Unified Computing System

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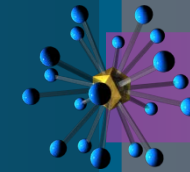
October, 2013

The Evolution Of Computing Architecture
From Mainframe to Today

Data Center 1.0

Data Center 2.0

Virtualization

Web

Client Server

Minicomputer

Data Center 3.0

Mainframe

| 1960 | 1970 | 1980 | 1990 | 2000 | 2010 |

The Evolution Of Computing Architecture

Data Center 1.0
Scale Up

Data Center 2.0
Scale Out

Data Center 3.0
Unified

1960   1970   1980   1990   2000   2010

The Evolution Of Computing Architecture

Data Center 1.0
Scale Up

Data Center 2.0
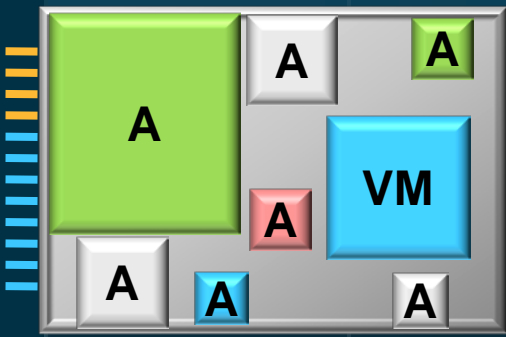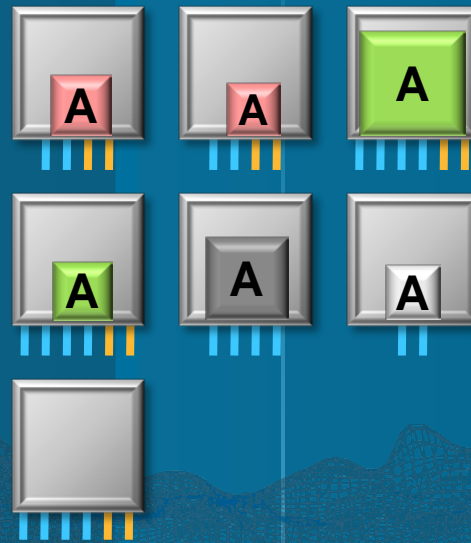Scale Out

Data Center 3.0
Unified

1960 1970 1980 1990 2000 2010
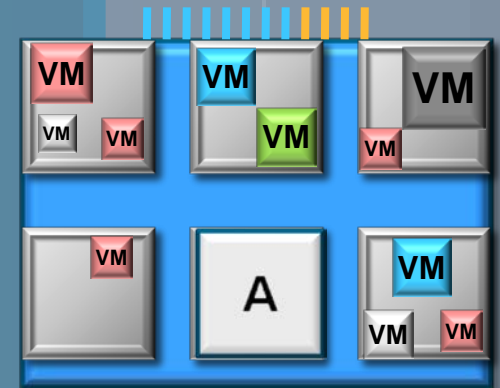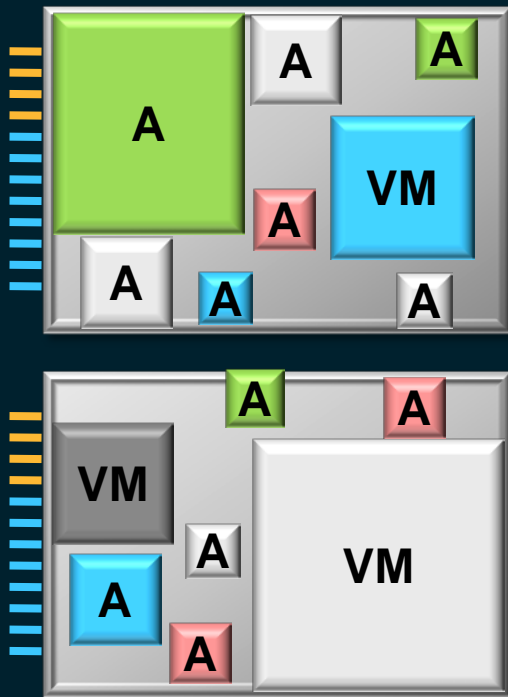
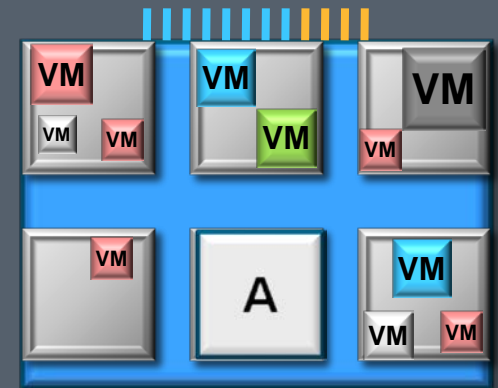# The Evolution Of Computing Architecture

Data Center 1.0
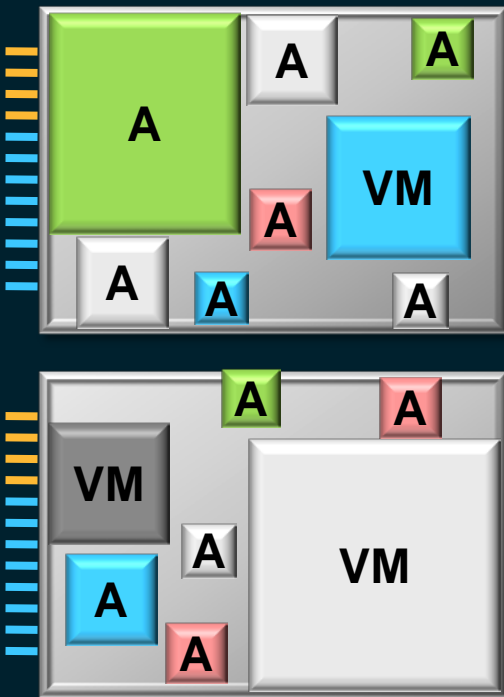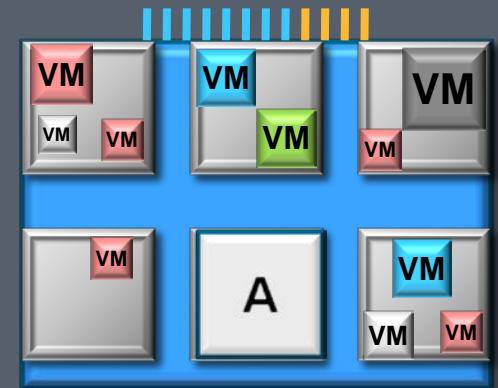Scale Up

Data Center 2.0
Scale Out

Data Center 3.0
Unified

The Evolution Of Computing Architecture

Data Center 1.0
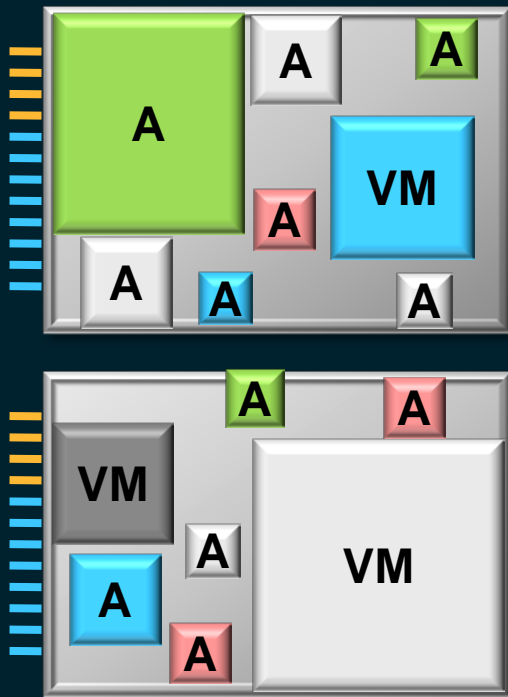Scale Up

Data Center 2.0
Scale Out

Data Center 3.0
Unified

The Evolution Of Computing Architecture

Unified Computing Architecture

Data Center 1.0
Scale Up

Data Center 2.0
Scale Out

Data Center 3.0
Unified

Data Center Economics

OVERALL SPEND DISTRIBUTION

- ■ People
- ■ Software
- ■ Energy / Facilities
- ■ Servers
- Networking
- ■ Storage
- ■ Disaster Recovery
- ■ Overhead

