Virtualisation as an IT Optimiser

”Virtually Green”

Scalable Energy Efficient Platforms for a Virtual World

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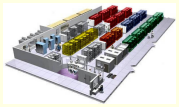
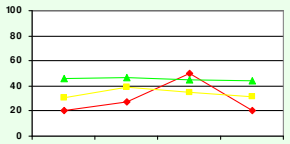
The real picture from data center input to usage: Where are the W consumed ?



Data Center

Servers Hardware



Server Loads

Typical Utilization

Mainframe	80 – 90%
Unix	10 – 20%
Wintel	5 – 12%

HVAC, UPS 40%

IT power 60%

AC/DC losses; 25%

Fans; 9%

DC/DC losses; 10%

Standby; 2%

Drives; 6%

PCI; 3%

Planar; 4%

Memory; 11%

Processor 30%

Idle; 80%

Used Resource 20% = 3,6% of total

Need one more W of compute energy ?

27 W data center ← X1,7 — 16 W equiv IT power ← x3 — 5 W equiv processor ← x5 — +1 W equiv. used ressource

SPL Sites & Facilities GTS

STG Systems Design

STG Lab Services

GTS DC Design – Southbank Ground Floor Lab

Innovation and Technical Leadership - The Server Portfolio

System z9 ™

System p5™

System i5™

System x™

BladeCenter™

Enterprise Storage Server™

Autonomic Computing	WorkLoad Mgr,Virtualization, Partitioning, Security, Systems Mgmt
Series Unique Technologies	z/OS, AIX 5L™, OS/400, Windows Operating System, FICON Express
Shared Components	BladeCenter, Linux, Processors, I/O Power, Hardware Console, Adapters, Switches, Power/Mechanical frames

Customer value

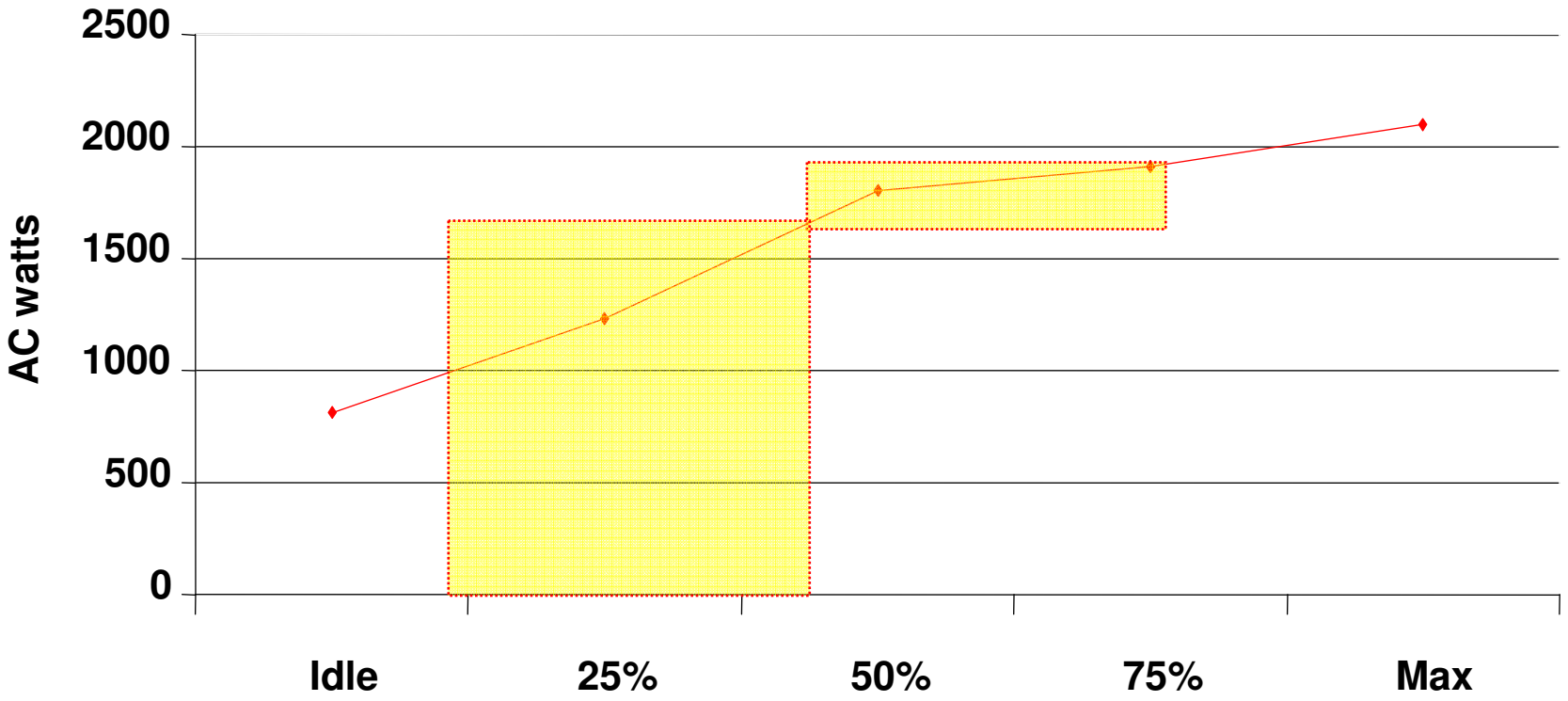
- IBM's best technology
- Shared innovation
- Faster servers
- Improved availability
- Faster to market
- Investment leverage

Overview – x86 Drivers

- Event Driven World
- Centralised computing
  - SW Model
  - Server Consolidation
  - **Desktop Consolidation**
- Scale up and Scale out
- Market driven systems
  - Volumes
  - Rapid Evolution of Technology
- **Virtualisation Revolution in x86 market**
- **Energy efficiency**

Power, Can Virtualization Help?

