IBM System x

A platform for virtualisation

System x overview for Virtualisation Roadshow
Rick Maltby
System x Leader, NE IOT

OUT WITH COMPLEXITY. OUT WITH INEFFICIENCY. OUT WITH CABLES.

System x Servers and Product Portfolio

Enterprise Servers

x3850 M2   x3950 M2   x3755

Rack Servers

x3250 M2
x3350
x3455
x3450
x3550
x3655
x3650
x3850 M2

Tower Servers

x3200 M2   x3400   x3500

Clusters

Novell

IBM Cluster 1350   Others
Datacenter

IBM BladeCenter

BladeCenter HT
BladeCenter H
BladeCenter S
BladeCenter T
BladeCenter E

Today's IT Challenge

System Management - IBM Director

"Server Sprawl"

Today's IT Challenge

IBM X4 Servers

Only IBM Offers Solutions Optimized
to Customer Strategic Direction

IBM BladeCenter

Consolidate:
➢Servers
➢Virtualize

Integrate:
➢Servers
➢Networking
➢I/O

Scale up

Scale Out

System Management - IBM Director

"Server Sprawl"

Scale Up or Scale Out: General Principles for Scaling

The choice of scale up and scale out needs to be dictated foremost by your clients application environment and needs – there is no magic formula that puts one architecture ahead of the other…

	Pros	Cons
Scale Out	▪ **More affordable hardware** ▪ **Downtime avoidance (clustering)** ▪ **Best performance for OLAP workloads**	▪ **More complex system administration** ▪ **Requires more skilled DBAs** ▪ **Many applications are not cluster aware or have limited cluster awareness** ▪ **May drive higher software costs**
Scale Up	▪ **Simplified administration** ▪ **Doesn't require detailed understanding of data usage and partitioning** ▪ **Easier to scale system resources** ▪ **Support applications that are not or have limited cluster awareness** ▪ **Best for OLTP applications**	▪ **Database capacity is greatly tied to the hardware** ▪ **More costly hardware** ▪ **Scaling is worse than linear due to inherent hardware bottlenecks as more resources are added** ▪ **Potential single point of failure**

Virtualization Sizing Guidance

Legacy 2-P Workloads virtualized to a VM defined as a Single processor (1vCPU)
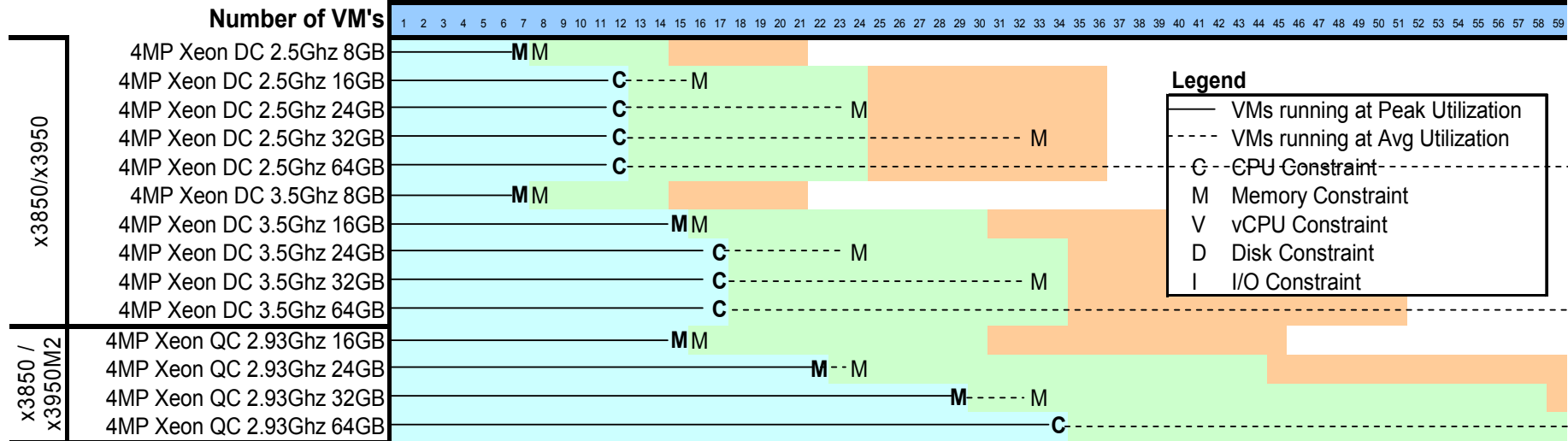
Number of Recommend