Pie chart values: 29%, 22%, 12%, 11%, 10%, 7%, 7%, 2%
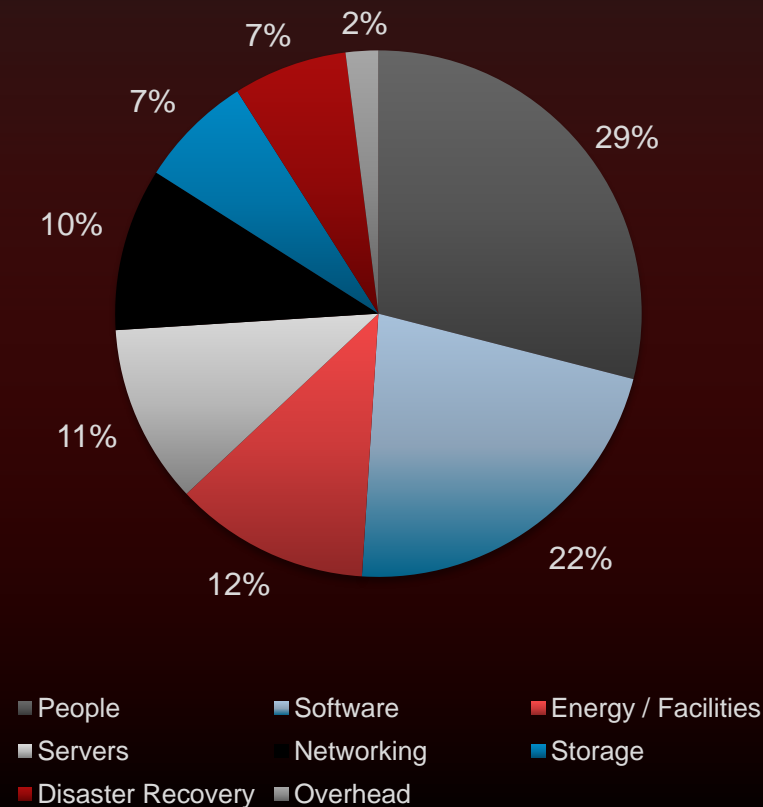
SERVER-RELATED SPEND (CAPEX+OPEX)
WW Spending on Servers, Power &Cooling,and Mgmt. / Administration

High OPEX

IDC, 2011

Customer Spending ($B): $300, $250, $200, $150, $100, $50, $0

Years: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013

- ■ Power & Cooling Expense
- ■ Mgmt. & Administration—Virtual Servers
- ■ Mgmt. & Administration—Standalone Servers
- ■ Server Spending
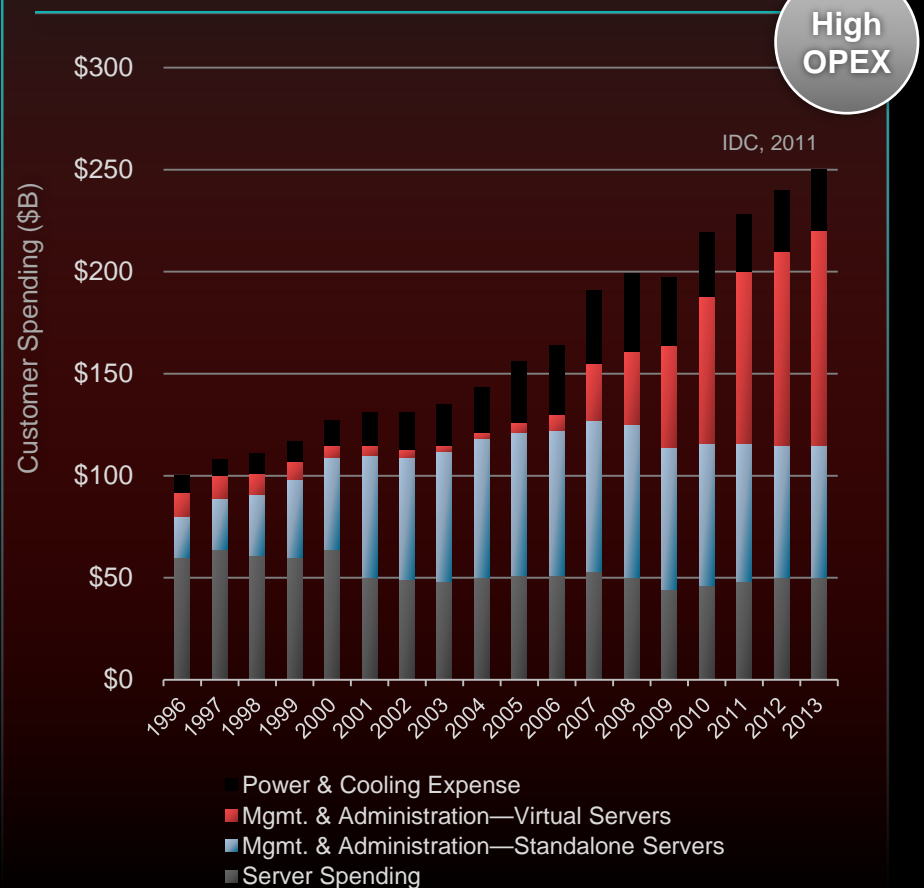
Unified Computing

- ## Self Integrating
  Faster deployment, higher reliability, higher productivity, fewer errors

- ## Embedded Management
  Simplified setup, increased control, lower costs

- ## Hardware state abstraction – Service Profiles
  Higher productivity, lower labor costs, fewer errors (no configuration drift)

- ## Unified Fabric
  Increase workload agility, lower costs, lower power, higher reliability, simplified setup, higher asset utilization, higher application performance

- ## Virtualized Adapters
  Higher workload agility, better VM performance, More workloads virtualized, lower cost per VM

Unifying the Data Center Fabric
Application Centric, not Server Centric

Management & Control

Primary Network

Secondary Network

Cisco Nexus
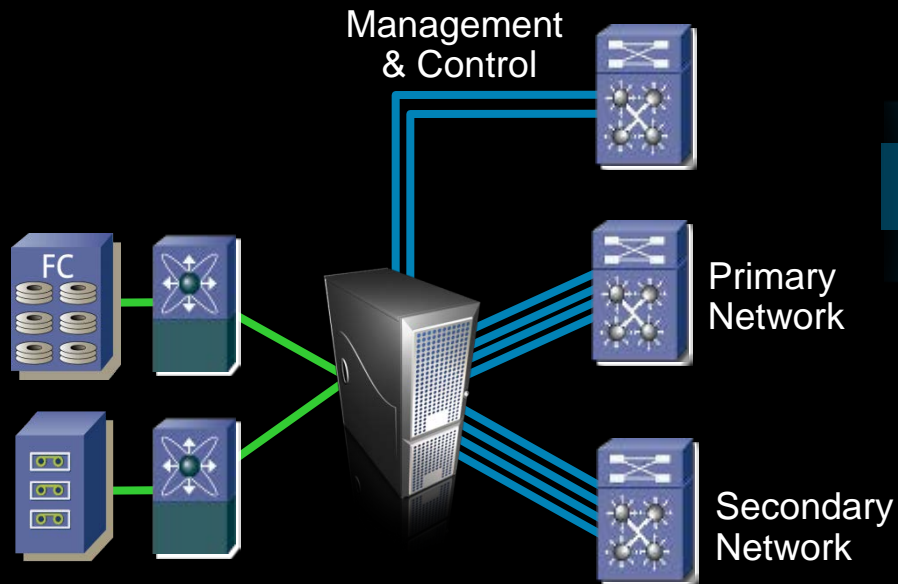
Legacy

Server = Application

- Inefficient
- Complex
- High Cost
- Fragile
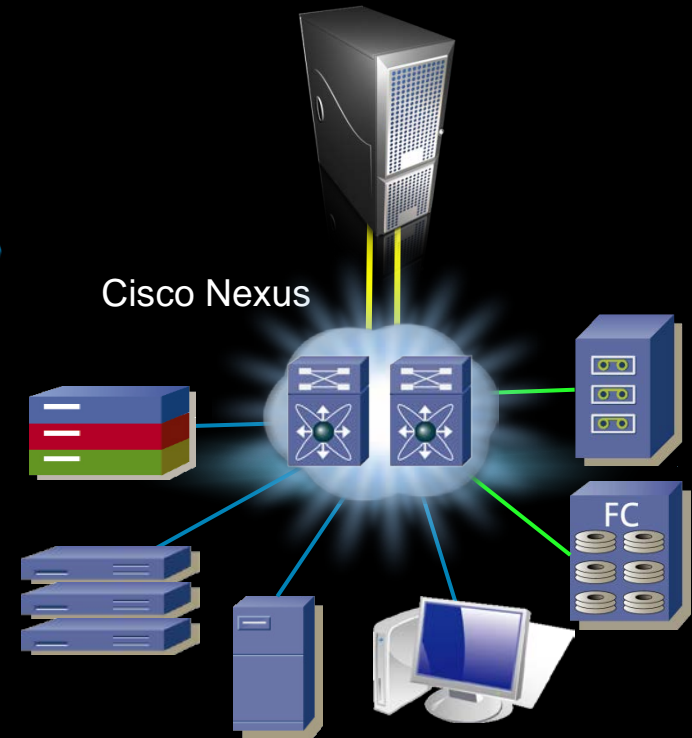
Unified