- Typical Intel type server utilization is quite low (15 - 40%)
- Tools like VMWare can increase utilization and unlock new processing capability for scale up and scale out without adding to power at the rack level



Virtualisation – Path

- Virtualise Server Apps
- Virtualise I/O / Storage
  - IBM Open Fabric Manager SW
- Virtualise Desktops
  - Security
  - Service / Support
  - Energy Efficiency 150W -> 15W

“a server or desktop is a file”

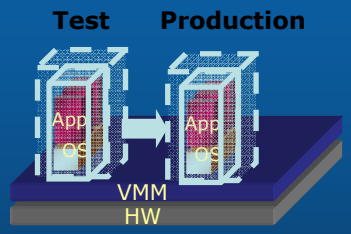
Virtualization Usage Models Are Evolving

Virtualization 1.0

IT Goal: Reduce Cost

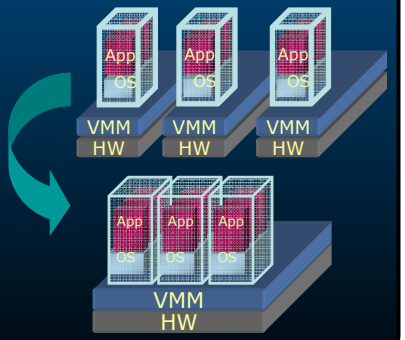
Test and Development

Enables Rapid Service Deployment



Server Consolidation

Reduce CAPEX, Increase Utilization

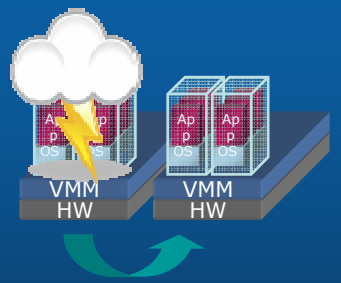


Virtualization 2.0

IT Goal: Increase Service Efficiency

Virtualization High Availability/ Disaster Recovery

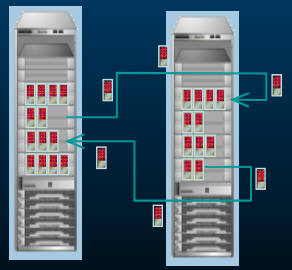
Business Continuity



Load Balancing

Streamline Resource Utilization

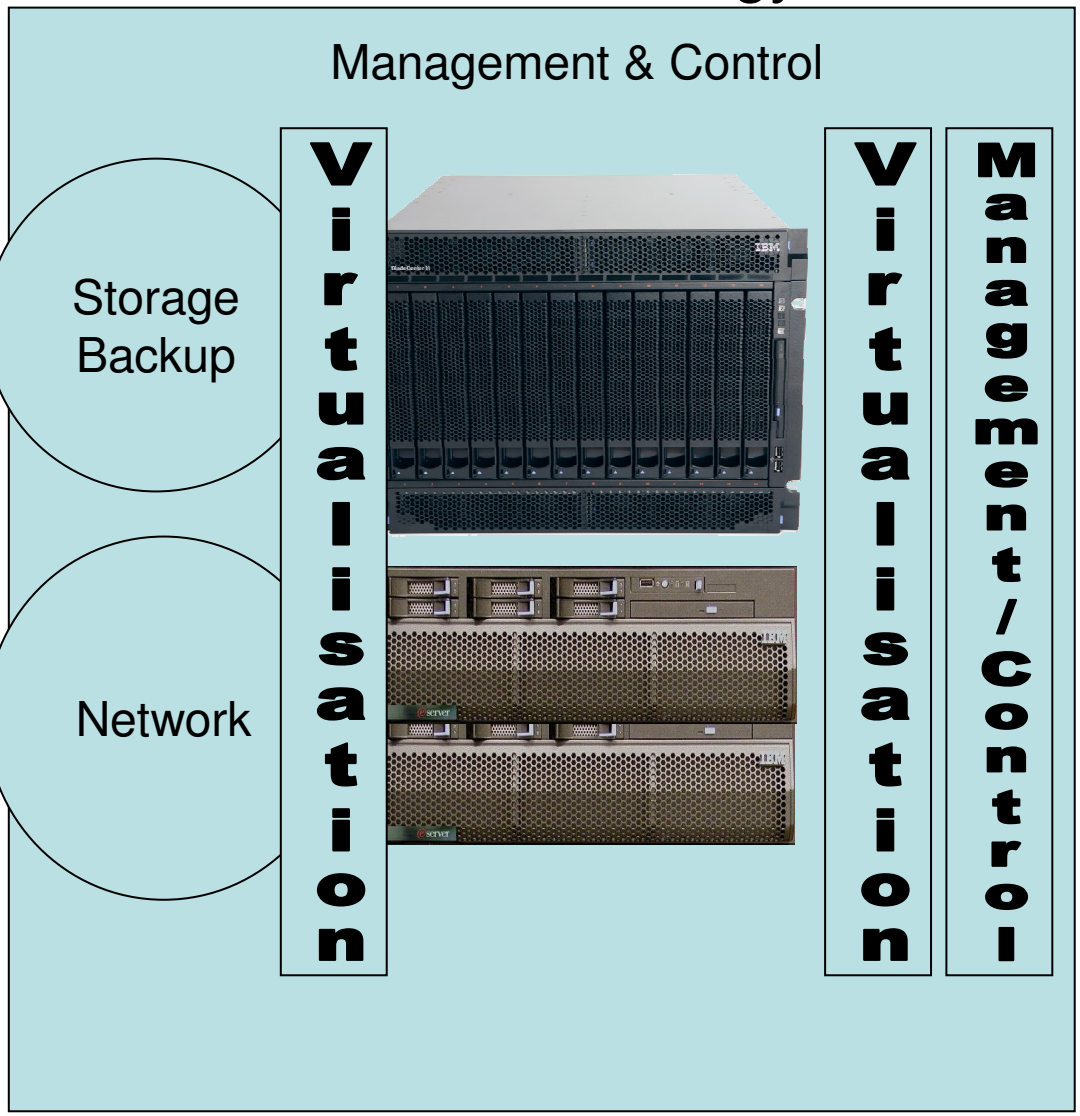
Balance Real-time Computing Demands With Capacity



When Virtualizing Servers, IT Should Consider Both Today and Tomorrow

IBM. intel vmware

Combining Bricks & Blades
A Smart, Flexible, Energy Efficient - Virtualisation Platform



