Unified Computing System: Architecture & Solutions

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Systems Engineer
Cisco Unified Computing System
Fastest Growing Product in the Market

30,000+ UNIQUE UCS CUSTOMERS\(^2\)

#2 WW Market Share in x86 Blades\(^1\)

$2B+ UCS Annualized Revenue Run Rate\(^2\)

3,600+ UCS CHANNEL PARTNERS

Top 5 Server Vendor\(^1\)

More Than 75% of All Fortune 500 Customers Have Invested in UCS

90 World Record Performance Benchmarks to Date

\(^1\)IDC Worldwide Quarterly Server Tracker, Q413, February 2014, Revenue Share
\(^2\)As of Cisco Q3FY13 earnings results
UCS momentum is fueled by game-changing innovation; Cisco is quickly passing established players.

UCS x86 Blade servers revenue grew 46% Y/Y in Q3CY13.

Customers Have Spoken

UCS #2 in Only 4 Years

Maintained #2 in Americas (28.7%), #2 in North America (29.9%), and #2 in the US (30.4%).

Maintained #2 worldwide in x86 Blades with 22.0%.

Cisco Connect, Riyadh, Saudi Arabia, April 29-30, 2014
They Said It Couldn’t Be Done

Customer Demand for Innovation Fuels UCS Growth

Demand for Data Center Innovation Has Vaulted Cisco Unified Computing System (UCS) to the #2 Leader in the Fast-Growing Segment of the x86 Server Market
**Cisco UCS Performance: 90 Records**

A History of World Record Performance on Industry-Standard Benchmarks

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Cisco UCS benchmarks that held world record performance records as of date of publication.

Cisco Connect, Riyadh, Saudi Arabia, April 29-30, 2014
Unified Computing System (UCS)
Subject matter experts consumed by manual configuration chores

Serial processes and multiple touches inhibit provisioning speed

Configuration drift and maintenance challenges

QoS settings
- Border port assignment per vNIC
- NIC transmit/receive rate limiting

VLAN assignments for NICs
- VLAN tagging config for NICs

Number of vNICs
- PXE settings
- NIC firmware
- Advanced feature settings

Remote KVM IP settings
- Call home behavior
- Remote KVM firmware

Server UUID
- Serial over LAN settings
- Boot order
- IPMI settings
- BIOS scrub actions
- BIOS firmware
- BIOS settings

FC fabric assignments for HBAs

Number of vHBAs
- HBA WWN assignments
- FC boot parameters

RAID settings
- Disk scrub actions

Compute, LAN, SAN Seamlessly Through Software
Cisco Unified Computing System

SAN A
Any ANSI T11 Compliant SAN

LAN
Any IEEE Compliant LAN

SAN B
Any ANSI T11 Compliant SAN

One Logical Chassis to Manage 160 Servers

LAN Connectivity
SAN Connectivity
Multiple Chassis
Blade & Rack Servers
Server Identity Management
Monitoring, Troubleshooting
Cisco UCS Architecture

- **UCS Manager**
  - APIs
  - XML API
  - Standard APIs

- **Fabric Interconnects**

- **Fabric Extenders**

- **Compute**
Unified Management

A Single Unified System
For Blade and Rack Servers

- Integral part of UCS system
- Manages all aspects of the UCS
- Single point of management for UCS

- Open API
- Integrated Automation
- Add capacity without complexity
UCS Benefits

Unified Management

Industry-leading compute without compromise

High Performance Virtual Networks

Highest Scale Unified Fabric

Fabric Interconnects

Virtual Adapters

Fabric Extenders

UCS C-series

UCS B-Series
Building Blocks of Cisco UCS
An Integrated System Optimizes Data Center Efficiency

UCS Manager
• Embedded—manages entire UCS Domain

Fabric Interconnect
• 10GE unified fabric switch

Chassis IO Module
• Remote line card

Blade Server Chassis
• Flexible bay configurations

Blade and Rack Servers
• x86 industry standard
• Patented extended memory

I/O Adapters
• Choice of multiple adapters
System Component Connectivity

- **Fabric Interconnect**
  - 32 Fixed Unified Ports + 4 or 1 Expansion slots to a maximum of 48 or 96 Unified Ports

- **Chassis**
  - Upto 8 half width blades or 4 full width blades

- **Fabric Extender**
  - Host to uplink traffic engineering
  - Up to 160Gb Flexible bandwidth allocation

- **Adapter**
  - Virtualized adapter for single OS and hypervisor systems
Wire for Bandwidth, Not Connectivity

- Wire Once Architecture
- All links can be active all the time
- Policy-driven bandwidth allocation
- Virtual interface granularity
Simplify your Data Center

What does your Data Center organization look like?