Server = Resource

- Efficient
- Simple
- Lower cost
- Agile

Legacy Fabric
Underutilized Resources, Stranded Bandwidth
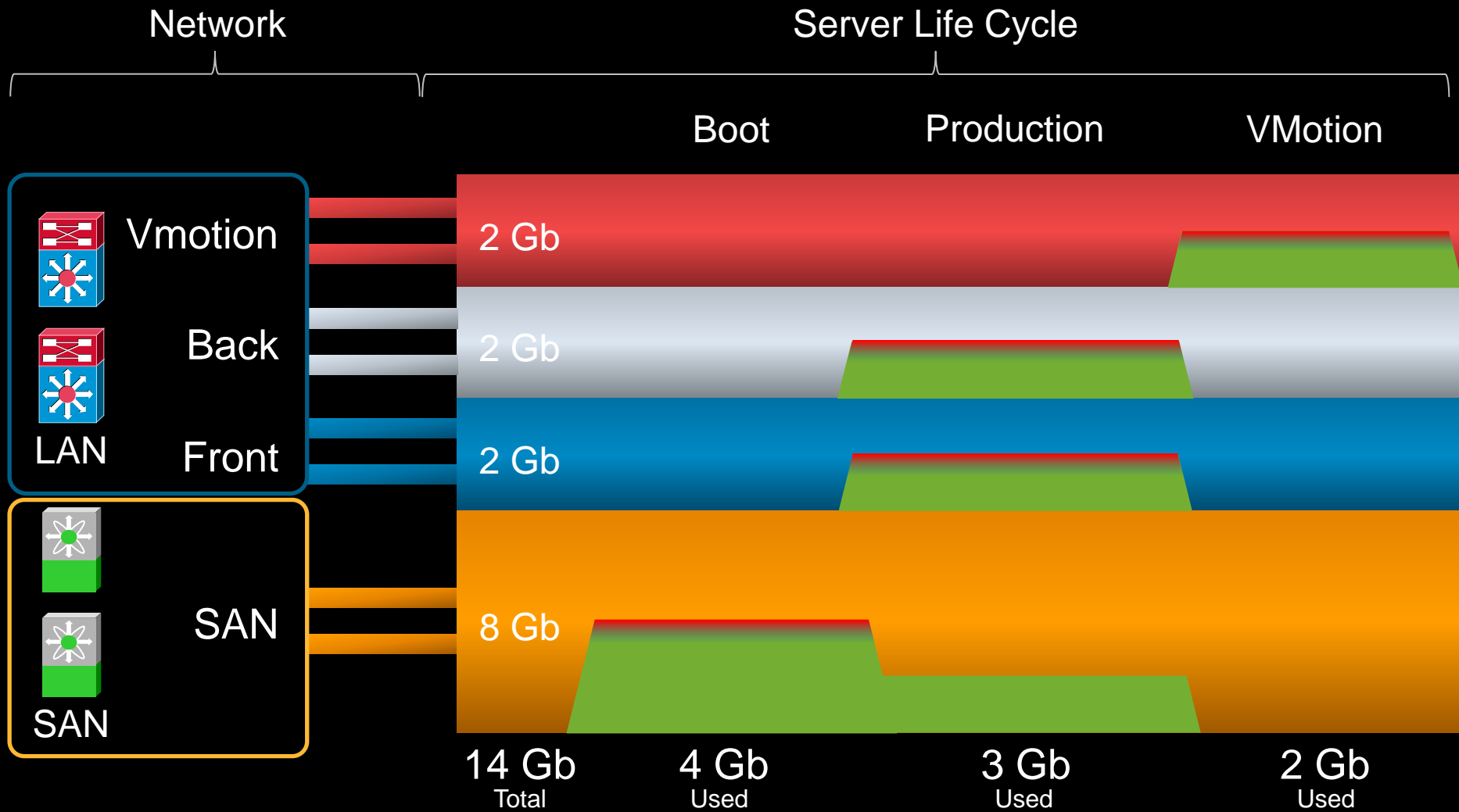
Network

Server Life Cycle

Boot

Production

VMotion

Vmotion

Back

LAN

Front

SAN

SAN

2 Gb

2 Gb

2 Gb

8 Gb

14 Gb
Total

4 Gb
Used

3 Gb
Used

2 Gb
Used

Unified Fabric

Lower cost: Half the switches, ¼ the adapters
Higher Capacity, Performance & Flexibility

Network

Server Life Cycle

Boot   Production   VMotion

Vmotion

Back

LAN   Front

2 Gb

2 Gb

20 Gb

Unified
Fabric   SAN

SAN

8 Gb

| 20 Gb | 4 Gb | 3 Gb | 2 Gb |
| Total | Used | Used | Used |

13
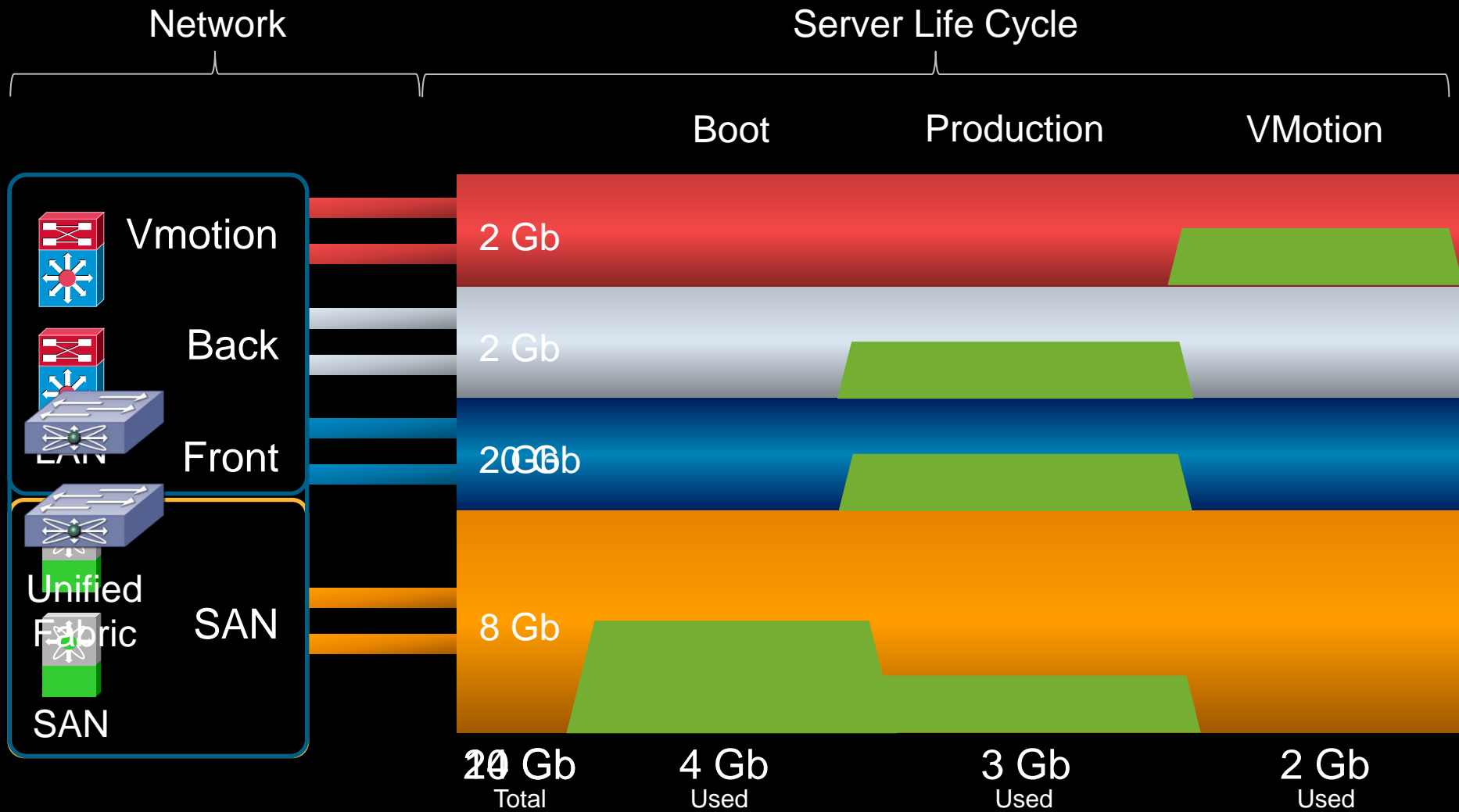
Unified Fabric

Lower cost: Half the switches, ¼ the adapters
Higher Capacity, Performance & Flexibility

Network   Server Life Cycle

Boot   Production   VMotion

Vmotion

Back

Front

Unified
Fabric   SAN

20 Gb

20 Gb
Total

10 Gb
Used

10 Gb
Used

20 Gb
Used

14

Modular Building Blocks

UCS Manager
Embedded– manages entire system

UCS Fabric Interconnect
20 Port 10Gb FCoE
40 Port 10Gb FCoE

UCS Fabric Extender
Remote line card

UCS Blade Server Chassis
Flexible bay configurations

UCS Compute Options
 Industry-standard architecture

UCS Virtual Adapters
Choice of multiple adapters

Modular Building Blocks

UCS Manager
Embedded– manages entire system

UCS Fabric Interconnect
20 Port 10Gb FCoE
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UCS Fabric Extender
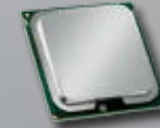Remote line card

