2013, December 2013
Thank you.