IBM Advantage

- Blades
  - Stable Compatible Proven Platform since 2002
  - No Single Point of Failure
  - Choice
    - Processors
    - Switches
    - Chassis
  - Energy Efficiency

IBM Advantage

- Bricks
  - Industry Leading Scalability
  - Industry Leading Performance
  - Optimised Memory System
  - Virtualisation ready
  - Proven Platform since 2001
  - Energy Efficiency

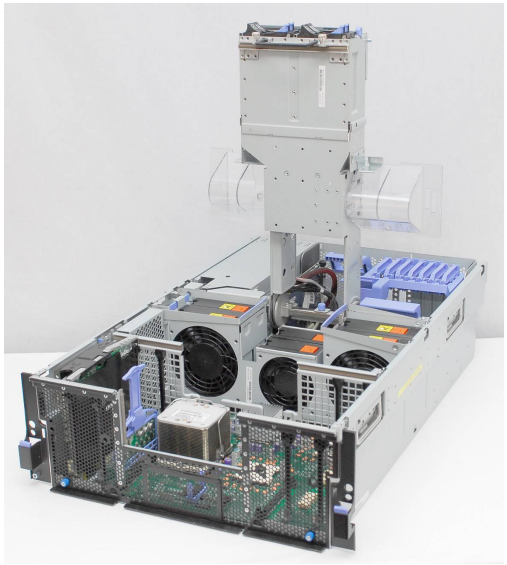
Brick Blade Combination

No Single Point of Failure
Energy & Systems Management
Scale-up Scale-out
Investment/Technology Protection

IBM System x3950 M2

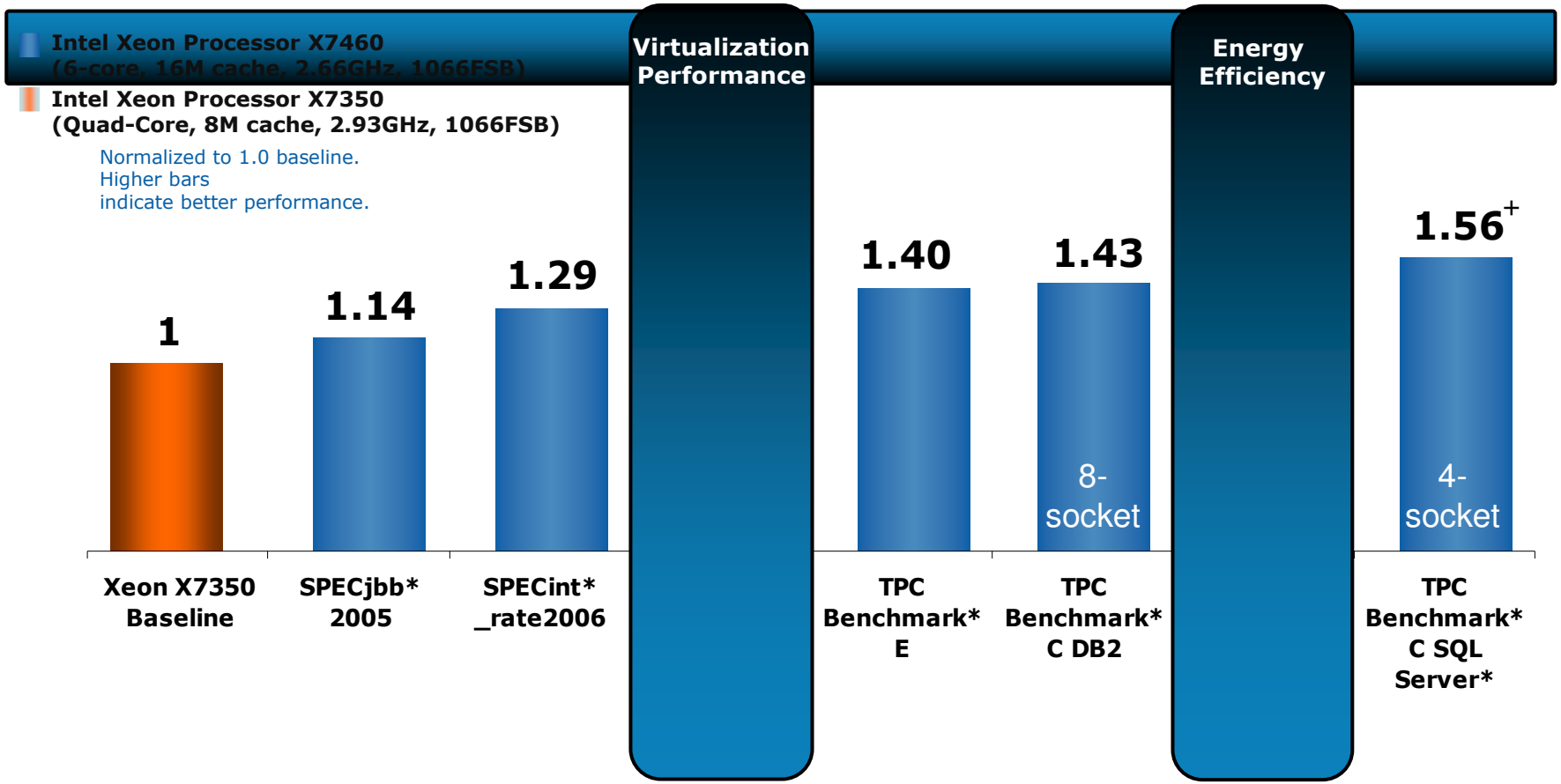
The Next Generation of X-Architecture

- Intel® Quad Core Xeon processor for greater peak protection
- Outstanding performance leveraging both the advancements of the X4 Architecture and the new Intel® Core™ Microarchitecture
- Easy to expand and scale with Scalability Wizard
- Greater Memory support in junction with VMware 3.1 128GB memory support
- Secure design with the onboard Trusted Platform Module (TPM) that
- Delivers embedded virtualization with the new VMware ESX 3i on board



Intel® Xeon™ 7400 Series: More Performance, Lower Power

45nm Intel® Xeon® Processor 7400 Series Based Servers



Source: Submitted, published, or Intel internally measured results, 19 August 2008. See backup slides for details.