UCS Blade Server Chassis
Flexible bay configurations

UCS Compute Options
 Industry-standard architecture

UCS Virtual Adapters
Choice of multiple adapters

16

UCS Fabric Topologies: Chassis Bandwidth Options
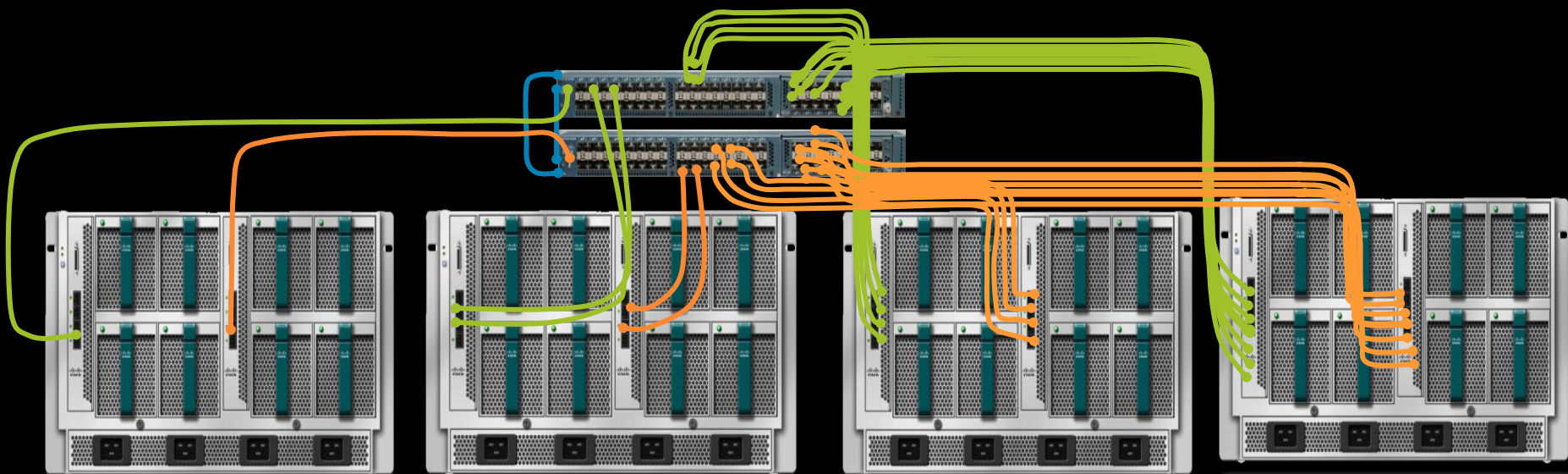
2x 1 Link
20 Gbps per Chassis

2x 2 Link
40 Gbps per Chassis

2x 4 Link
80 Gbps per Chassis

2x 8 Links
160 Gbps per Chassis

- Wire **once** for bandwidth, not connectivity

- Policy-driven bandwidth allocation

- All links can be active all the time

- Integrates as a single system into your data center

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UCS Features and Capabilities

Why is the UCS System Different?
Fewer Physical Components – Fully Integrated

UCS Manager
Service Profiles
Automation Friendly

UCS Fabric Interconnect
10GE Unified Fabric switch

UCS Fabric Extender
Remote line card
Two per chassis

UCS Virtual Interface Adapter
Creating NICs & HBAs in SW

UCS Blade and Rack Servers
x86 industry standard
Patented extended memory
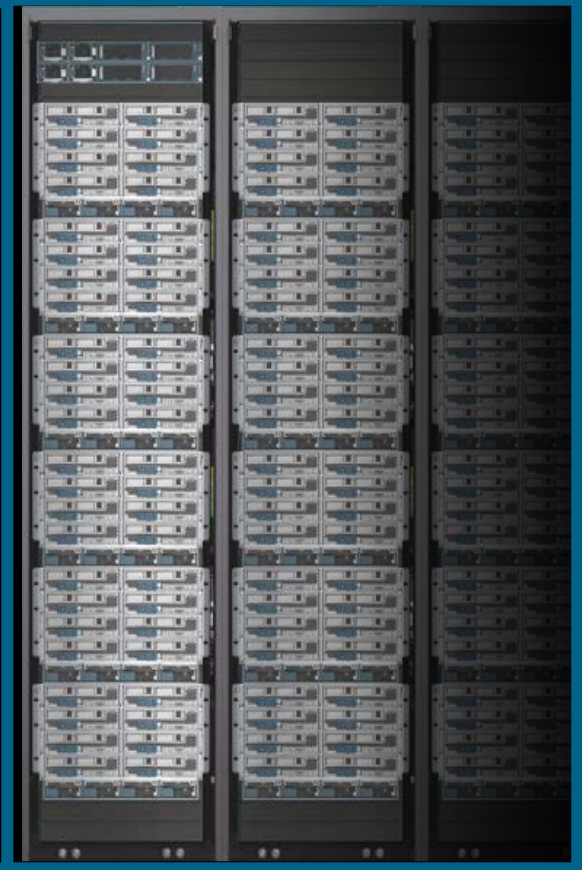
Stateless computing

Server Hardware

+

Service Profiles

=

Servers

Stateless Computing: UCS Service Profiles

Cisco UCS Service Profile

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

SAN

LAN

Zero Touch Integration
Decouple Complexity & Scale

Physical Inventory
Name: UCS 12
Class: System
ID: 77449-32
Chassis: 1
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8
Chassis: 2
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8
Chassis: 3
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8
Chassis: 4
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8
Chassis: 5
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

- Increase capacity, not complexity
- New equipment self integrates

Name: UCS 5108
Class: Chassis
ID: 234222-33
IOM 1: UCS 2104
IOM 2: UCS 2104
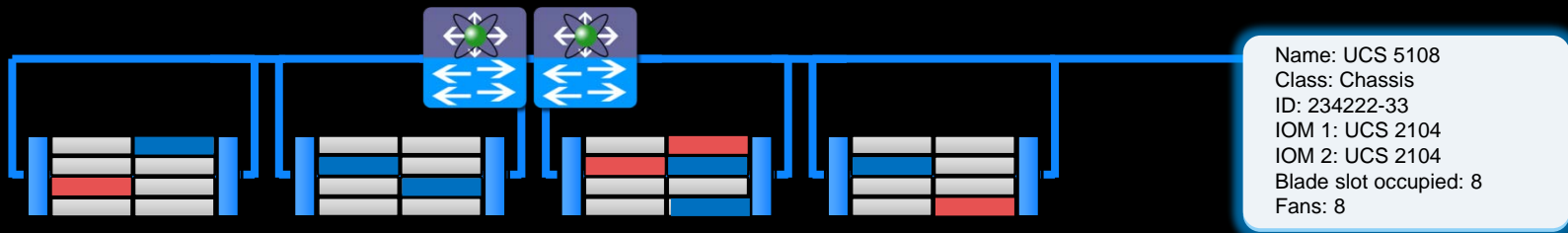Blade slot occupied: 8
Fans: 8

Zero Touch Integration
Decouple Complexity & Scale

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Chassis: 3
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8
Chassis: 4

Policy Inventory
Service Profile: Default 1
Service Profile: HR-App1
- Blade slots occupied: 8

- Increase capacity, not complexity
- New equipment self integrates
- Inventory & status updated
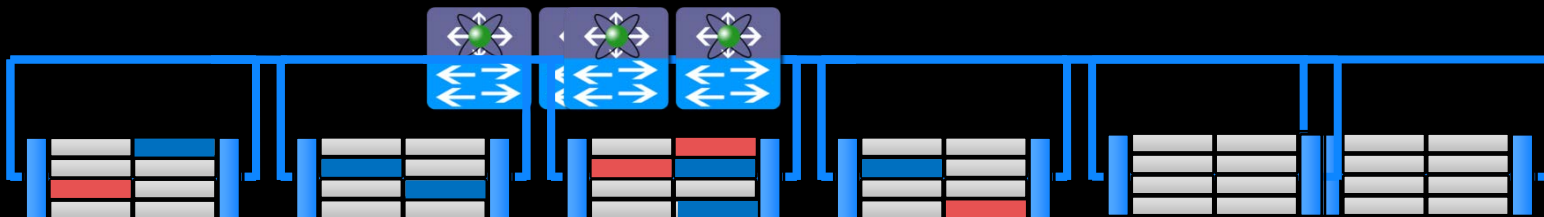
Zero Touch Integration
Decouple Complexity & Scale
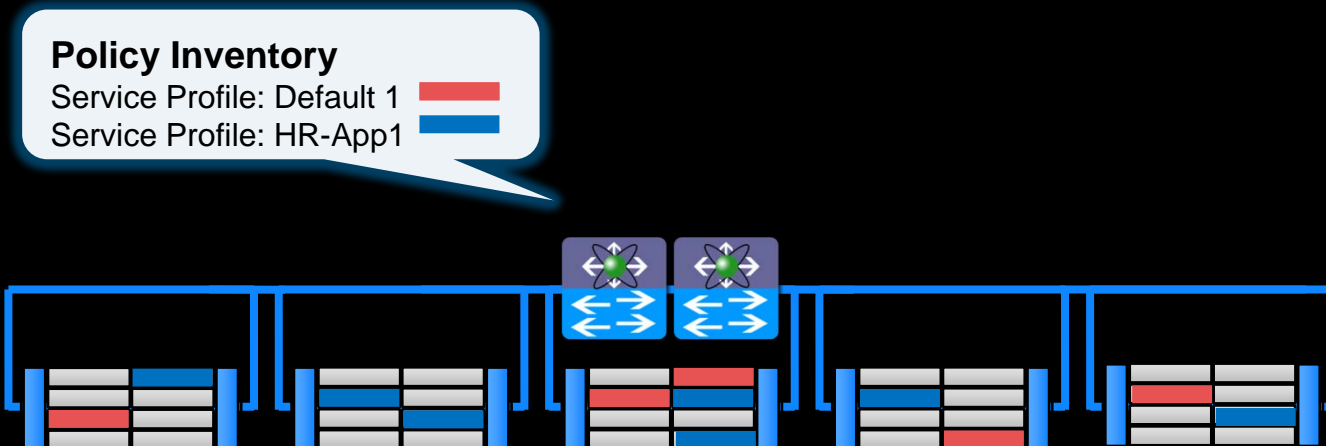
- Increase capacity, not complexity
- New equipment self integrates
- Inventory & status updated
- Immediately apply existing policies

