Unified Computing System (UCS)

Sascha Merg, Consulting Systems Engineer
Data Center & Virtualization Team Europe
Unify And Simplify

SAN A
LAN
SAN B

Ethernet Switch Mgmt
FC Switch Mgmt

Chassis Mgmt
Ethernet Blade Switch Mgmt
Fibre Channel Blade Switch Mgmt
Virtual Switch Mgmt

Hypervisor
OS
VM VM VM VM
VM VM VM VM

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Unify And Simplify

Fabric Extender and VN-Link simplify server access management
Unify And Simplify

- SAN A
- LAN
- SAN B
- Ethernet Switch Mgmt
- FC Switch Mgmt
- Chassis Mgmt
- Fibre Channel Blade Switch Mgmt

- Hypervisor
- VM
- OS
Unify And Simplify

Unified Fabric simplifies I/O infrastructure and management while maintaining Enterprise-class high-availability
Unify And Simplify

Hypervisor

VM

OS

LAN

SAN A

SAN B

Ethernet Switch Mgmt

Chassis Mgmt
Unify And Simplify

Cisco UCS consolidates server infrastructure into a single point of management.
Unify And Simplify

Cisco UCS consolidates server infrastructure into a single point of management.
## UCS Building Blocks

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UCS Manager</strong></td>
<td>Embedded – manages entire system</td>
</tr>
<tr>
<td><strong>UCS Fabric Interconnect</strong></td>
<td>32-48 Port 10Gb FCoE</td>
</tr>
<tr>
<td><strong>UCS Fabric Extender</strong></td>
<td>Remote line cards</td>
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<tr>
<td><strong>UCS Blade Server Chassis</strong></td>
<td>Flexible bay configurations</td>
</tr>
<tr>
<td><strong>UCS Blade Server</strong></td>
<td>Industry-standard architecture</td>
</tr>
<tr>
<td><strong>UCS Virtual Adapters</strong></td>
<td>Choice of multiple adapters</td>
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</table>
UCS Building Blocks

**UCS Manager**
Embedded – manages entire system

**UCS Fabric Interconnect**
32-48 Port 10Gb FCoE

**UCS Fabric Extender**
Remote line cards

**UCS Blade Server Chassis**
Flexible bay configurations

**UCS Blade Server**
Industry-standard architecture

**UCS Virtual Adapters**
Choice of multiple adapters
Unified Computing System Manager

- Embedded device manager for family of UCS components
- Enables stateless computing via Service Profiles
- Efficient scale: Same effort for 1 or N blades
- Access via GUI, CLI, or standards-based API
- APIs for integration with new and existing data center infrastructure
UCS 6100 Series Fabric Interconnects

- 10 Gigabit Ethernet, FCoE capable, SFP+ ports
- 20 and 40 fixed port versions with Expansion slots for additional Fiber Channel and 10 GE connectivity
- 1/2/4/8 Gigabit FC Uplinks available
- Up to to 1 Tbps of throughput
- Hot pluggable fan and power supplies
- Hardware based support for Cisco VN-Link technology

Architected for up to 40 chassis per UCS system
UCS 6200 Series Fabric Interconnects

- 10 Gigabit Ethernet, FCoE and FC capable, SFP+ ports
- 32 fixed Unified Ports with Expansion slot for additional 16 Unified Ports
- Up to 1 Tbps of throughput
- Hot pluggable fan and power supplies

Architected for up to 40 chassis per UCS system
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- 10 Gigabit Ethernet, FCoE and FC capable, SFP+ ports
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- Up to 1 Tbps of throughput
- Hot pluggable fan and power supplies

Architected for up to 40 chassis per UCS system
UCS 2100 & 2200 Series Fabric Extenders

- Connects UCS blade chassis to the Fabric Interconnect
- Remote-line card: logically part of the Fabric Interconnect
- Four or eight 10 Gigabit Ethernet, FCoE capable, SFP+ ports
- Up to 2 Fabric Extenders per chassis for redundancy and up to 160 Gbps of bandwidth per chassis
UCS 2100 & 2200 Series Fabric Extenders

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- Up to 2 Fabric Extenders per chassis for redundancy and up to 160 Gbps of bandwidth per chassis
UCS 5108 Blade Chassis

- Up to 8 half slot blades
- Up to 4 full slot blades
- 4x power supplies, N+N grid redundant
- 8x fans included
- 2x UCS 2104 or 2208 Fabric Extender
- All items hot-pluggable

Up to 40 chassis per UCS system
UCS 5108 Blade Chassis

- Up to 8 half slot blades
- Up to 4 full slot blades
- 4x power supplies, N+N grid redundant
- 8x fans included
- 2x UCS 2104 or 2208 Fabric Extender
- All items hot-pluggable