Number of VM's 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65

x3500/x3550/x3650
- 2DP Xeon DC 1.6Ghz 8GB — C----- M
- 2DP Xeon DC 1.6Ghz 16GB — C------------- M
- 2DP Xeon DC 1.6Ghz 24GB — C-------------------- M
- 2DP Xeon DC 1.6Ghz 32GB — C------------------------------- M
- 2DP Xeon QC 1.6Ghz 8GB — M M
- 2DP Xeon QC 1.6Ghz 16GB — C-------- M
- 2DP Xeon QC 1.6Ghz 24GB — C----------- M
- 2DP Xeon QC 1.6Ghz 32GB — C--------------- M
- 2DP Xeon QC 2.67Ghz 8GB — M M
- 2DP Xeon QC 2.67Ghz 16GB — C--M
- 2DP Xeon QC 2.67Ghz 24GB — C------- M
- 2DP Xeon QC 2.67Ghz 32GB — C--------- M

x3455/x3655
- 2DP Opteron DC 2.6Ghz 8GB
- 2DP Opteron DC 2.6Ghz 16GB — C------------- M
- 2DP Opteron DC 2.6Ghz 24GB — C----------------- M
- 2DP Opteron DC 2.6Ghz 32GB — C------------------------------- V
- 2DP Opteron DC 2.6Ghz 48GB — C------------------------------- V
- 2DP Opteron DC 2.8Ghz 8GB
- 2DP Opteron DC 2.8Ghz 16GB — C------------- M
- 2DP Opteron DC 2.8Ghz 24GB — C----------------- M
- 2DP Opteron DC 2.8Ghz 32GB — C------------------------------- V
- 2DP Opteron DC 2.8Ghz 48GB — C------------------------------- V

x3755
- 3MP Opteron DC 2.6Ghz 8GB — C M
- 3MP Opteron DC 2.6Ghz 16GB — C-------- M
- 3MP Opteron DC 2.6Ghz 24GB — C----------- M
- 3MP Opteron DC 2.6Ghz 48GB — C----------- M
- 3MP Opteron DC 2.8Ghz 8GB — C M
- 3MP Opteron DC 2.8Ghz 16GB — C-------- M
- 3MP Opteron DC 2.8Ghz 24GB — C----------- M
- 3MP Opteron DC 2.8Ghz 48GB — C----------- M
- 4MP Opteron DC 2.6Ghz 8GB — M M
- 4MP Opteron DC 2.6Ghz 16GB — C--M
- 4MP Opteron DC 2.6Ghz 32GB — C----------------- M
- 4MP Opteron DC 2.6Ghz 64GB — C--- V
- 4MP Opteron DC 2.8Ghz 8GB — M M
- 4MP Opteron DC 2.8Ghz 16GB — C M
- 4MP Opteron DC 2.8Ghz 32GB — C-------------- M
- 4MP Opteron DC 2.8Ghz 64GB — C--- V

Legend

——	VMs running at Peak Utilization
- - - -	VMs running at Avg Utilization
C	CPU Constraint
M	Memory Constraint
V	vCPU Constraint
D	Disk Constraint
I	I/O Constraint

NOTE : The information in the following table represents the conclusions of IBM from testing of systems in a controlled environment. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions. IBM makes no representation or warranty that an individual user will achieve results equivalent to the levels stated in this document.

Introduction to IBM Sizing Guides

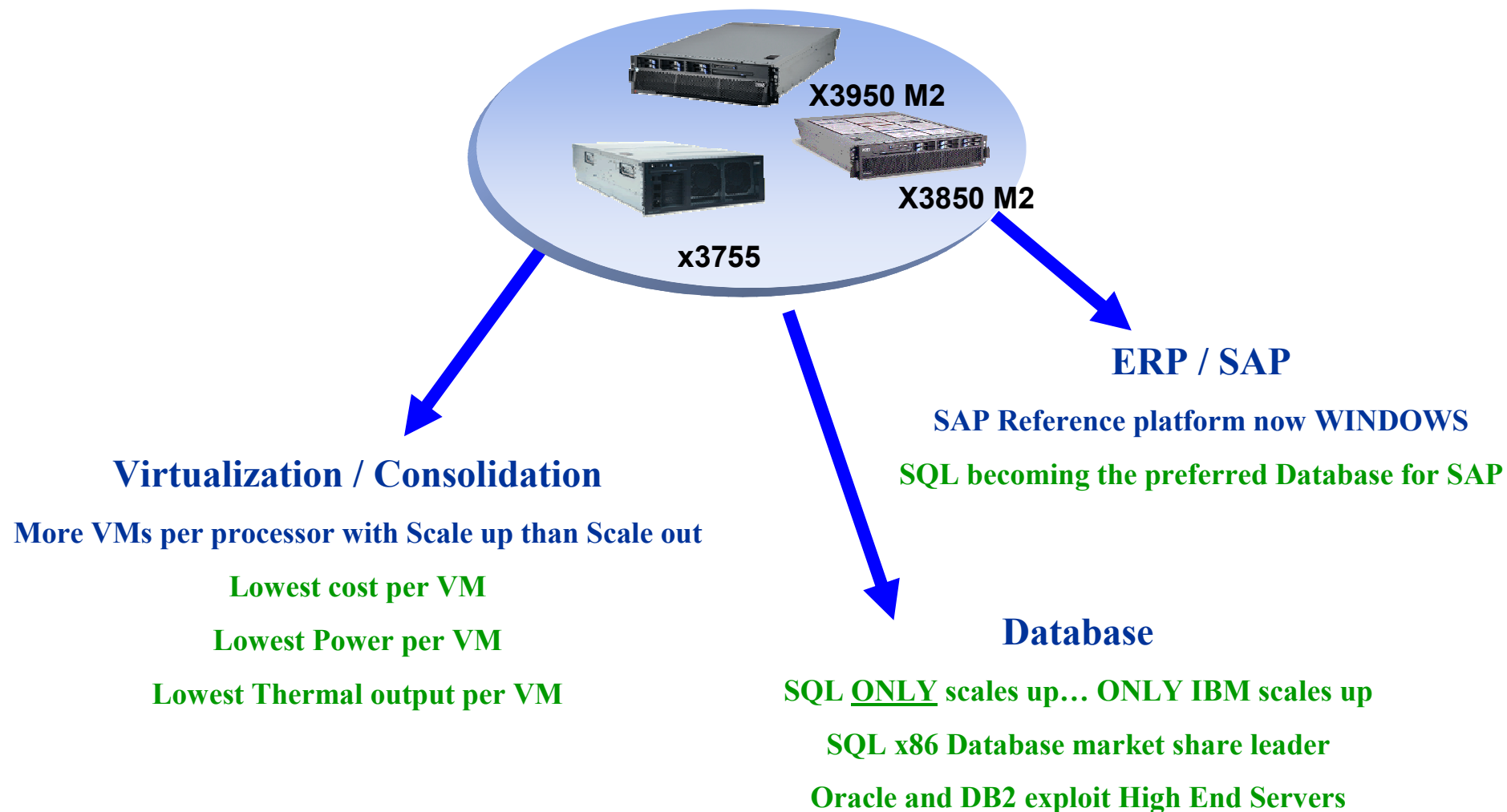**Legacy 2-P Workloads virtualized to a VM defined as a Single processor (1vCPU)**