Policy Inventory
Service Profile: Default 1
Service Profile: HR-App1

UCS vs Legacy Systems

Legacy Blade Architecture
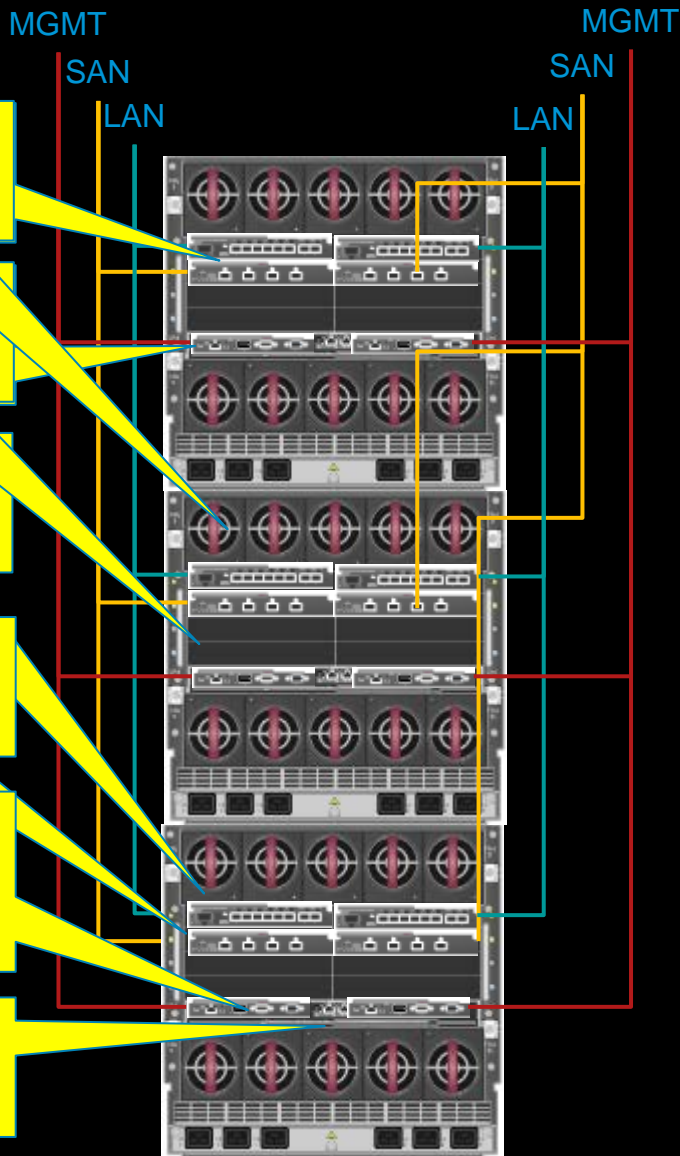
MGMT

SAN

LAN

Additional LAN & SAN Connections

Additional Management Connections

Multiple Ethernet Connections

Multiple SAN Connections

Separate Remote Management per Chassis

Multiple Management Modules

MGMT

SAN

LAN

- Over the past 10 years
  - An   not
    th
  - M   ches
    th
  - M   erver
  - Ma   d, not
    int

- An accio   re
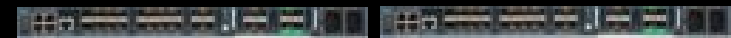
- Result:
  - M
    m
  - M   tain
    po
  - M   re
  - More difficult to scale

26
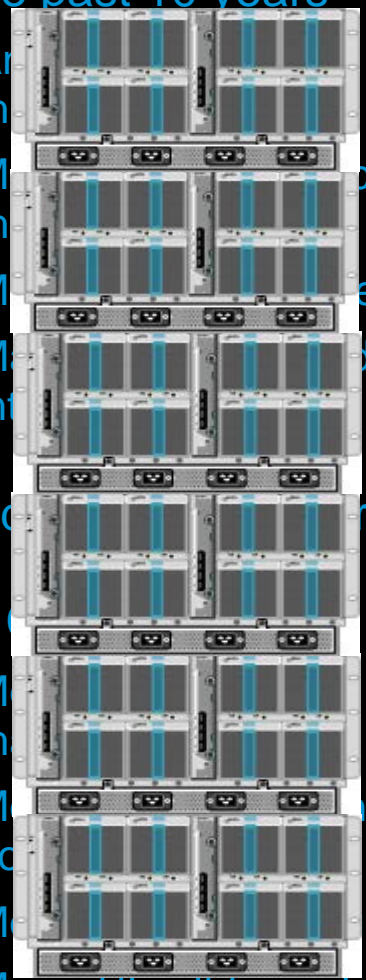
Cisco UCS – Reducing Complexity
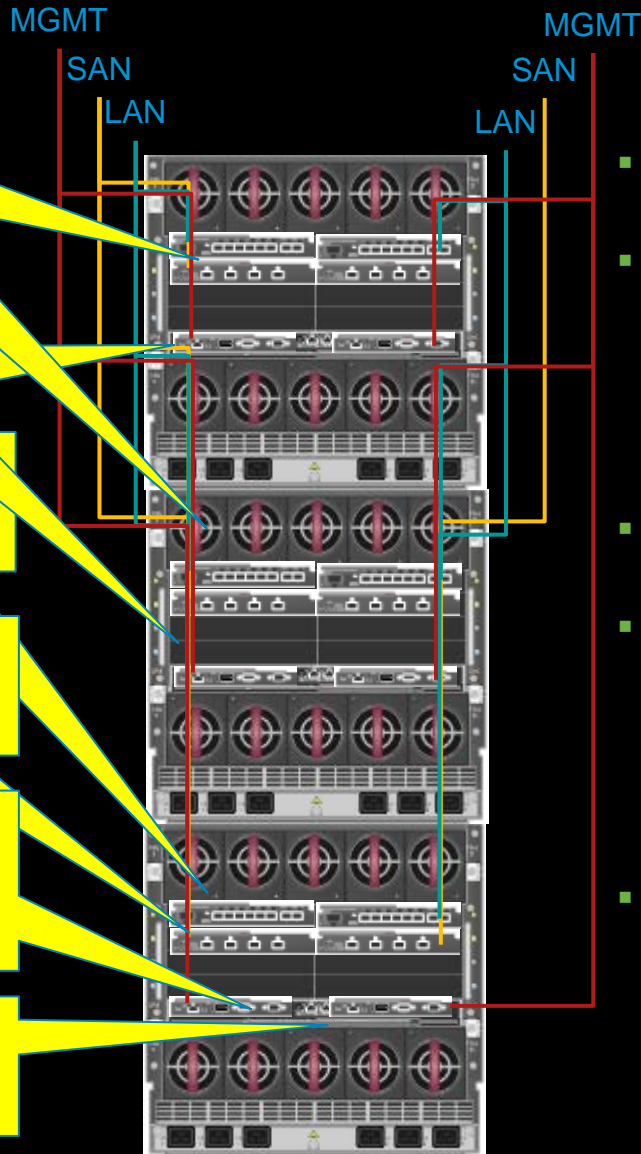
MGMT

MGMT

SAN

SAN

LAN

LAN

Additional LAN & SAN Connections

Additional Management Connections

Multiple Ethernet Connections

Multiple SAN Connections

Separate Remote Management per Chassis

Multiple Management Modules

- Embed management

- Remove unnecessary
  - Switches
  - Adapters
  - Management Modules

- Unify fabrics

- Power & Cooling
  - Less than 1/3rd the support infrastructure
  - 63% open design
  - Low power components