Up to 40 chassis per UCS system
UCS Server Portfolio

C260 M2
2-Socket Intel E7-2800, 16 Disks, 64 DIMM, 6 PCIe 2U
## UCS Server Portfolio

<table>
<thead>
<tr>
<th>Blade</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B200 M2</td>
<td>2-Socket Intel 5600, 2 SFF Disk, 12 DIMM</td>
</tr>
<tr>
<td></td>
<td>B250 M2</td>
<td>2-Socket Intel 5600, 2 SFF Disk, 48 DIMM</td>
</tr>
<tr>
<td></td>
<td>B230 M2</td>
<td>2-Socket Intel E7-2800, 2 SSD, 32 DIMM</td>
</tr>
<tr>
<td></td>
<td>B440 M2</td>
<td>4-Socket Intel E7-4800, 4 SFF Disk, 32 DIMM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rack Mount</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C200 M2</td>
<td>2-Socket Intel 5600, 4 Disks, 12 DIMM, 2 PCIe 1U</td>
</tr>
<tr>
<td></td>
<td>C210 M2</td>
<td>2-Socket Intel 5600, 16 Disks, 12 DIMM, 5 PCIe 2U</td>
</tr>
<tr>
<td></td>
<td>C250 M2</td>
<td>2-Socket Intel 5600, 8 Disks, 48 DIMM, 5 PCIe 2U</td>
</tr>
<tr>
<td></td>
<td>C260 M2</td>
<td>2-Socket Intel E7-2800, 16 Disks, 64 DIMM, 6 PCIe 2U</td>
</tr>
<tr>
<td></td>
<td>C460 M2</td>
<td>4-Socket Intel E7-4800, 12 Disks, 64 DIMM, 10 PCIe 4U</td>
</tr>
</tbody>
</table>
UCS B200 M2 Blade

- Stateless design
- 2x Intel Xeon 5600 Series Processors
- 12x DIMM slots - up to 192GB RAM
- 2x SFF optional SAS hot-plug hard drives
- RAID 0, 1, 0+1
- 1x 10Gb dual port mezzanine adapter
- Remote and local access to keyboard, video, mouse, serial
- Integrated with UCS Manager

Up to 8 blades per UCS 5108 Blade Chassis
UCS B250 M2 Blade

- Stateless design
- 2x Intel Xeon 5600 Series Processors

- 2x SFF optional SAS hot-plug hard drives
- RAID 0, 1, 0+1

- Remote and local access to keyboard, video, mouse, serial
- Integrated with UCS Manager

Up to 4 blades per UCS 5108 Blade Chassis
UCS B250 M2 Blade

- Stateless design
- 2x Intel Xeon 5600 Series Processors
- 48x DIMM slots - up to 384GB RAM
- 2x SFF optional SAS hot-plug hard drives
- RAID 0, 1, 0+1
- 2x 10Gb dual port mezzanine adapter
- Remote and local access to keyboard, video, mouse, serial
- Integrated with UCS Manager

Up to 4 blades per UCS 5108 Blade Chassis
UCS B230 M2 Blade

- Stateless design
- 2x Intel E7-2800 Series Processors
- 32x DIMM slots, up to 512GB RAM
- 2x optional SSD hot-plug hard drives
- 1x 10Gb dual port mezzanine adapter
- Remote and local access to keyboard, video, mouse, serial
- Integrated with UCS Manager

Up to 8 blades per UCS 5108 Blade Chassis
UCS B440 M2 Blade

- Stateless design
- 4x Intel E7-4800 Series Processors
- 32x DIMM slots, up to 512GB RAM
- 4x optional SFF SAS or SSD hot-plug hard drives
- RAID 0, 1, 5, 6 and nested RAID options
- Optional battery backed cache
- 2x 10Gb dual port mezzanine adapter
- Remote and local access to keyboard, video, mouse, serial
- Integrated with UCS Manager

Up to 4 blades per UCS 5108 Blade Chassis
Cisco UCS B230 M2 Single Rack

- 48 Blade single rack solution
- Balanced across all dimensions
  - Processing: 960 Intel EX cores
  - Memory: 24 TB
  - I/O: 960Gb
Cisco UCS B230 M2 Single Rack

- 48 Blade single rack solution
- Balanced across all dimensions
  - Processing: 960 Intel EX cores
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  - I/O: 960Gb

Reality check: don’t try this at home ;-)!

