IBM

Technical **Forum** & 17 al 21 Octubre 2011
Executive Briefing

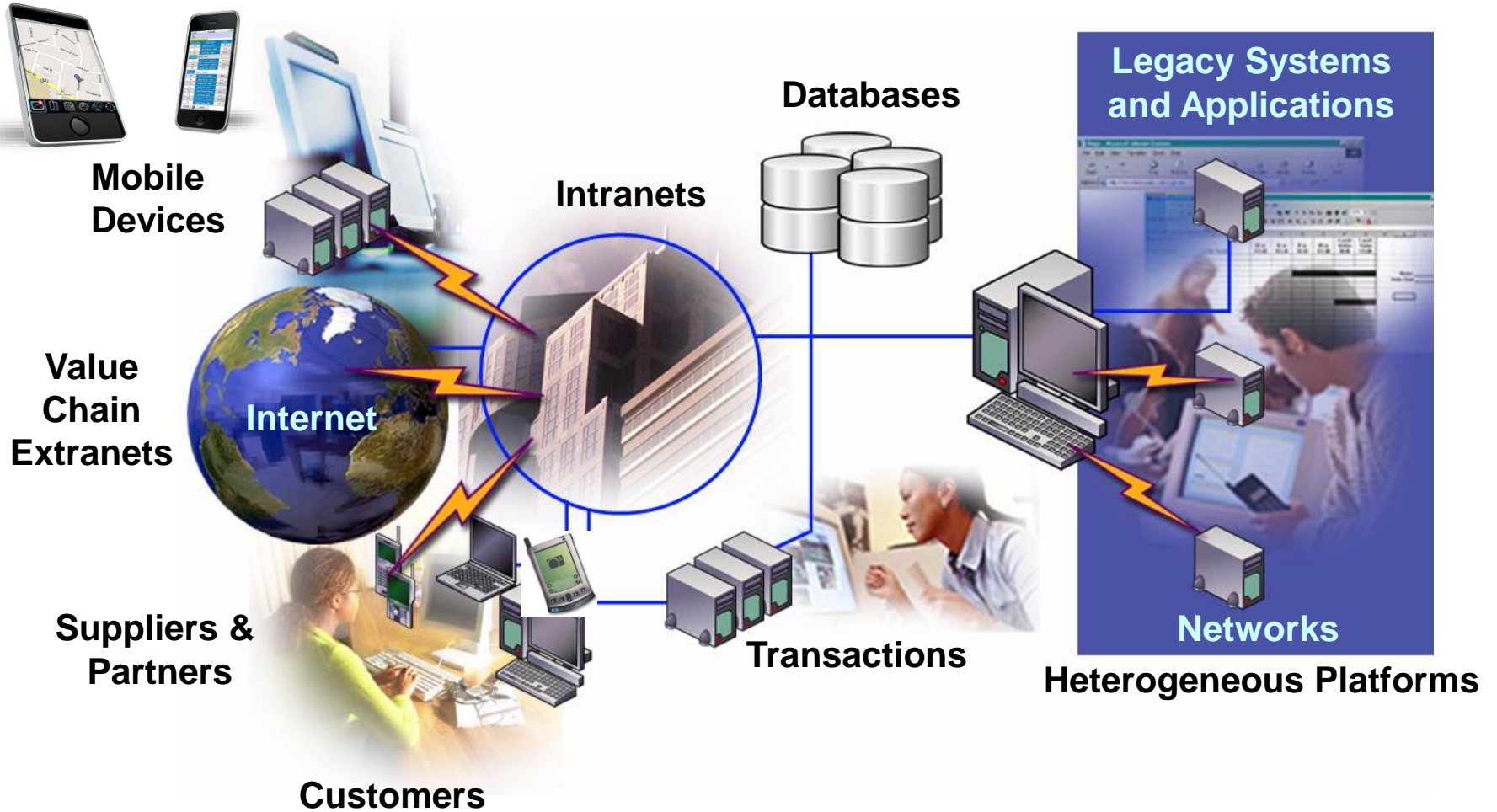Imagine **PODER**   Imagine **CAPACIDAD**