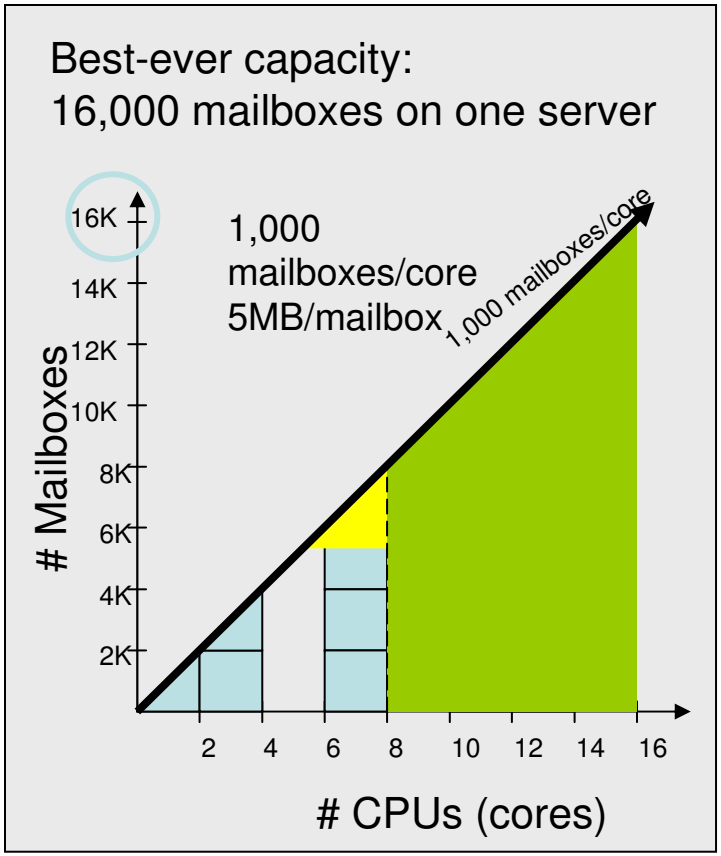
Bigger is Better for Virtualized Environments!

16,000 Heavy Exchange Users – One Server!

NEW

- Virtually Eliminates historical software limitations
- Exceeds capacity of native deployments
- Extracts more work from hardware resources
- Unprecedented achievement highlighting the value of scale-up

Scalable Platform Technology



http://www.vmware.com/company/news/releases/ibm_exchange_vmworld.html

vmware IBM intel Xeon inside

Extend blade benefits to your entire business

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

IBM BladeCenter S
Distributed, small office, easy to configure

IBM BladeCenter E
Best energy efficiency, best density

IBM BladeCenter H
High performance

IBM BladeCenter T
Ruggedized

IBM BladeCenter HT
Ruggedized, high performance

HS21
Proc: Xeon Quad Core
Mem: 4 DIMM / 16GB
HDD: 2

HS21 XM
Proc: Xeon Quad Core
Mem: 8 DIMM / 32GB
HDD: 1

LS21
Proc: Opteron Dual Core
Mem: 8 DIMM / 32GB
HDD: 1

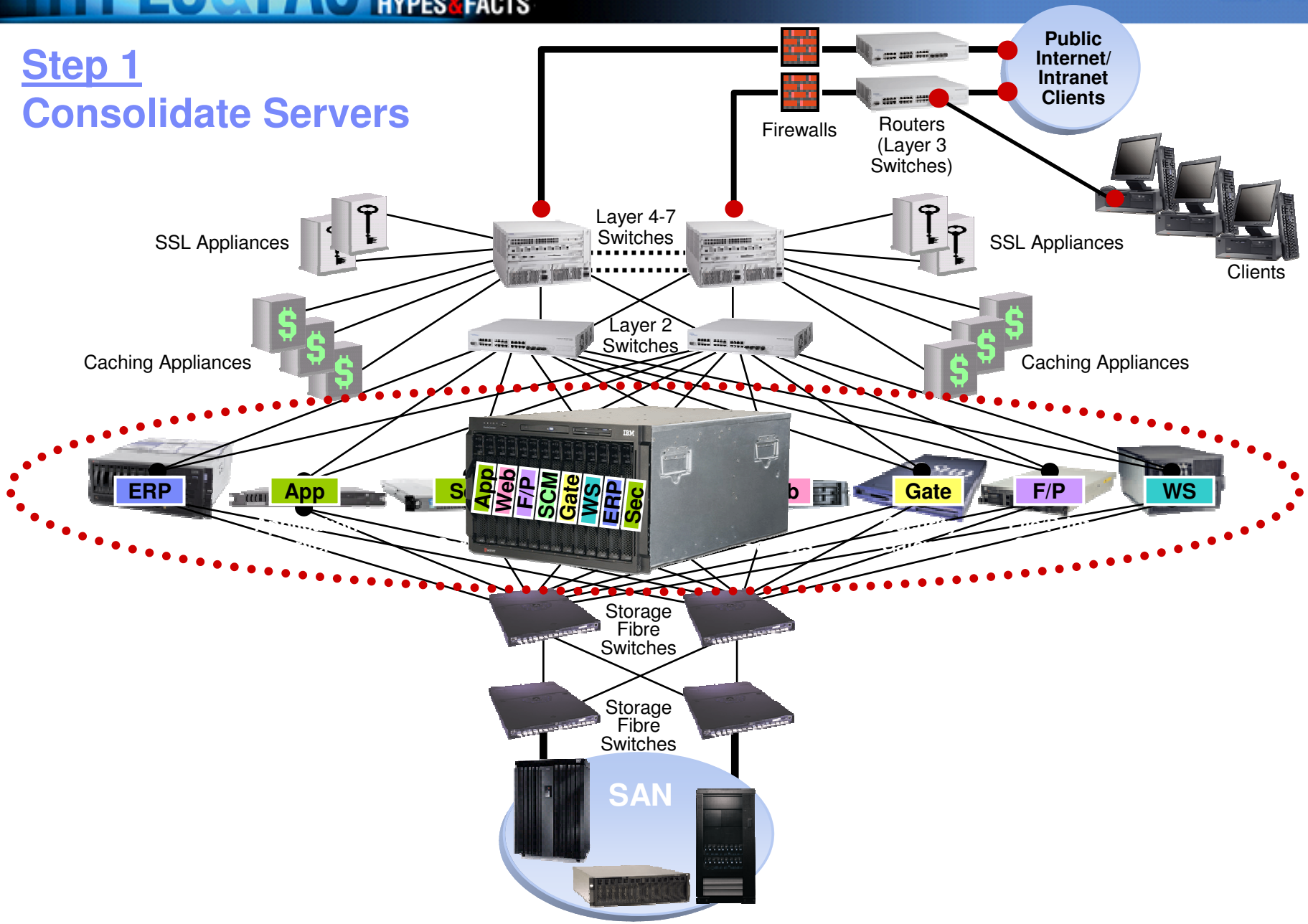
LS41
Proc: Opteron Dual Core
Mem: 16 DIMM / 64GB
HDD: 2