Why? Power & Cooling per Rack! Nearly 20 kW!
### Dual port 10Gb adapters

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Interfaces</th>
<th>Interface Type</th>
<th>VN-Link</th>
<th>Ethernet NIC Teaming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco UCS 82598KR CI 10-GE Adapter</td>
<td>2</td>
<td>Fixed</td>
<td>Software</td>
<td>Software, via bonding driver</td>
</tr>
<tr>
<td>Cisco UCS M71KR-Q CNA</td>
<td>4</td>
<td>Fixed</td>
<td>Software</td>
<td>Software, via bonding driver</td>
</tr>
<tr>
<td>Cisco M71KR-E CNA</td>
<td>4</td>
<td>Fixed</td>
<td>Software</td>
<td>Software, via bonding driver</td>
</tr>
<tr>
<td>Cisco UCS M81KR VIC</td>
<td>128</td>
<td>Dynamic</td>
<td>Hardware/Software</td>
<td>Hardware, no driver needed</td>
</tr>
</tbody>
</table>
Cisco’s Rack Server Portfolio
UCS C-Series Rack Server Portfolio

- High Density 1U Server
- Economical, High-capacity 2U Server
- Memory Intensive 2U Server
- Memory/Disk Intensive 2U Server
- Performance Optimized Server
- Price / Performance Optimized Servers

Scalability / Performance 4U Server

UCS C460 M2

UCS C250 M2

UCS C260 M2

UCS C200 M2

UCS C210 M2

UCS C200 M2
New 2U, Westmere-EX based 2 socket server with extended memory
- Max 20 cores with up to 1TB of memory
- Uses regular or extended memory riser boards and the regular memory risers do not bear the cost of extended memory
- Up to 64 DIMMs using extended memory riser boards
- Up to 32 DIMMs with regular riser boards

Up to 16 SFF disk drives (2.5”’) HDD or SSD
- Up to 1GB of flash-backed cache

Six PCIe slots, 2 x 10GbE SFP+ LOMs and 4 x 1GbE LOMs

Internal redundant flash ports and a USB port

Front KVM console and LEDs consistent with the C250
Cisco Unified Computing System
Racks + Racks/Blades + Blades

- Unified Fabric
- VM FEX and Adapter FEX
- UCS Manager
- Automated provisioning—service profiles
- Racks only
- Racks + Blades
- Blades only
Integration With UCSM

![Cisco Unified Computing System Manager - UCS-TME LAB](image)

**Fault Summary**

- **Status**
  - Overall Status: ok

**Actions**

- Create Service Profile
- Boot Server
- Shutdown Server
- Reset
- Recover Server
- Server Maintenance
- KVM Console
- SSH to CIMC For Solar
- Turn on Locator LED
- View POST Results

**Physical Display**

- **Properties**
  - ID: 1
  - Product Name: Cisco UCS C200 M2
  - Vendor: Cisco Systems Inc
  - Serial Number: 000000000000000
  - Name: [Name]
  - User Label: [User Label]
  - UUID: 8be840c4-510f-11de-0000-000000000000
  - Service Profile: org/123
  - Locator LED:

- **Summary**
  - Number of Processors: 2
  - Cores: 12
  - Threads: 24
  - Effective Memory (MB): 49152
  - Total Memory (MB): 49152
  - Adaptors: 1
  - NICs: 54
  - HBAs: 1

- **Part Details**
- **Connection Details**
- **Boot Order Details**

**Logged in as admin@172.25.177.225**

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Key Innovations
1 - UCS Service Profiles
Hardware State Abstraction

- LAN Connectivity
- OS & Application
- SAN Connectivity

MAC Address
NIC Firmware
NIC Settings
Drive Controller F/W
Drive Firmware
UUID
BIOS Firmware
BIOS Settings
Boot Order
WWN Address
HBA Firmware
HBA Settings

State abstracted from hardware

✓ Separate firmware, addresses, and parameter settings from server hardware
✓ Separate access port settings from physical ports
✓ Physical servers become interchangeable hardware components
✓ Easy to move OS & applications across server hardware
Embedded Unified Management

- Unified Management Domain
  - Automatic discovery
  - Dynamic Provisioning
- Building Block for Dynamic Data Center
  - Simplify management of infrastructure for ESX clusters and datacenters
  - One-click configuration of LAN, SAN and firmware parameters
Embedded Unified Management

- Unified Management Domain
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  - Simplify management of infrastructure for ESX clusters and datacenters
  - One-click configuration of LAN, SAN and firmware parameters

Service Profile: ESXi
- Network: VLAN10,20,30, QoS
- MAC: 08:00:69:02:01:FC
- WWN: 5080020000075740
- BIOS: Version 1.42
- Boot Order: LAN, SAN
- Power Priority: Low
Embedded Unified Management

- Unified Management Domain
  - Automatic discovery
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- Building Block for Dynamic Data Center
  - Simplify management of infrastructure for ESX clusters and datacenters
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- BIOS: Version 1.42
- Boot Order: LAN,SAN
- Power Priority: Low
Wire once for bandwidth, not connectivity
All links can be active at the same time: no STP
2 - Unified I/O

Wire Once Architecture

✔ Wire once for bandwidth, not connectivity
✔ All links can be active at the same time: no STP
Mgmt