- Optimize virtualization
  - Processor Density
  - VM/host ratio
  - 20+% I/O improvement
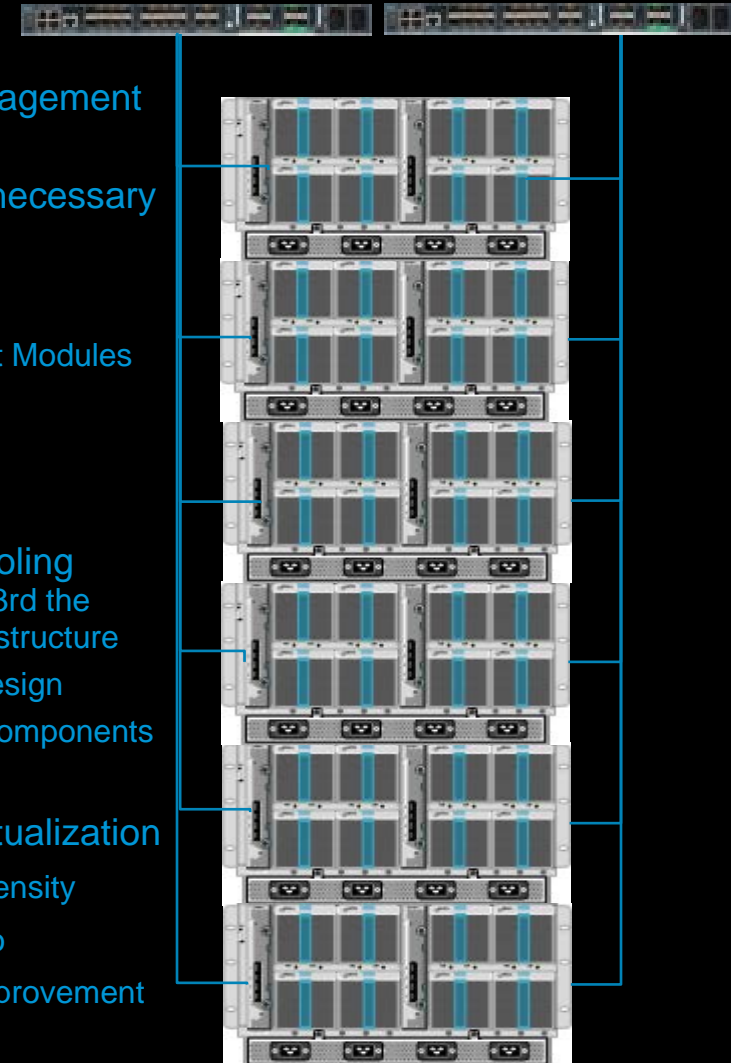
UCS **IS** Simplified Management

UCS Manager

One Interface

$$	HP Virtual Connect Enterprise Manager (VCEM)
	HP Insight Remote Support & Recovery
$$	HP Insight Power Manager
	HP Insight Manager(SIM)

Virtual Connect Manager	Virtual Connect Manager	Virtual Connect Manager	Virtual Connect Manager
$$ HP iLO Advanced for BladeSystem	$$ HP iLO Advanced for BladeSystem	$$ HP iLO Advanced for BladeSystem	$$ HP iLO Advanced for BladeSystem
Chassis Onboard Administrator	Chassis Onboard Administrator	Chassis Onboard Administrator	Chassis Onboard Administrator

Expensive Complicated Accidental Architecture

UCS Is Fabric Computing

Mgmt

LAN
Any IEEE Compliant LAN

SAN A
Any ANSI T11 Compliant SAN

SAN B
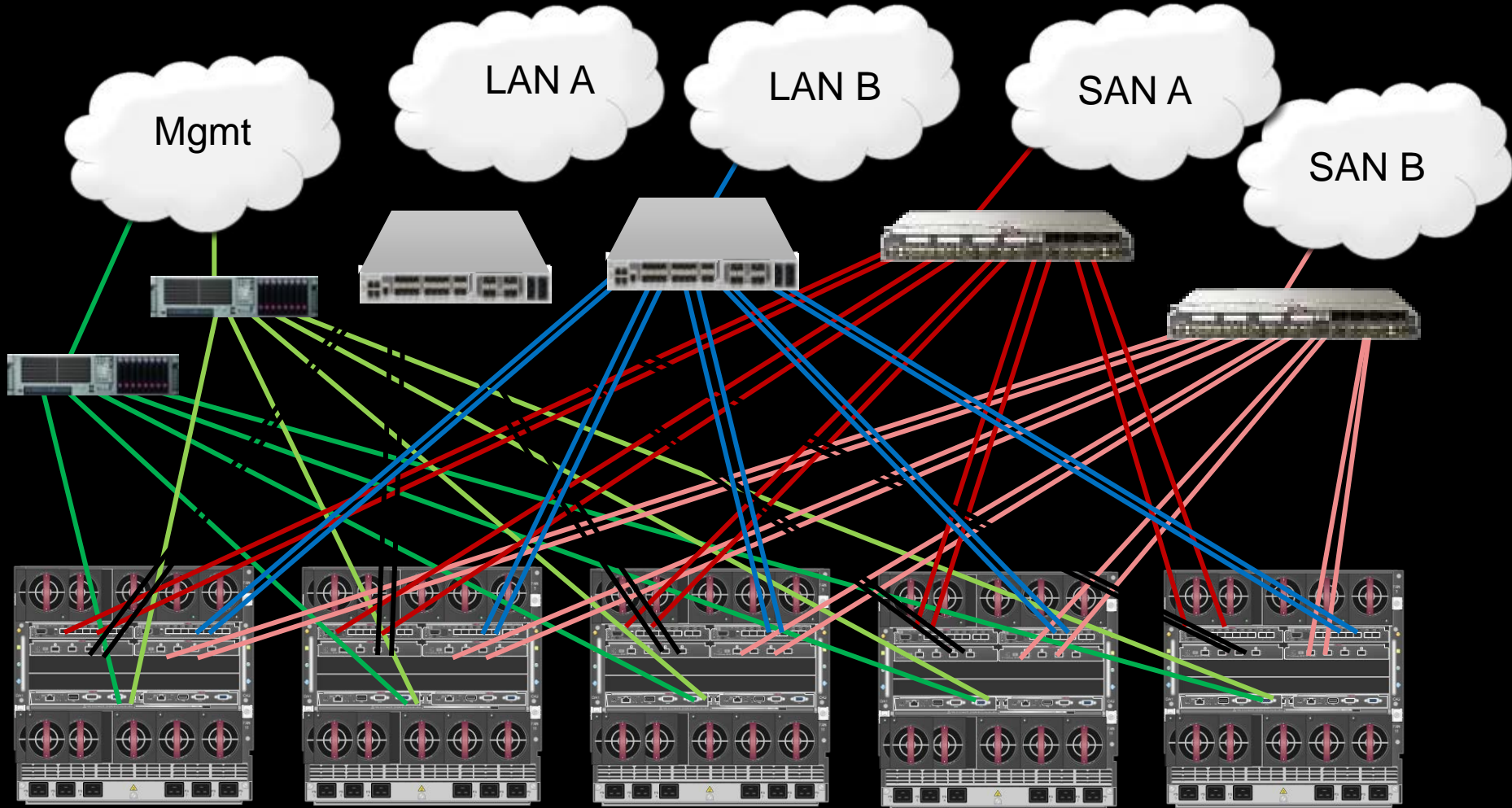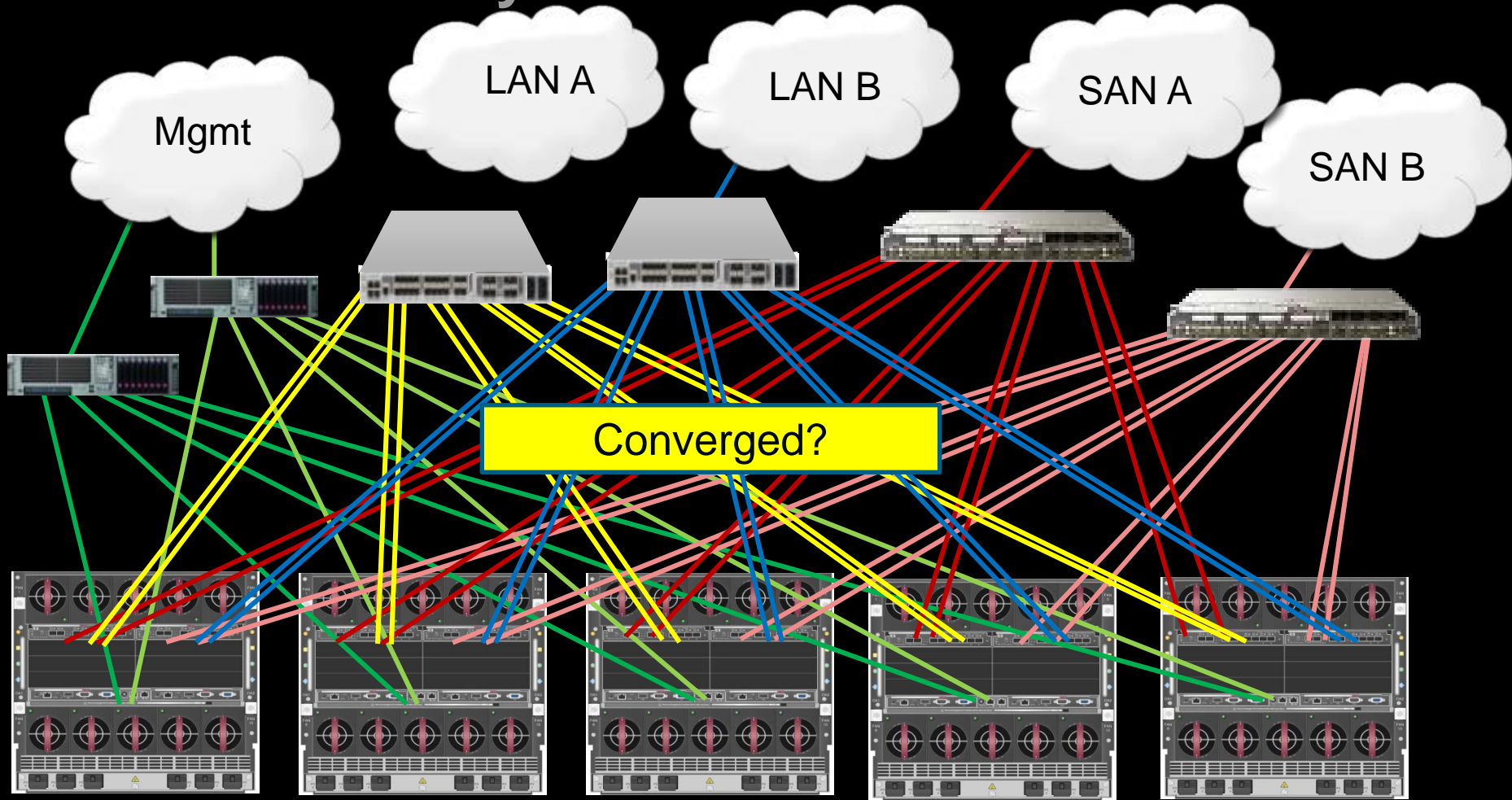ANSI T11 Compliant SAN
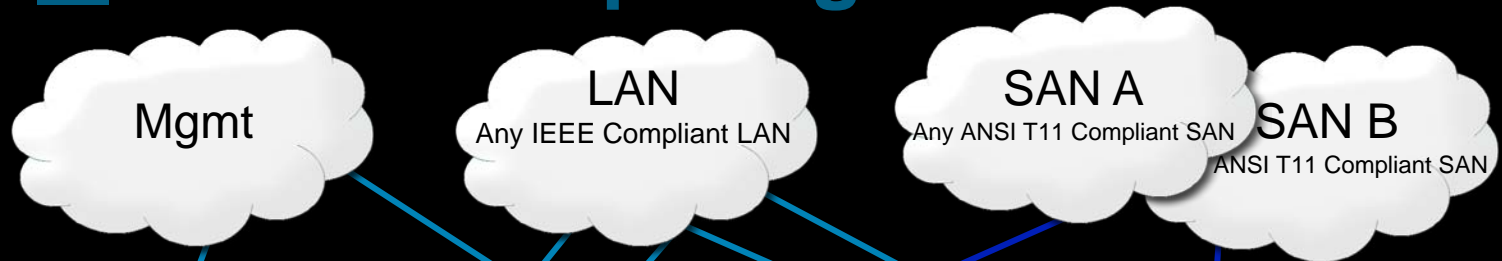
One Logical Chassis to Manage*