The Value of Virtualization

Tracy Smith
Executive I/T Specialist

Today's IT Environment

*IT environments are increasingly heterogeneous and complex*

Mobile Devices

Value Chain Extranets

Internet

Suppliers & Partners

Customers

Intranets

Databases

Transactions

Legacy Systems and Applications

Networks

Heterogeneous Platforms

Power is performance redefined

Complexity is accelerating

The complexity of your infrastructure may be holding you back

Power is performance redefined

Key Concerns for IT Executives

**Price/Performance gains in technology
are more than offset
by complexity and increasing costs**

New applications

Price/perf

Skills Shortage

Workloads

Complexity

Services and Software Costs
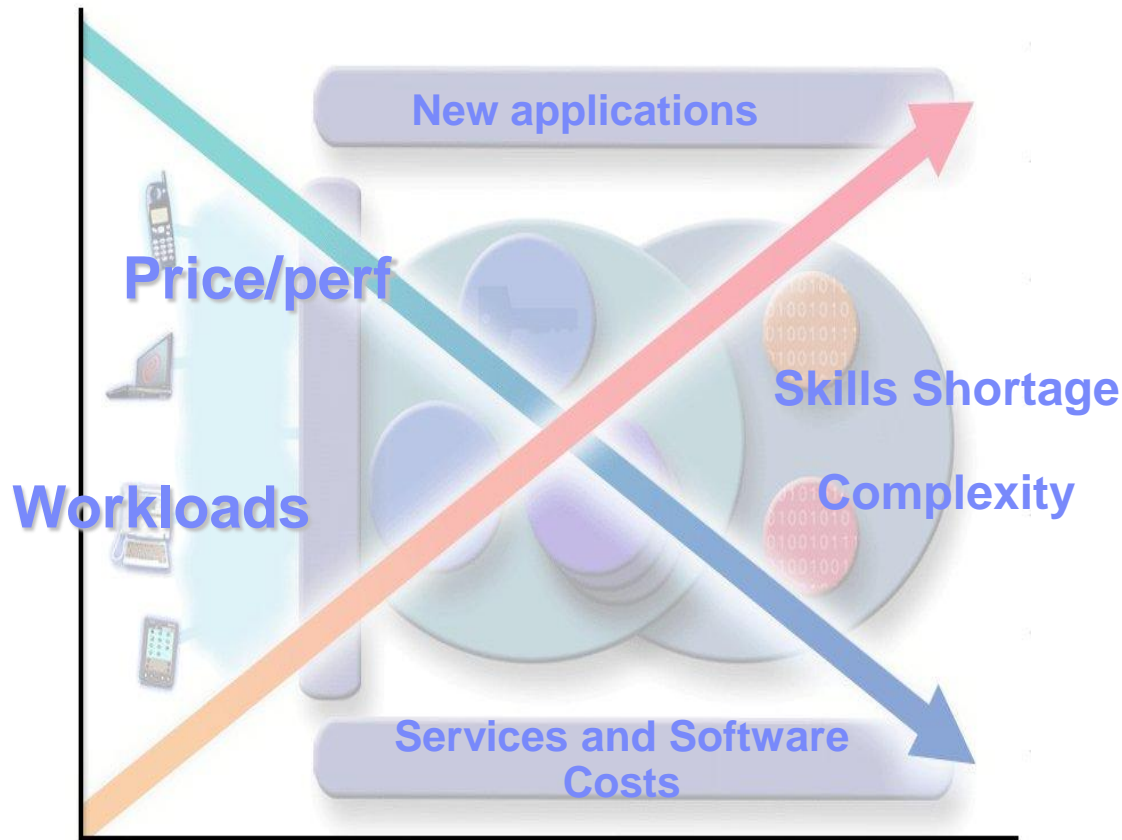
▶ *Escalating Cost of IT Infrastructure*

  ▶desktop, network, servers, storage
  ▶increasing complexity, higher service costs, more demanding SLAs
  ▶multi-tier applications requiring dozens of servers