Number of VM's

x3850/x3950	4MP Xeon DC 2.5Ghz 8GB	M M
	4MP Xeon DC 2.5Ghz 16GB	C - - - - - M
	4MP Xeon DC 2.5Ghz 24GB	C - - - - - - - - M
	4MP Xeon DC 2.5Ghz 32GB	C - - - - - - - - - - - M
	4MP Xeon DC 2.5Ghz 64GB	C
	4MP Xeon DC 3.5Ghz 8GB	M M
	4MP Xeon DC 3.5Ghz 16GB	M M
	4MP Xeon DC 3.5Ghz 24GB	C - - - - - M
	4MP Xeon DC 3.5Ghz 32GB	C - - - - - - - - - M
	4MP Xeon DC 3.5Ghz 64GB	C
x3850 / x3950M2	4MP Xeon QC 2.93Ghz 16GB	M M
	4MP Xeon QC 2.93Ghz 24GB	M - - M
	4MP Xeon QC 2.93Ghz 32GB	M - - - - - M
	4MP Xeon QC 2.93Ghz 64GB	C

Legend
- VMs running at Peak Utilization
- - - VMs running at Avg Utilization
- C CPU Constraint
- M Memory Constraint
- V vCPU Constraint
- D Disk Constraint
- I I/O Constraint

Zone 1 *(Conservative)*
– Aggressive application (ie. Database)
– Unpredictable workload
– No tolerance for performance degradation

Zone 3 *(Aggressive)*
– Lightly aggressive application (ie. Web)
– Predictable Workload
– High tolerance for performance degradation

Zone 2 *(Moderately Conservative)*
– Moderately aggressive application (ie. Collaboration)
– Predictable workload
– Some tolerance for performance degradation

NOTE : The information in the following table represents the conclusions of IBM from testing of systems in a controlled environment. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions. IBM makes no representation or warranty that an individual user will achieve results equivalent to the levels stated in this document.

# System x HE Growth Fueled by 3 Killer Apps

X3950 M2

X3850 M2

x3755

ERP / SAP

SAP Reference platform now WINDOWS

SQL becoming the preferred Database for SAP

Virtualization / Consolidation

More VMs per processor with Scale up than Scale out

Lowest cost per VM

Lowest Power per VM

Lowest Thermal output per VM

Database

SQL ONLY scales up… ONLY IBM scales up

SQL x86 Database market share leader

Oracle and DB2 exploit High End Servers

Why customers are moving to Highend

Why Highend and not mulit-core Dual Socket machines ?

- Technology Reasons: a High End server provides
  - Larger memory footprint
  - Faster I/O
  - Better redundancy
  - Lowest cost per Virtual Machine
  - Superior scalability

- Balanced Systems Performance Reasons:
  - 'It's Not the Cores – It's the Systems', Gabriel Consulting March 07
    - "The need for larger than four processor SMP servers will likely be rediscovered"
- Application Drivers
  - SQL
  - Exchange
  - SAP
  - Virtualized Clients
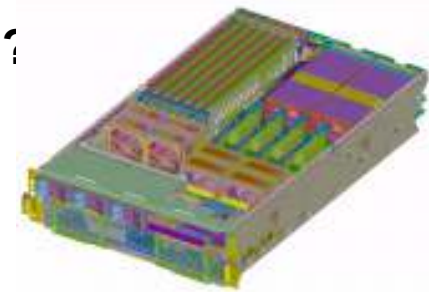
IBM System x On Demand Datacenter