LAN Connectivity
SAN Networking
Blade Chassis'
Server Blades
Rack Servers
Server Identity Management
Monitoring, Troubleshooting
etc.

*architectural limit of 320 servers with 160 servers supported as of 1.4(1)
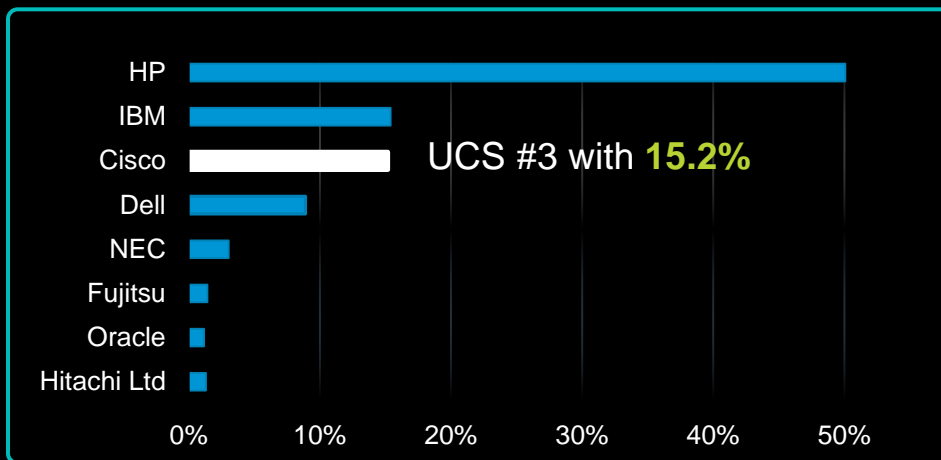
Legacy I/O & Management Design for 80 Blades

Can you see the difference?

Mgmt

LAN A

LAN B

SAN A

SAN B

Converged?

Customers Have Spoken

X86 Server Blade Market Share, Q2CY12[1]

Worldwide

UCS #3 with **15.2%**

Chart bars (top to bottom): HP, IBM, Cisco, Dell, NEC, Fujitsu, Oracle, Hitachi Ltd

Axis: 0%, 10%, 20%, 30%, 40%, 50%

North America

UCS #2 with **21.9%**

Chart bars (top to bottom): HP, Cisco, IBM, Dell, Oracle

Axis: 0%, 10%, 20%, 30%, 40%, 50%

Source: [1] IDC Worldwide Quarterly Server Tracker, Q2 2012, August, 2012, Revenue Share Revenue
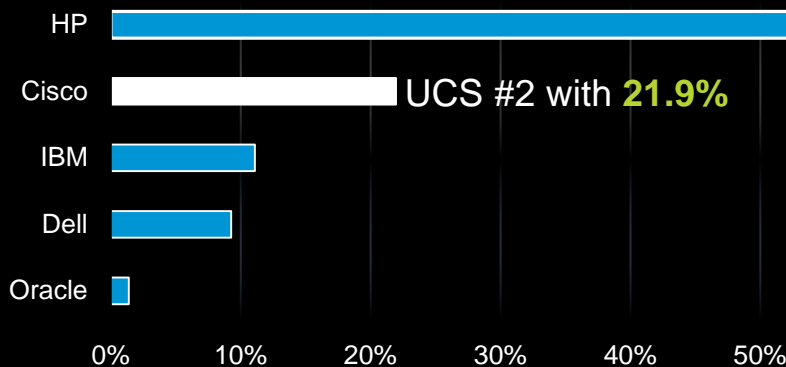
- UCS momentum is fueled by game-changing innovation; Cisco is quickly passing established players[1]

- x86 Blade servers are growing over twice as fast as the overall x86 computing market[2]

UCS After Only Three Years

- Maintained #2 in N. America (21.9%) and #2 in the US (22.2%)[1]

- Maintained #3 worldwide in x86 Blades with 15.2%, just behind IBM's 15.4%[1]

[2] IDC Q1 CY12 Server Forecaster, Based on x86 Blade

Innovating with Unified Fabric

Fewer Components, Efficient Power and Cooling

Traditional Blade Server

Cisco Unified Computing System
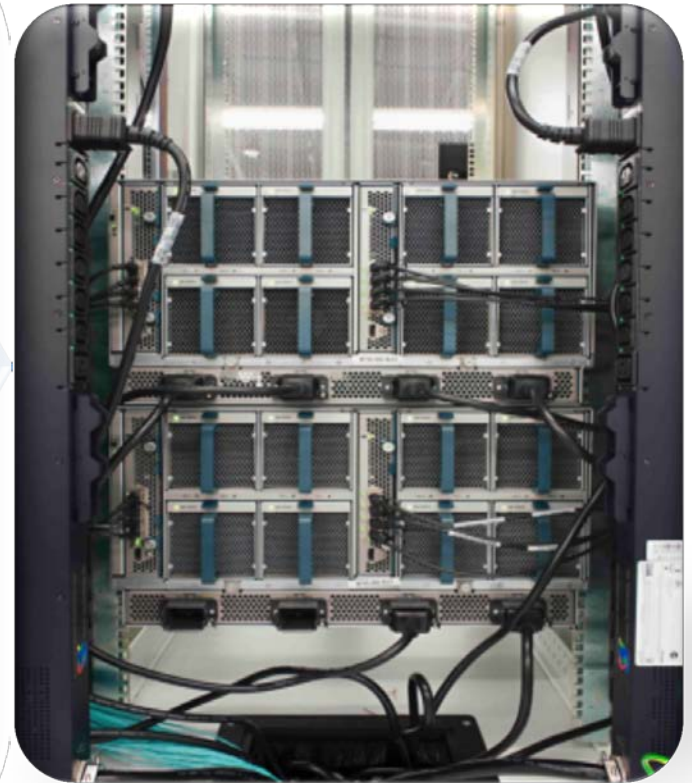
Fewer Connections and Cables, Less HW

Meet Kerrigan

- **Embedded management**
  - Fabric Interconnect

- **DC Networking**
  - Nexus 5500
  - Unified Fabric

- **C Series Server**
  - Integrated Rack Mountable servers

- **Power & Cooling**
  - Less than 1/3rd the support infrastructure
  - 63% open design
  - Low power components

- **Blade Chassis**
  - Processor Density
  - VM/host ratio
  - 20+% I/O improvement

UCS Blade Chassis (6120) Cost vs. HP
Chassis and Networking only – no blade servers.