HC10
Proc: Conroe dual core
Mem: 4 DIMM/8GB
HDD: 1

QS21
Proc: Cell BE
Mem: 2GB (XDR)
HDD: 1

JS12
Proc: PowerPC
Mem:4 DIMM / 16GB
HDD: 2

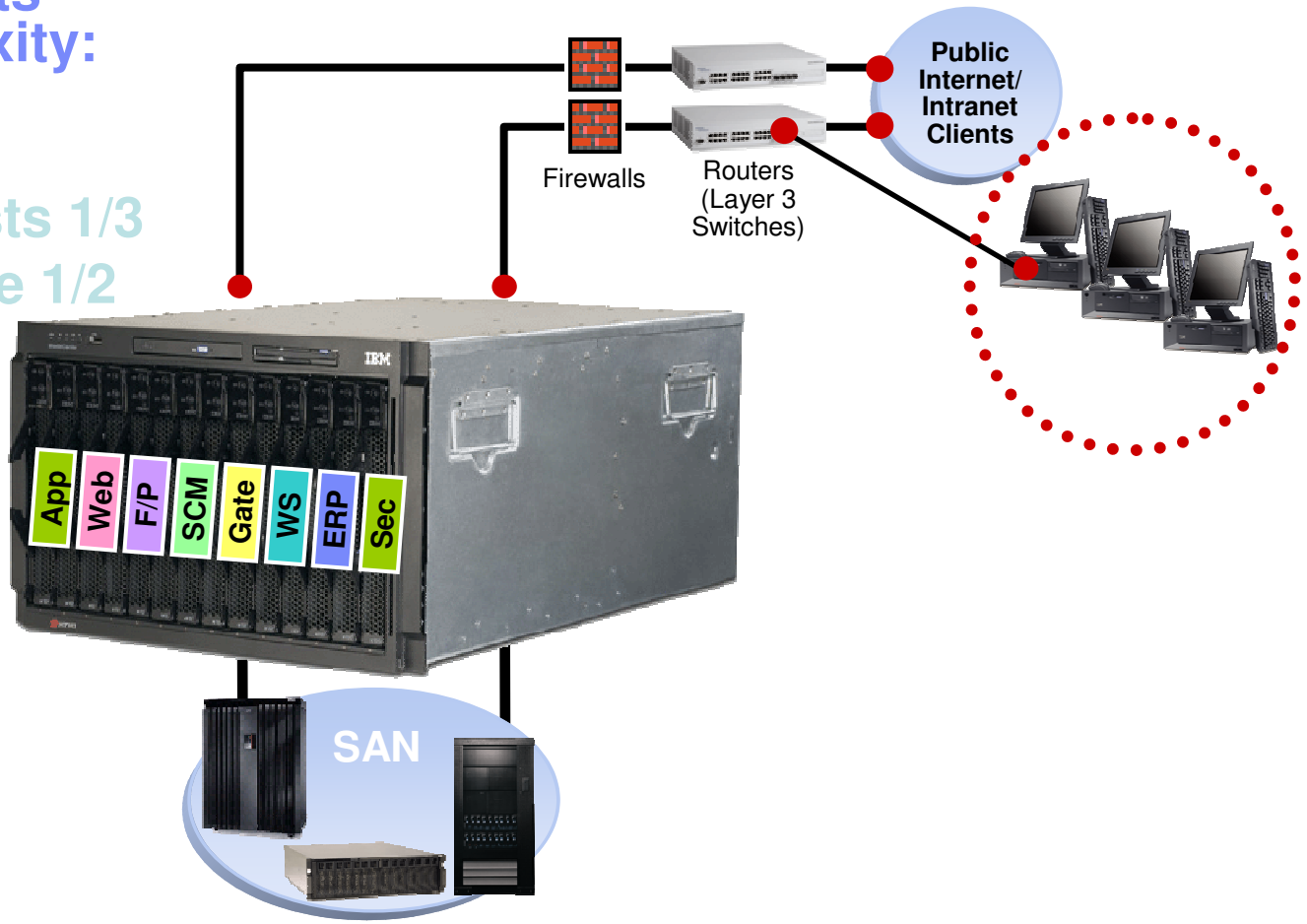
Step 1
Consolidate Servers



~~Result~~
~~Step 6~~
~~BladeCenter~~
~~Transformation~~

Consolidate Clients Collapses Complexity:

- Reduce costs 1/4
- Reduce power costs 1/3
- Reduce floor space 1/2
- Integrate into 1