> In the Virtual Datacenter all systems are running multiple applications… utilization becomes the key determinant of efficiency

- Procurement Cost
- Energy Consumption
- Heat Dissipation
- Management Resources

> Utilization level drives the virtual density level... and therefore the cost per VM

> Focus shifts from cost per physical machine to cost per virtual machine

> Management software becomes the critical link between the physical platforms and the virtual machines running on them

Web 3	Client VM
Web 3	
ERP 3	Client VM
Email 3	
Security 3	
Web 2	Client VM
ERP 2	Client VM
Email 2	Client VM
Security 2	
ERP	Client VM
Web	
Security	Client VM
Email	
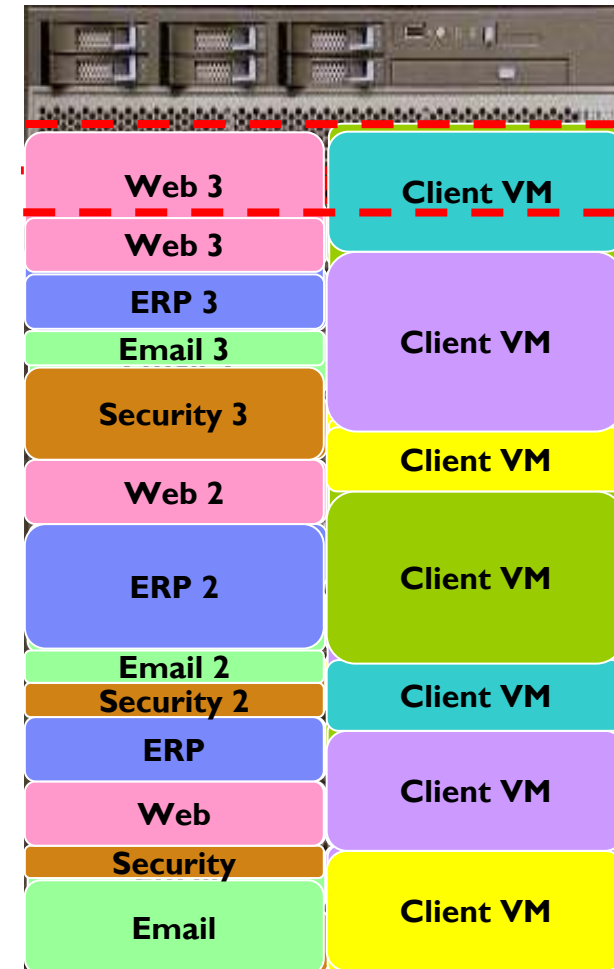
Early Reviews………..(*IBM wins again*)

➢ **IBM x3850M2 & x3950M2 are designed for target workloads….**

- **Virtualization / SCON –** *BEST IN SHOW VMWorld !!!!!*

  - Balance design to optimize for virtualized environment
  - Embedded hypervisor design for easy deployment
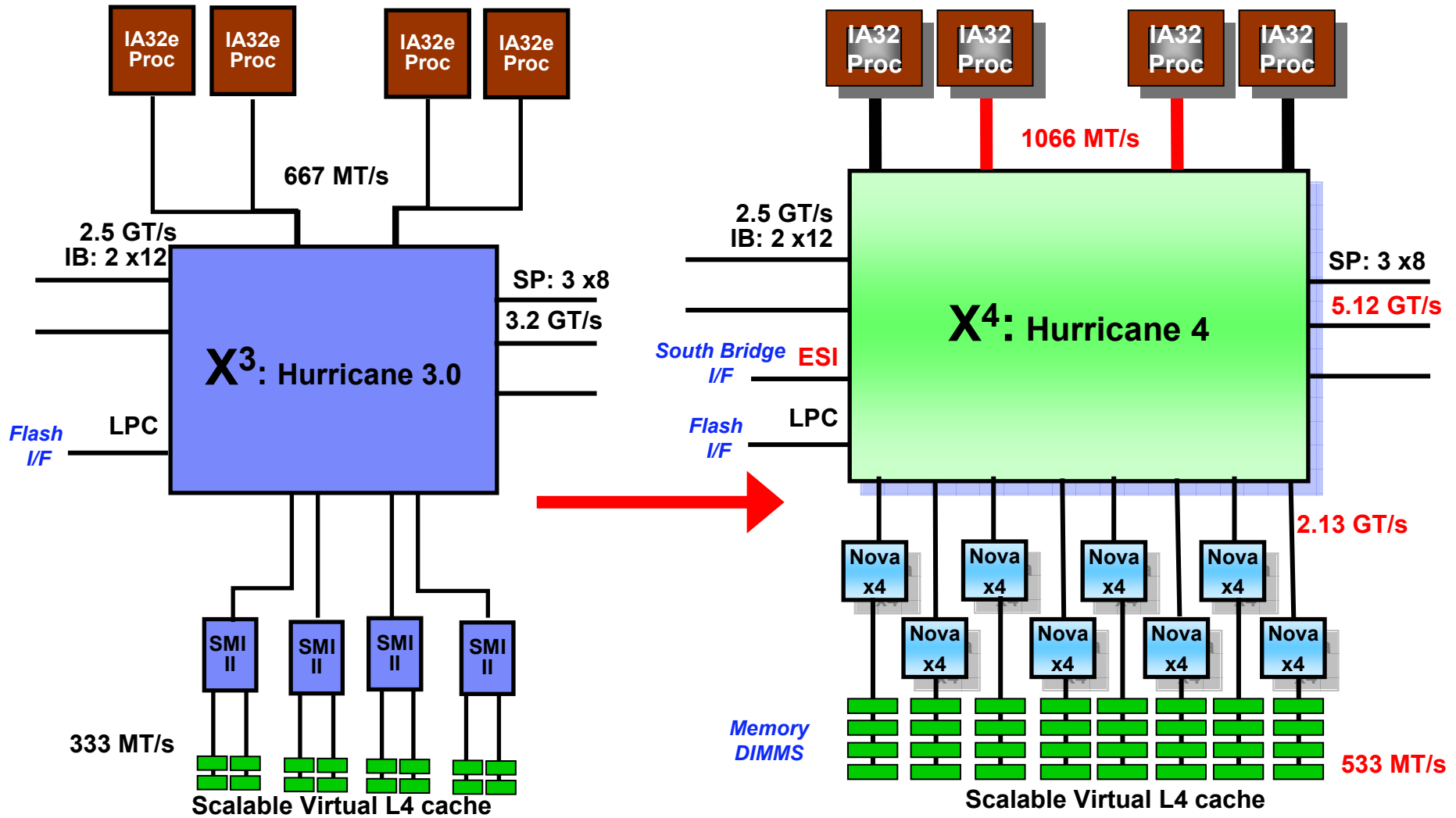 - Scalability greater than 4-way for better economies of scale