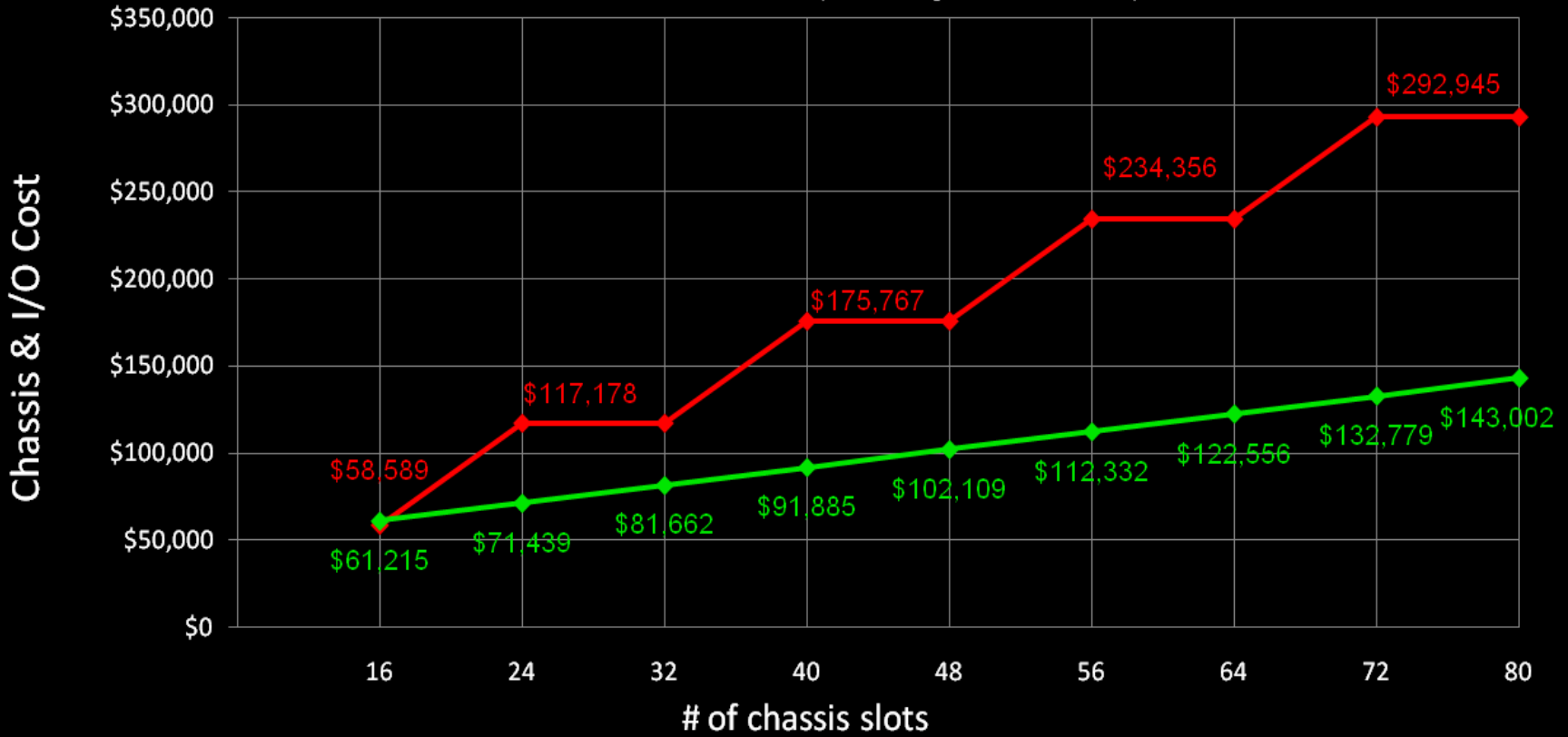**BLADE CHASSIS SAVINGS @ SCALE - BLADE SLOT SOLUTION**

UCS 5108 with UCS 6120 FI (two uplinks per FEX) 4 x 10Gb & FC4 vs.

HP c7000 with VC Flex Fabric (including HP VCEM & IC)

Chassis & I/O Cost

HP c7000 values: $58,589 (16), $117,178 (24), $175,767 (40), $234,356 (56), $292,945 (72)

Cisco UCS 5108 values: $61,215 (16), $71,439 (24), $81,662 (32), $91,885 (40), $102,109 (48), $112,332 (56), $122,556 (64), $132,779 (72), $143,002 (80)
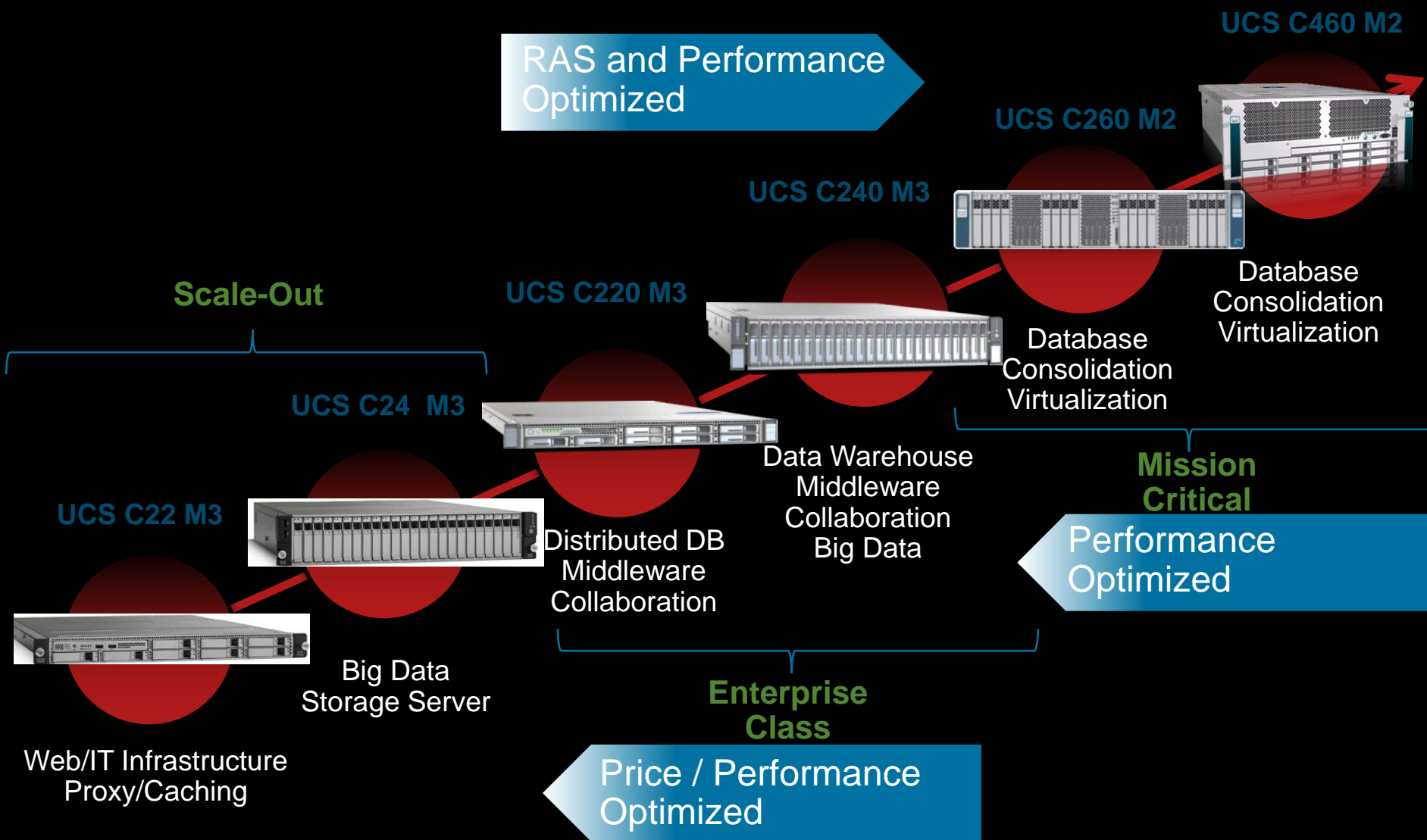
# of chassis slots

Legend: HP c7000 — Cisco UCS 5108

UCS MSRP 6/28/2011; HP retail 7/2/2011

Cisco and HP pricing publically available on 07/02/2011

Cisco UCS Portfolio

Cisco's Rack Portfolio UCS C-Series Rack Server Portfolio

RAS and Performance Optimized

UCS C460 M2

UCS C260 M2

UCS C240 M3

Database Consolidation Virtualization

Scale-Out

UCS C220 M3

Database Consolidation Virtualization

UCS C24 M3

Data Warehouse Middleware Collaboration Big Data

Mission Critical

UCS C22 M3

Distributed DB Middleware Collaboration

Performance Optimized

Big Data Storage Server

Web/IT Infrastructure Proxy/Caching

Enterprise Class

Price / Performance Optimized

Questions?

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