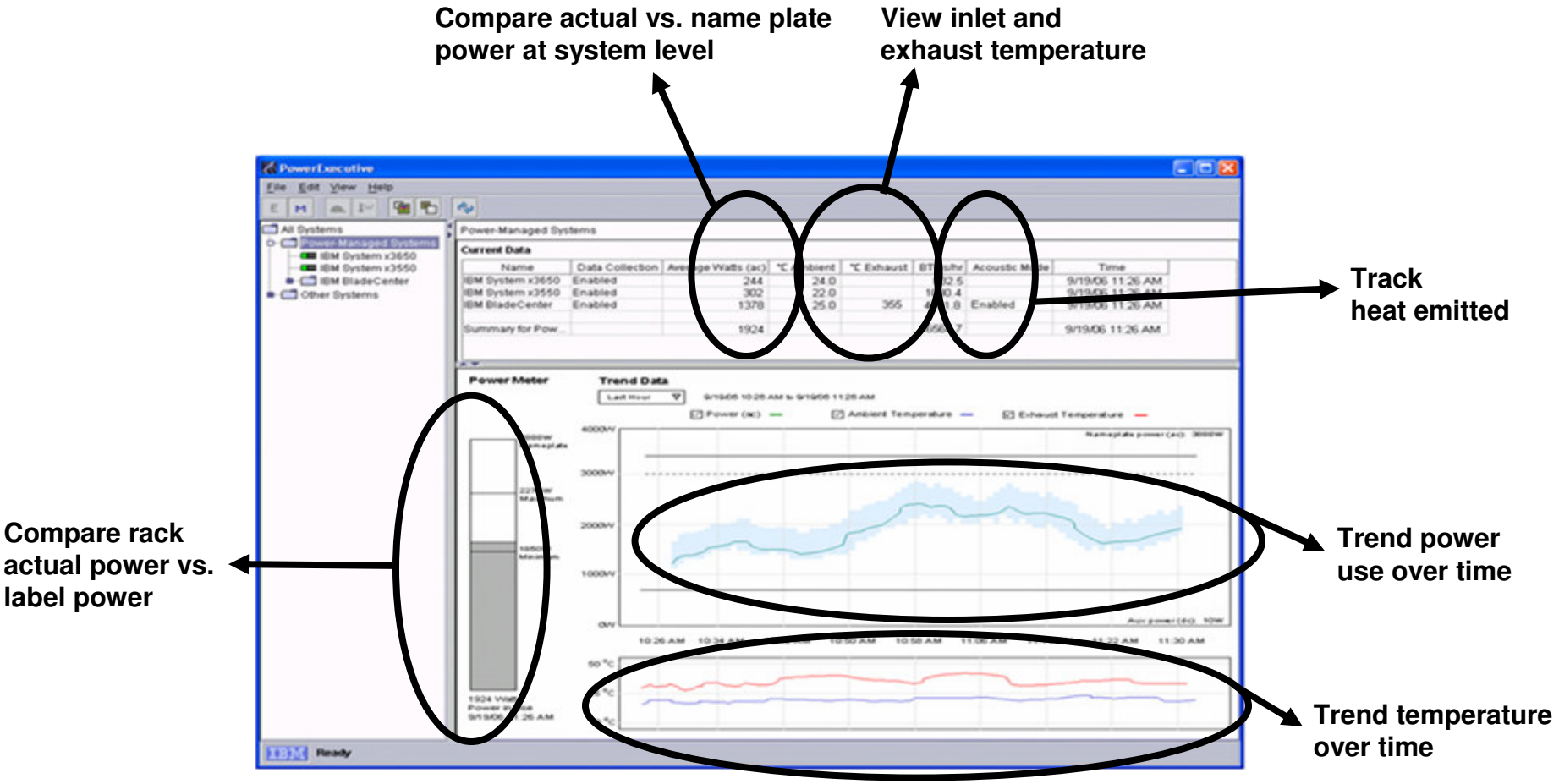


IBM BladeCenter S

All-in-one gets you up and running fast

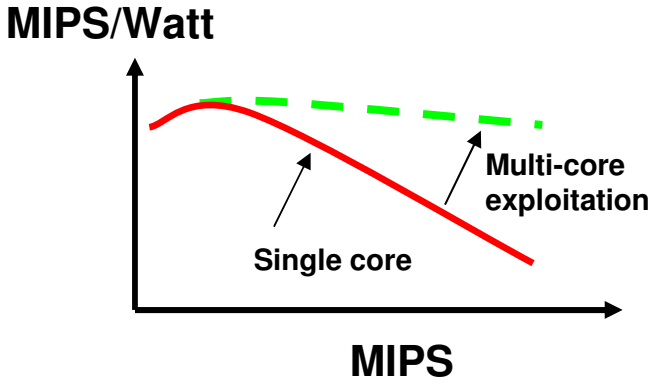
- **Integrated business-in-a box foundation with configurable shared storage**
- **Big IT results even from the smallest IT staffs to deliver big IT results**
- **Easy with "select-and-click" configurability**
- **Office-friendly 240v power**
- **Grows with your business**
- **Optimised for small office environments**

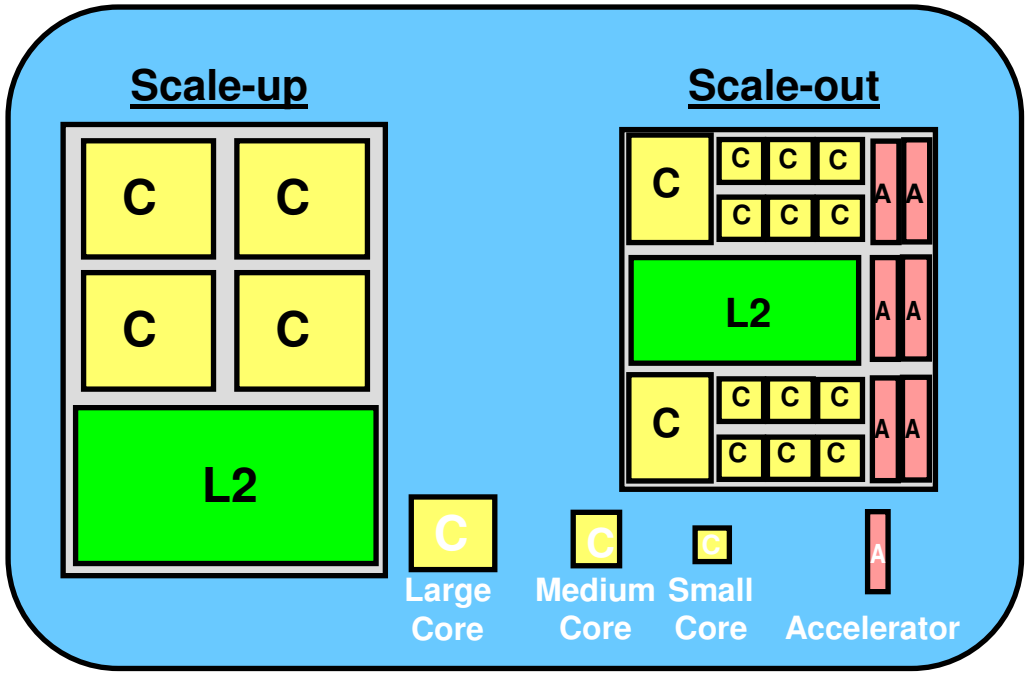
Simple, powerful and easy power management