- **Database –**

  - Only Tier 1 w/ Scale up solution for SQL
  - #1 TPC-C *27% better than HP* Proliant DL580 G5
  - #1 TPC-C 8 socket *63% improvement* over previous generation

- **Enterprise Applications –**

  - Optimized for 2-Tier deployments
  - Trusted Server Boot for mission critical applications thru CRTM/TPM
  - Most reliability / availability features standard in x86 server

Evolving X3 into X4

IA32e Proc **IA32e Proc** **IA32e Proc** **IA32e Proc**

667 MT/s

2.5 GT/s
IB: 2 x12

SP: 3 x8
3.2 GT/s

X^3: Hurricane 3.0

Flash I/F LPC

SMI II **SMI II** **SMI II** **SMI II**

333 MT/s

Scalable Virtual L4 cache

IA32 Proc **IA32 Proc** **IA32 Proc** **IA32 Proc**

1066 MT/s

2.5 GT/s
IB: 2 x12

SP: 3 x8
5.12 GT/s

South Bridge I/F ESI

Flash I/F LPC

X^4: Hurricane 4

2.13 GT/s

Nova x4 **Nova x4** **Nova x4** **Nova x4**

Nova x4 **Nova x4** **Nova x4** **Nova x4**

Memory DIMMS

533 MT/s

Scalable Virtual L4 cache

Leadership Scaling Solution…..

NEW

x3950 M2

x3850 M2

+

=

Coming in 1Q08

Outstanding 4-socket reliability

- **Investment projection with ability to upgrade to 2 node solution with ScaleXpander Option kit**

- **Target Applications**
  - Enterprise resource planning, database serving or custom-developed, Java™ technology-based applications.

ScaleXpander Option Kit

- **Provides the flexibility of upgrading to multinode capability when the time is right for your business.**
  - Includes ScaleXpander chip, scalability cable, cable management arm