LAN A

LAN B

SAN A

SAN B
CNA View On Host

2x 10 GE/FCoE

Cisco ASIC

10 GE

Fibre Channel

10 GE

FC

PCle Bus
CNA View On VMware ESX - Fibre Channel HBA

Qlogic

Emulex
This is a B200 Blade with 2 physical 10GE ports, but the ESXi hosts sees 4x 10GE.
This is thanks to the VIC Ethernet NIC capabilities.
3 - Virtualized Adapter
Cisco UCS M81KR VIC

✓ Converged Network Adapter designed for both single-OS and VM-based deployments
   ✓ Virtualize in Hardware
   ✓ PCIe compliant

✓ High Performance
   ✓ 2x 10Gb
   ✓ >500K IOPS

✓ The OS/Hypervisor sees up to 128 distinct PCIe devices
   ✓ Ethernet vNIC and FC vHBA
   ✓ Management from the network

✓ VN-Link in Hardware – Ideal for Virtualization Environments
   ✓ Bypass vSwitch to deliver VN-Link in hardware
   ✓ Tight integration with VMware vCenter
UCS 1280 VIC

Side A

Side B

256 devices
2nd Gen Virtual Interface Card - Q4CY11
Cisco UCS VIC1280

✔ Dual 4x 10 GE port-channels to a single server slot
✔ Host connectivity PCIe Gen2 x16
✔ PCIe Gen 2 x16 bandwidth limit is 32 Gbps
✔ HW capable of 256 devices
  ✔ OS restrictions apply
Cisco UCS With Memory Extension

- 48 DIMMs
- Max 384GB
- Higher Performance

Classic

- 12 DIMMs
- Max 96GB
- Higher Performance

- 18 DIMMs
- Max 144GB
- Lower Performance
4 - Optimizing Memory with the Xeon 5600

Classic

- 12 DIMMs
- Max 96GB
- Higher Performance

- 18 DIMMs
- Max 144GB
- Lower Performance

Cisco UCS With Memory Extension

- 48 DIMMs
- Max 384GB
- Higher Performance
5 - Embedded UCS Manager
Complete Programmatic API

- UCS Manager GUI based on Java Web Start
- Multi-Tenancy capabilities, RBAC
- Standards-based XML API
- Bi-Directional access to physical & logical internals
$1.1 Billion Annualized Run Rate, 129% year over year growth

7,400 UCS Customers; 2,620 repeat customers with average 3.4 repeat buys

350 ATP Channel Partners for UCS B-Series; All for UCS C-Series; Active Distis with Configuration to Order Capability

Ten of Thousands of supported applications

44+ World Record Performance Benchmarks to date

44+ ISVs writing to UCS API
  - UCS Emulator Guide downloaded over 15,960 times
  - XML model information Guide downloaded over 7,467 times
# UCS Performance Records In 25 Months—16 UCS C-Series Records And Counting

<table>
<thead>
<tr>
<th>Spec Test</th>
<th>Model</th>
<th>Year</th>
<th>Quarter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECjbb2005 X86/64 2-socket B200 M2</td>
<td>SPECOMPL base2001 4-socket C460 M1</td>
<td>Q2 CY09</td>
<td>16 UCS C-Series Records And Counting</td>
<td></td>
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<tr>
<td>SPECOMPL base2001 2-socket B200 M2</td>
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<tr>
<td>SPECOMPM base2001 2-socket B200 M2</td>
<td>SPECjbb2005 X86/64 2-socket B230 M1</td>
<td>Q3 CY10</td>
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<tr>
<td>SPECfp_rate_base 2006 X86/64 2-socket B200 M2</td>
<td>SPECjbb2005 X86/64 4-socket C460 M1</td>
<td>Q4 CY10</td>
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<td>SPECfp_rate_base 2006 X86/64 2-socket B200 M2</td>
<td>SPECfp_rate_base 2006 X86/64 4-socket C460 M1</td>
<td>Q1 CY11</td>
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<td>SPECfp_rate_base 2006 X86/64 4-socket C460 M1</td>
<td>Q2 CY11</td>
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<td></td>
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</table>
Consider Some Facts

- HP has lost nearly 6 points of WW market share in blades since UCS entered the market.
- Dell had nearly a decade head-start in the blade market. UCS has surpassed them in 2 years.
- HP entered the Ethernet switching market years ago and ended 2010 with 10.3% market share. Cisco entered the blade server market in 2009 and presently holds 10.4% share.

IDC Worldwide Quarterly Server Tracker, Q1 2011, May 2011 and IDC Q4 CY10 Server Forecaster
Dell’Oro L 2-3 Ethernet Vendor Table Q4 2010. L 2/3 Switching manufacturer revenue share for combined HP and 3Com for CY2010.