Multi-Threaded, Multi-Core Chips Are Enabling Power-Efficient, High-Performance Processors

- Use multiple cores at lower frequency to speed-up parallel part of a program, and single core at higher frequency for sequential parts, to minimize power consumption
- Variety of techniques are becoming available to exploit multi-threaded and multi-core processors
  - Enhancements to compilers and operating systems
  - Extensions to and new programming languages
- Application optimization at chip level will be achieved with different size cores, cores with dedicated SW functionality and accelerators



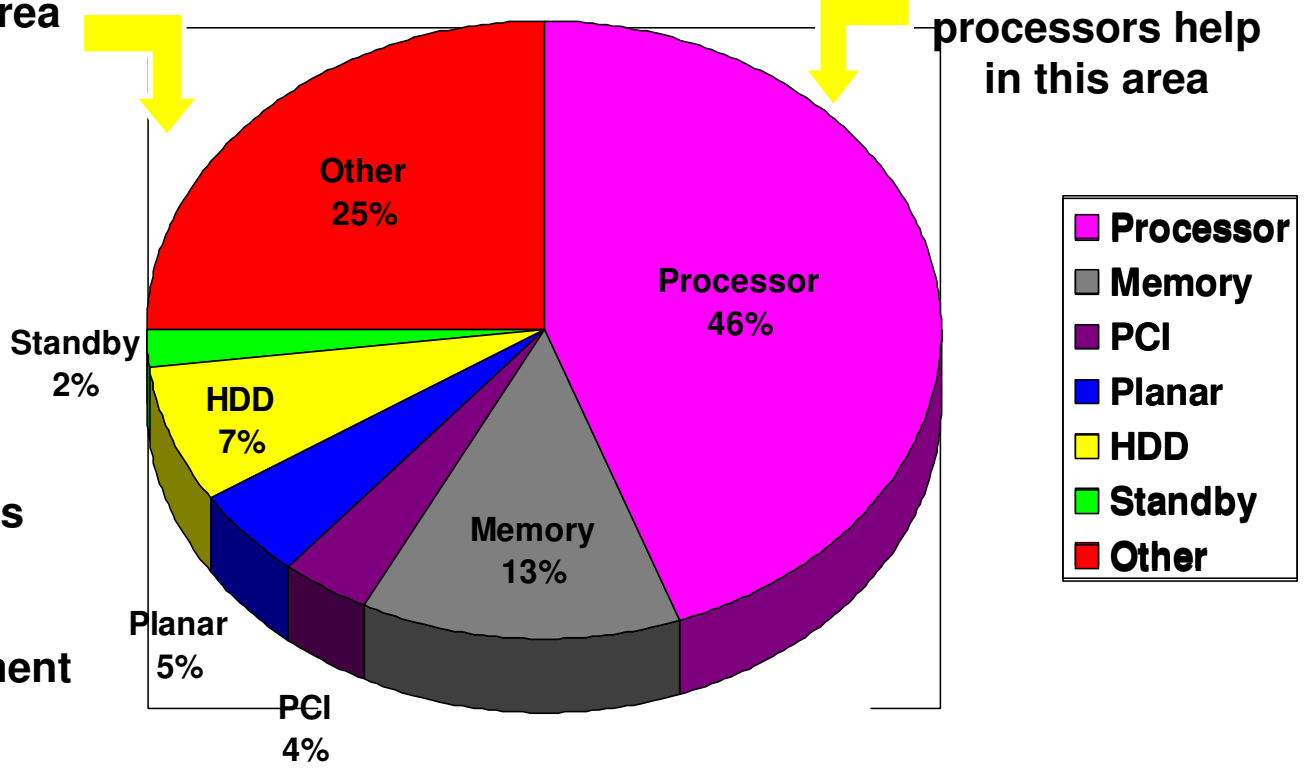


What's Using the Power?

- The processor power growth is the largest single contributor but there are many other areas - the more you pack into a server the more power it needs!

BladeCenter helps in this area

Low Voltage processors help in this area



OTHER?