Superior Scalability

- **Superior 8+ socket performance unmatched by competition.**
  - 64 cores/1TB memory
- **Delivering SMP capability at a fraction of the price.**
- **Target Applications:**
  - Virtualization, Enterprise Resource Planning, Customer Relationship Management and database applications.
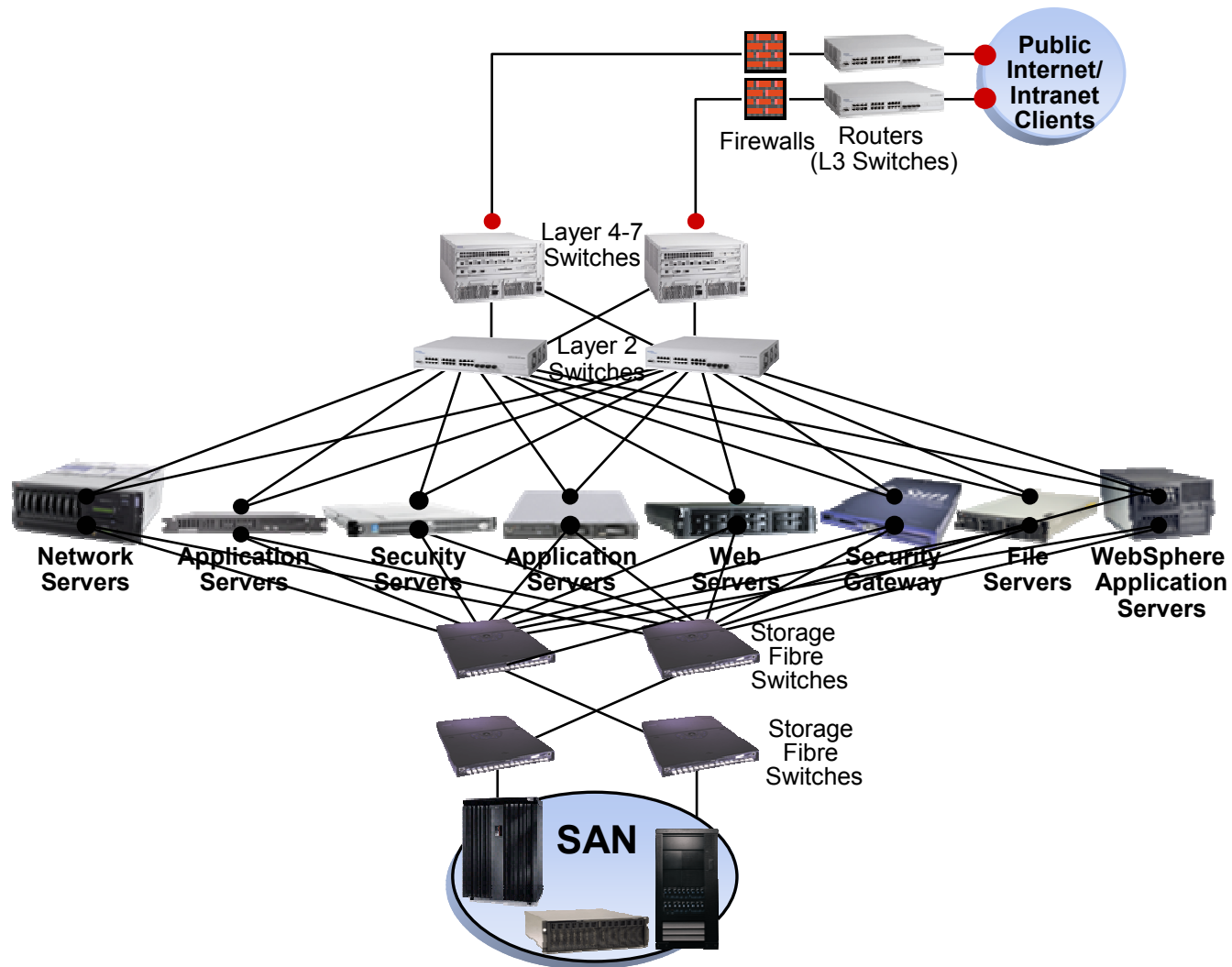
Why are Customers buying Blades?

- **Customer Pain Points**
  - Infrastructure Costs
  - Complex Infrastructure
  - Aging Hardware
  - Lack of Investment Protection
  - Server Sprawl
  - Single Points of Failure
  - Under Utilised Resources
  - Lengthy & Inflexible Deployment
- **Customers need**
  - More Servers in Less Space
  - More Connectivity with Less Connections
  - More Flexibility with Less Complexity
  - More Performance with Less Power & Cooling
  - More Manageability with Less Intervention
  - More Solutions with Less Disparity

Ideal answer ？ -   Blades !

Take back control

Simplify your infrastructure and gain control

Public
Internet/
Intranet
Clients

Firewalls   Routers
(L3 Switches)