From ad hoc and inconsistent…

…to structured, but siloed, complicated and costly…

…to simple, optimized and automated
## Building Blocks

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Unified Computing System Manager

- Embedded device manager for family of UCS components
- Enables stateless computing via Service Profiles
- Efficient scale: Same effort for 1 to N blades
- APIs for integration with new and existing data center infrastructure
Repurpose Compute Resources in Minutes

- Production Subnet
- Pre-Production Subnet
- Other Production Subnet

Core Virtualized Apps

- General WWW Server
- Security Apps
- Offline Transcoding Application

Live Transcoding Application

Reporting

BMC Manager

Live Transcoding Application
UCS Manager

- Single point of management for UCS system of components
  - Adapters, blades, chassis, fabric extenders, fabric interconnects
- Embedded device manager
  - Discovery, Inventory, Configuration, Monitoring, Diagnostics, Statistics Collection
  - Coordinated deployment to managed endpoints
- APIs for integration with new and existing data center infrastructure
  - SMASH-CLP, IPMI, SNMP
  - XML-based SDK for commercial & custom implementations
Management Protocols

- SNMP
- SMASH CLP
- CIM XML
- syslog
- Call-home
- UCS CLI and GUI
- UCS XML API
- IPMI
- Remote KVM
- Serial Over LAN
UCS Central
Unified Computing at Global Scale

- Unifies management of multi UCS domains
- Leverages UCS Manager technology
- Simplify global operations with centralized inventory, faults, logs, and server consoles

- Delivers global policies, service profiles, ID pools, and templates
- Foundation for high availability, disaster recovery, and workload mobility
- Model based API for large scale automation
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UCS 6200UP Fabric Interconnect

**6248UP Feature details**
- High Density 48 ports in 1RU
- 1Tbps Switching capability
- All ports can be used as uplinks or downlinks
- All ports can be configured to support either 1Gb or 10Gb speeds
- Unified Ports
- 1 Expansion slots
- 2us Latency
- 80 PLUS Gold PSUs
- Backward and forward Compatibility

**6296UP Feature details**
- High Density 96 ports in 2RU
- 2Tbps Switching capability
- All ports can be used as uplinks or downlinks
- All ports can be configured to support either 1Gb or 10Gb speeds
- Unified Ports
- 4 Expansion slots
- 2us Latency
- 80 PLUS Gold PSUs
- Backward and forward Compatibility
UCS Unified Ports
Dynamic Port Allocation: Lossless Ethernet or Fibre Channel

- Convert protocol support on the same port dynamically
- All ports on UCS 6200 Series
- 16-port Expansion Module for 6248UP and 6296UP

### Benefits
- Simplify switch purchase - remove ports ratio guess work
- Increase design flexibility
- Remove specific protocol bandwidth bottlenecks

### Use-cases
- Flexible LAN & storage convergence based on business needs
- Service can be adjusted based on the demand for specific traffic

Native Fibre Channel

Lossless Ethernet: 1/10GbE, FCoE, iSCSI, NAS

- Flexible LAN & storage convergence based on business needs
- Service can be adjusted based on the demand for specific traffic
UCS 6200 Expansion Module

UCS-FI-E16UP

- 16 “Unified Ports”
- Ports can be configured as either Ethernet or Native FC Ports
- Ethernet operations at 1/10 Gigabit Ethernet
- Fibre Channel operations at 8/4/2/1G
- Uses existing Ethernet SFP+ and Cisco 8/4/2G and 4/2/1G FC Optics
Unified Port Management

Unified Computing System Manager

Configure Base Card

Icons:
- Unconfigured
- FCoE Storage
- Uplink
- Monitor Port
- Storage
- Server
- Uplink Port Channel Member
- Monitor Port
- Appliance
- Appliance Port Channel Member
- Port Channel Member

Colors:
- Up
- Admin Down
- Fail
- Link Down

Buttons:
- Configure Base Card
- Configure GEM Card
- Finish
- Cancel
# Building Blocks

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 Mix blade types within enclosure                                               |
| **UCS Rack Servers**    | Different server types  
 Standalone or UCSM integrated                                                    |
| **UCS Adapters**        | Three adapter options  
 Mix adapters within blade                                                       |
UCS 2200XP I/O Module

2204 Feature details

- Increased uplink bandwidth
  - 4 x 10 Gig network-facing ports
- Double the server-facing bandwidth
  - 16 x 10 Gig = 4 per half width slot
- Two I/O Modules per chassis
  - 40Gbps to a single half-width blade (20Gbps left and right)
  - 80Gbps to a full-width blade
- Built in chassis management
- Fully managed by UCSM

2208 Feature details

- Double the uplink bandwidth
  - 8 x 10 Gig network-facing ports
- Quadruple the server-facing bandwidth
  - 32 x 10 Gig = 4 per half width slot
- Two I/O Modules per chassis
  - 80Gbps to a single half-width blade (40Gbps left and right)
  - 160Gbps to a full-width blade
- Built in Chassis Management
- Fully Managed by UCSM
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UCS 5108 Blade Chassis

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 2200 Fabric Extender
- All items hot-pluggable
UCS 5108 Blade Chassis Parts