- **AC to DC Transitions**
- **DC to DC Deliveries**
- **Fans and air movement**

Power and Cooling

Financial Services – High Density Computing Deployment

Client requirements

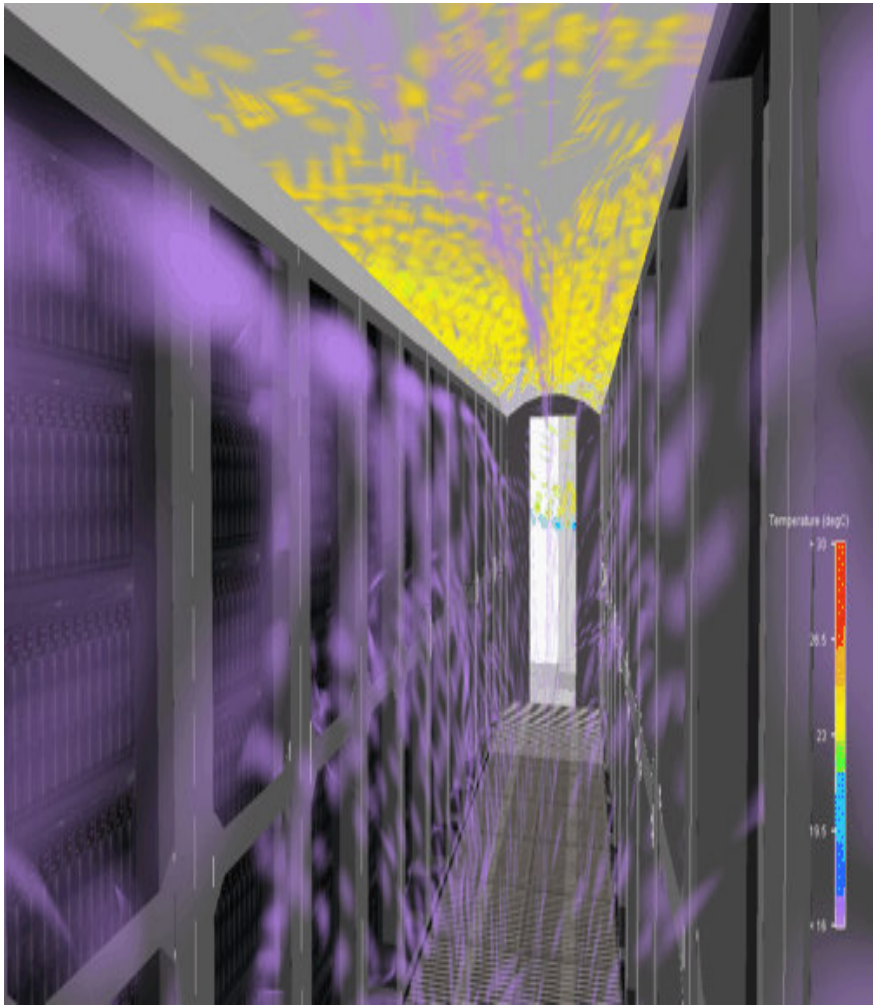
- High density blade deployment for compute intensive financial applications
- Limited floor space and limited power availability
- High availability and resiliency
- Cost and energy efficient

Solution

- 2,100 blades in 1100 m^2
- IBM Integrated Rack Solution for High Density
- Integrated networking, power management and environmental monitoring

Benefits

- Centre enclosed cold aisle layout enables 6kW per m^2 or 25kW/rack
- Significant reduction in data center size and number of air conditioning units – cooling efficiency increased by 40-60%
- Reduction of 15-25% in space needed for cabling; improves air flow distribution



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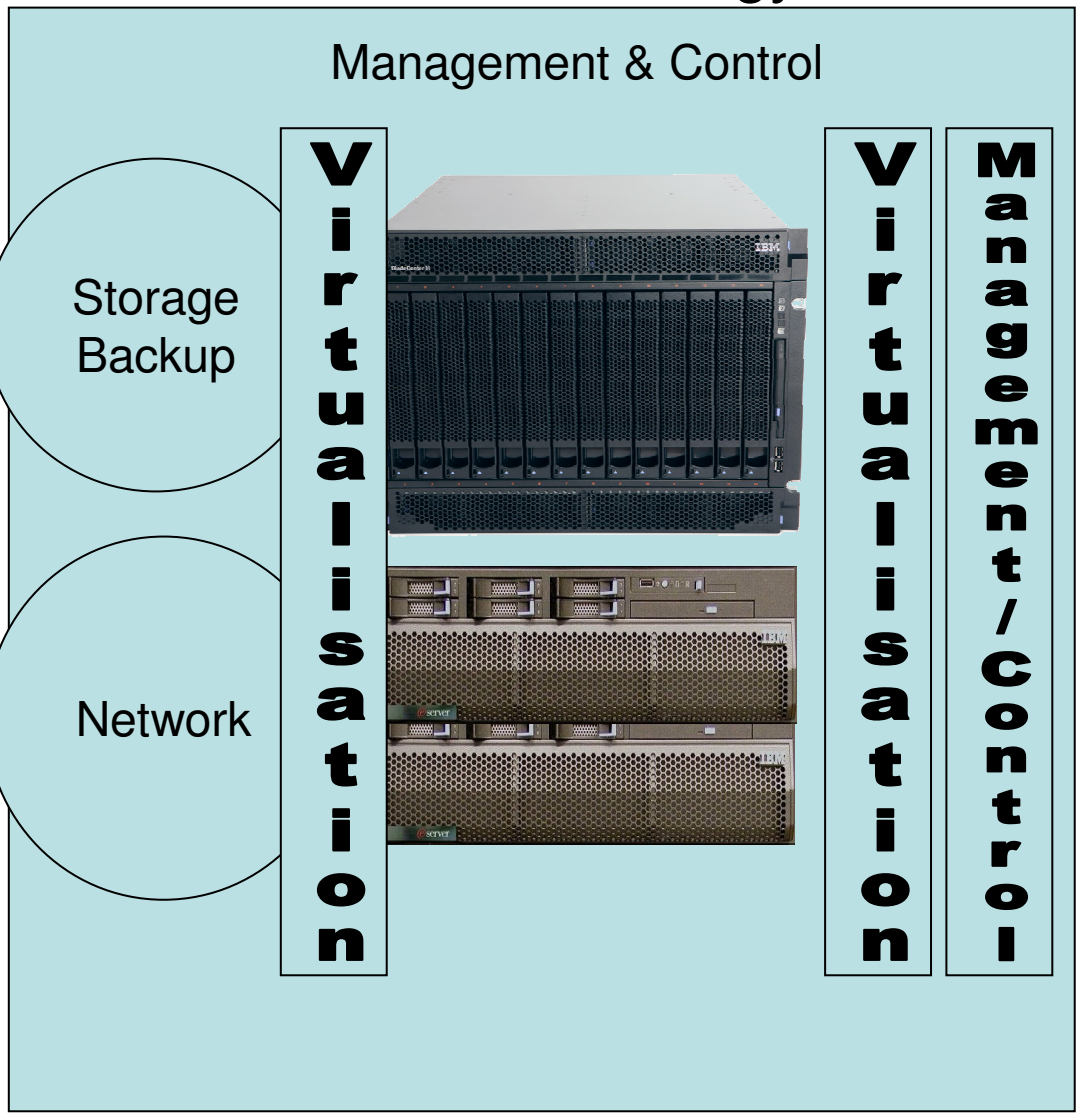

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