Layer 4-7
Switches

Layer 2
Switches

Network
Servers

Application
Servers

Security
Servers

Application
Servers

Web
Servers

Security
Gateway

File
Servers

WebSphere
Application
Servers

Storage
Fibre
Switches

Storage
Fibre
Switches

SAN

Simplify your infrastructure and gain control

- **Multiple server management tools reduced to one**

- **SAN cables removed**

- **LAN cables removed**

- **Multiple external switches integrated inside the chassis**

- **KVM costs eliminated**

- **PDU costs drastically reduced**
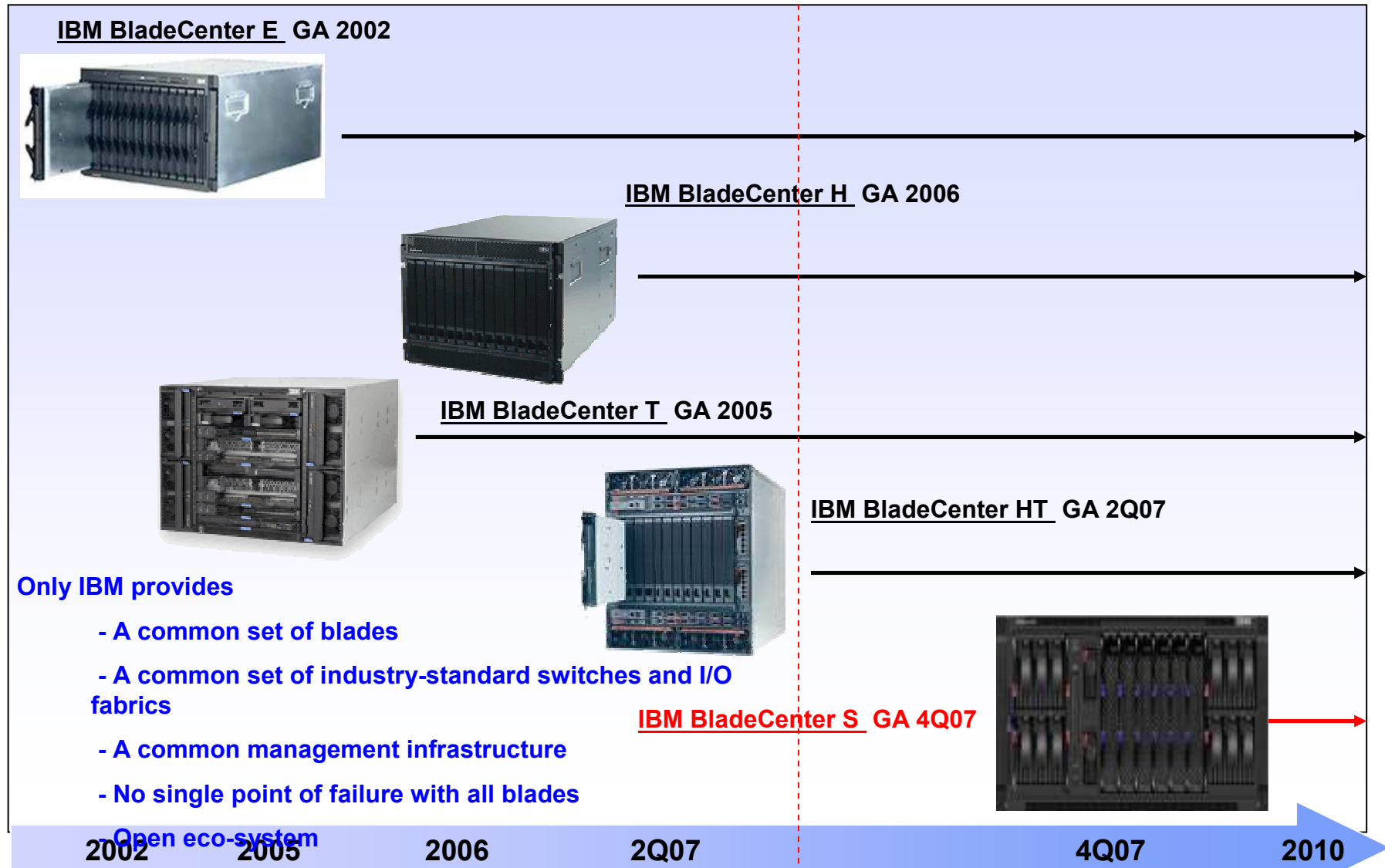
- **Power, heat and floor space conserved**

Firewalls Routers

Public Internet/ Intranet Clients

SAN
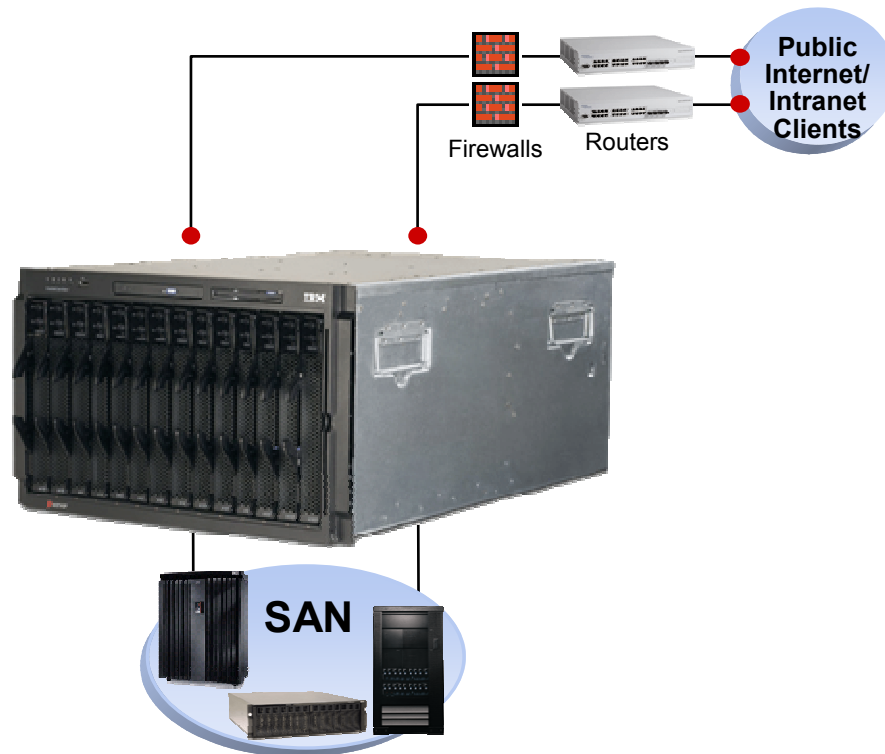
IBM BladeCenter delivers

- **Right** choice, tailored to fit your diverse needs
    - Largest choice of compatible offerings