- 2 Fabric Extenders
- 8 Fan Modules
- 4 Power Connectors
- 4 to 8 Blades
- 4 Power Supplies
- 6U, 19” Rack
UCS 5108 Blade Chassis Backplane

Redundant data and management paths
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UCS Compute Portfolio
Performance Optimized for Bare Metal, Virtualized, and Cloud Applications

Cisco UCS: Many Server Form Factors, One System
Industry-Leading Compute Without Compromise

**Scale Out**
- **UCS B22 M3**
  - Entry Blade Server for IT Infrastructure and Web Applications.
  - 2xE5-2400, 384 GB, 12 DIMMs

**Enterprise Performance**
- **UCS B200 M3**
  - Optimal Choice for VDI, Private Cloud, or Dense Virtualization/Consolidation Workloads.
  - 2xE5-2600 V2, 768 GB, 24 DIMMs

**Intensive/Mission Critical**
- **UCS B420 M3**
  - Enterprise Class, 4-Socket Blade for Large, Memory-Intensive Bare Metal and Virtualized Applications.
  - 4xE5-4600, 1.5 TB, 48 DIMMs

- **UCS B260 M4**
  - Mission-Critical, 2-Socket Blade for Large, CPU-Intensive Bare Metal and Virtualized Applications.
  - 2xE7 V2, 1.5 TB, 48 DIMMs

- **UCS B460 M4**
  - Mission-Critical, 4-Socket Blade for Large, CPU-Intensive Bare Metal and Virtualized Applications.
  - 4xE7 V2, 3 TB, 96 DIMMs
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Industry-Leading Compute Without Compromise

### Scale Out
- **UCS C24 M3**
  2xE5-2400 v2, 384 GB, 12 DIMMs

- **UCS C22 M3**
  Entry Rack Server for Distributed and Web Infrastructure Applications.
  2xE5-2400 v2, 384 GB, 12 DIMMs

### Enterprise Performance
- **UCS C240 M3**
  Ideal Platform for Big Data, ERP, and Database Applications.
  2xE5-2600 v2, 768 GB, 24 DIMMs

- **UCS C220 M3**
  Versatile, General Purpose Enterprise Infrastructure, and Application Server.
  2xE5-2600 v2, 512 GB, 16 DIMMs

### Intensive/Mission Critical
- **UCS C460 M4**
  Mission-Critical, 4-Socket Server for Large, CPU-Intensive Applications.
  4xE7-8800 v2, 6 TB, 96 GB DIMMs
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Adapters for B-Series M72KR-Q / M72KR-E

High Performance 10Gbps per port maximum throughput for high bandwidth SAN and LAN traffic
Full hardware offload for FCoE protocol processing
Full support for TCP/IP and Ethernet with enhancements
  - Priority-based Flow Control (802.1Qbb)
  - Jumbo frames
  - Checksum offloads
  - Segmentation offloads
Common driver for CNAs and HBAs

Full 10Gbps network performance with support both LAN and SAN traffic
Full hardware offload for FCoE protocol processing
Integrated data buffer and code space memory
Theoretical 10Gb FC throughput
Common driver for UCNAs and HBAs
Support for Jumbo frames
*Cannot do per priority pause on Ethernet traffic.*
I/O Adapters for B-Series M61KR-I / M51KR-B

Interface Type PCIe v2.0 (5.0GT/s)
Full support for TCP/IP and Ethernet with enhancements:
  - Priority-based Flow Control (802.1Qbb)
  - Jumbo frames
  - Checksum offloads
  - Segmentation offloads

Broadcom NetXtreme II 57711 Dual-Port 10 Gigabit Ethernet PCIe Adapter
  - iSCSI offload
  - Virtual LANs (VLANs), IEEE 802.1q
  - IEEE 802.3x flow control
  - TCP, IP, UDP checksum offload - TCP segmentation
  - iSCSI Boot capable
UCS 1280 VIC

Customer benefits

- 80 Gb I/O connectivity per adapter
- VM-FEX scale to 116 VM

Feature details

- Dual 4x10 Gbps port-channel to a single slot
- Host connectivity PCIe Gen2 x6
- HW Capable of 256 PCIe devices
  - OS restriction apply
- PCIe virtualization OS independent
- Single OS driver image for both VICs
- FabricFailover supported
- No user configuration required for 4x10Gb port channel
- Not limited to 10Gig bandwidth per vNIC
- Flows from each vNIC can be load balanced
Cisco Unified Computing System
Benefits Beyond Efficiency: More Effective IT

Single Unified System
Eliminates cost manual integration

Unified Management
Consistent, error free alignment of policy, configuration, and workload

Intelligent Infrastructure
Automates IT processes to support any workload in minutes

Unified Fabric
Lower infrastructure cost per server
Operational integration of physical and virtual

Server Innovations
Superior price/performance and IT productivity for lower cost of computing