- **Open** and innovative for a flexible business foundation
    - Broadest eco-system of industry leading partners

- **Easy** to deploy, integrate and manage
    - Best of breed management and deployment tools

- **Green** today for a better tomorrow
   - Industry leading power effieciency

IBM BladeCenter 2007 Roadmap

IBM BladeCenter E GA 2002

IBM BladeCenter H GA 2006

IBM BladeCenter T GA 2005

IBM BladeCenter HT GA 2Q07

IBM BladeCenter S GA 4Q07

Only IBM provides

- A common set of blades

- A common set of industry-standard switches and I/O fabrics

- A common management infrastructure

- No single point of failure with all blades

- Open eco-system

| 2002 | 2005 | 2006 | 2Q07 | 4Q07 | 2010 |

The IBM BladeCenter S Value Proposition

- Affordable consolidation and virtualization platform

- Simplified and integrated systems management makes it easy to deploy, use and manage

- Improved efficiency, scalability and resilience.

- Simplified IT infrastructure, (space, power, cooling and cabling)

- Reduced total costs and implementation risks

- Open platform with solution building blocks from IBM and Business Partners
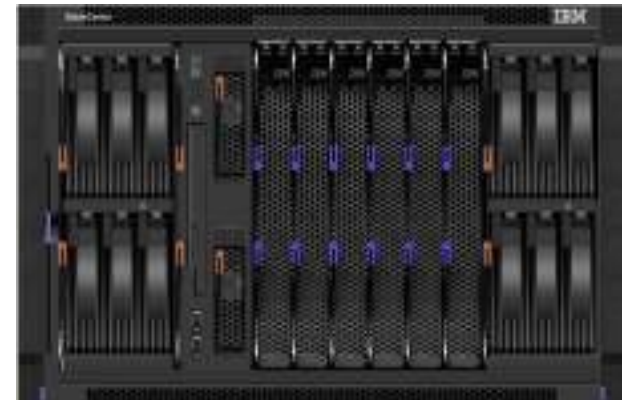
BladeCenter protects your critical business operations

- **Engineered for reliability**
  - Dual power connections
  - Thermal/cooling redundancy
  - Dual blade connections for all I/O
  - Dual switch modules
  - Dual paths through backplane
  - Dual Management Modules
  - Dual N+N power topologies
  - True N+N thermal solutions

- **Engineered for availability**
  - Automated failover capability via Management Module
  - Management Module monitors health of chassis components
  - Comprehensive Predictive Failure Analysis® proactively identifies many potential issues before they cause failures
  - First Failure Data Capture helps provide integrity of error reporting
  - Light Path Diagnostics for easy trouble shooting

No single point of failure

# Enterprise-class reliability with redundant I/O

- IBM provides dual I/O and dual power connections to the chassis on all blades

- Many other vendors fail to provide this protection

*Would you connect your enterprise rack server
to a single PDU or a single switch?*

**IBM BladeCenter —
Complete redundancy**
Dual I/O, dual power

**Competitors —
Lack redundancy**
Single I/O, single power
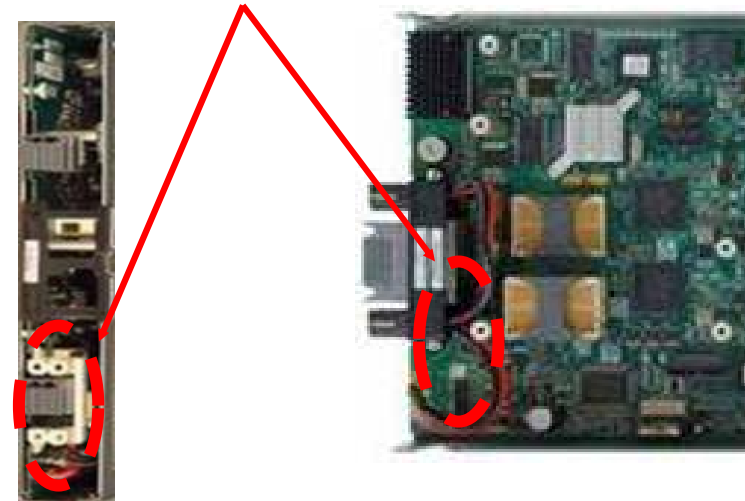
Blade Deployment Made Easy

IBM BladeCenter Open Fabric Manager Summary

- **Save time** — **Pre-configure LAN and SAN connections once for each blade**
  - Automatically makes all I/O connections whenever you plug in a blade
  - Simplified login — Single login vs. 22 logins for HP Virtual Connect
  - Checks for any conflicts automatically

- **Maintain large data center** — **Manage up to 1400 blades**
  - Manage LAN and SAN connections across 100 chassis
  - HP's server pool is limited to 1 with up to 4 chassis (future)

- **Remain open** — **Avoid change to your network standards**
  - Works with BladeCenter chassis, blades and switches
  - HP's Virtual Connect supports only HP Ethernet and FC modules

- **Connect with ease** — **Simple GUI for easy configuration**
  - Single interface for server and switch management