▶ *Difficult to link IT to business plans*

  ▶need for integrated IT 'vision'
  ▶need incremental and full TCO analysis

▶ *Difficult for IT infrastructure to respond quickly to change in business directions*

  ▶need a simpler IT infrastructure that is highly flexible
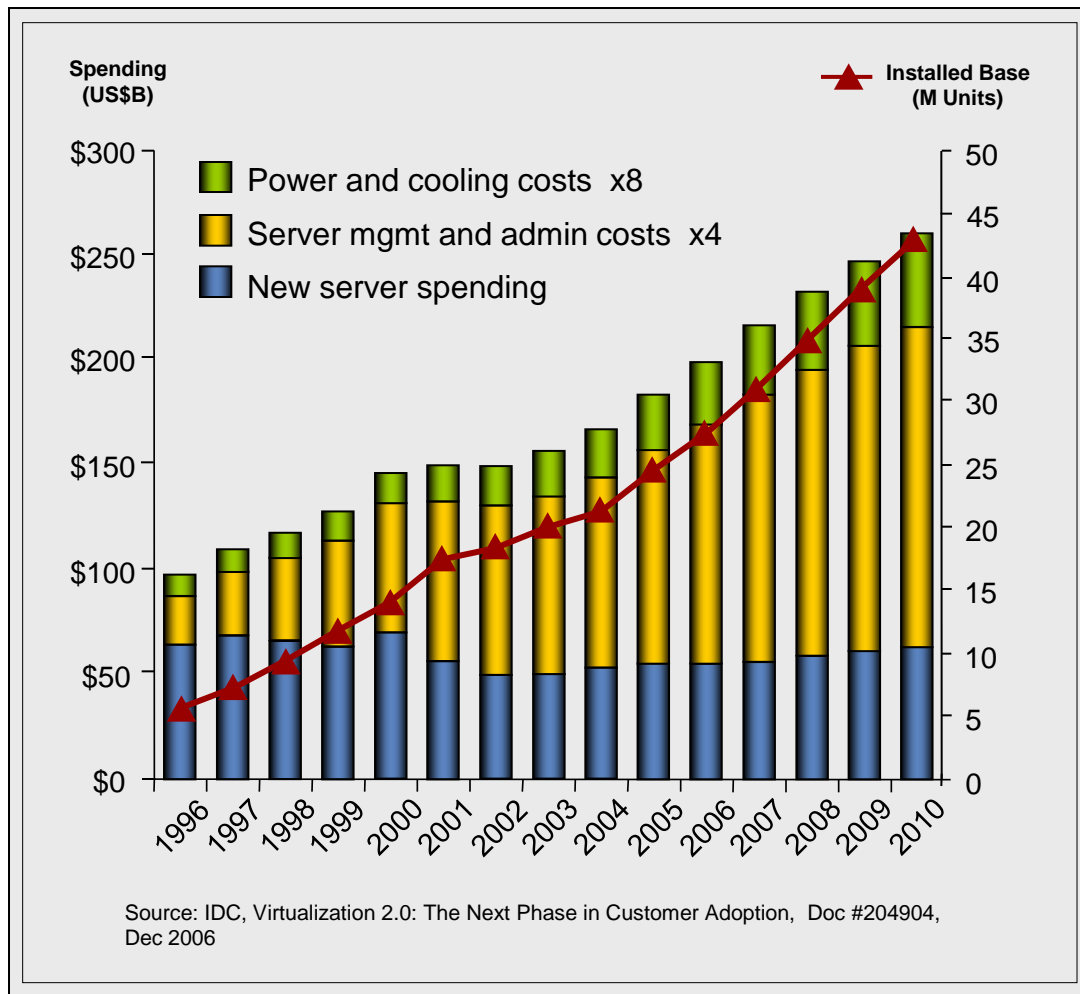 ▶need for rapid implementation without the long-term cost and risk

Today's reality . . .

IDC reports that IT operational labor spend grew at 10% CAGR 2003 – 2008

70% of IT budget goes toward operational overhead

85-95% of server capacity is excess – nearly $140B in over expenditure
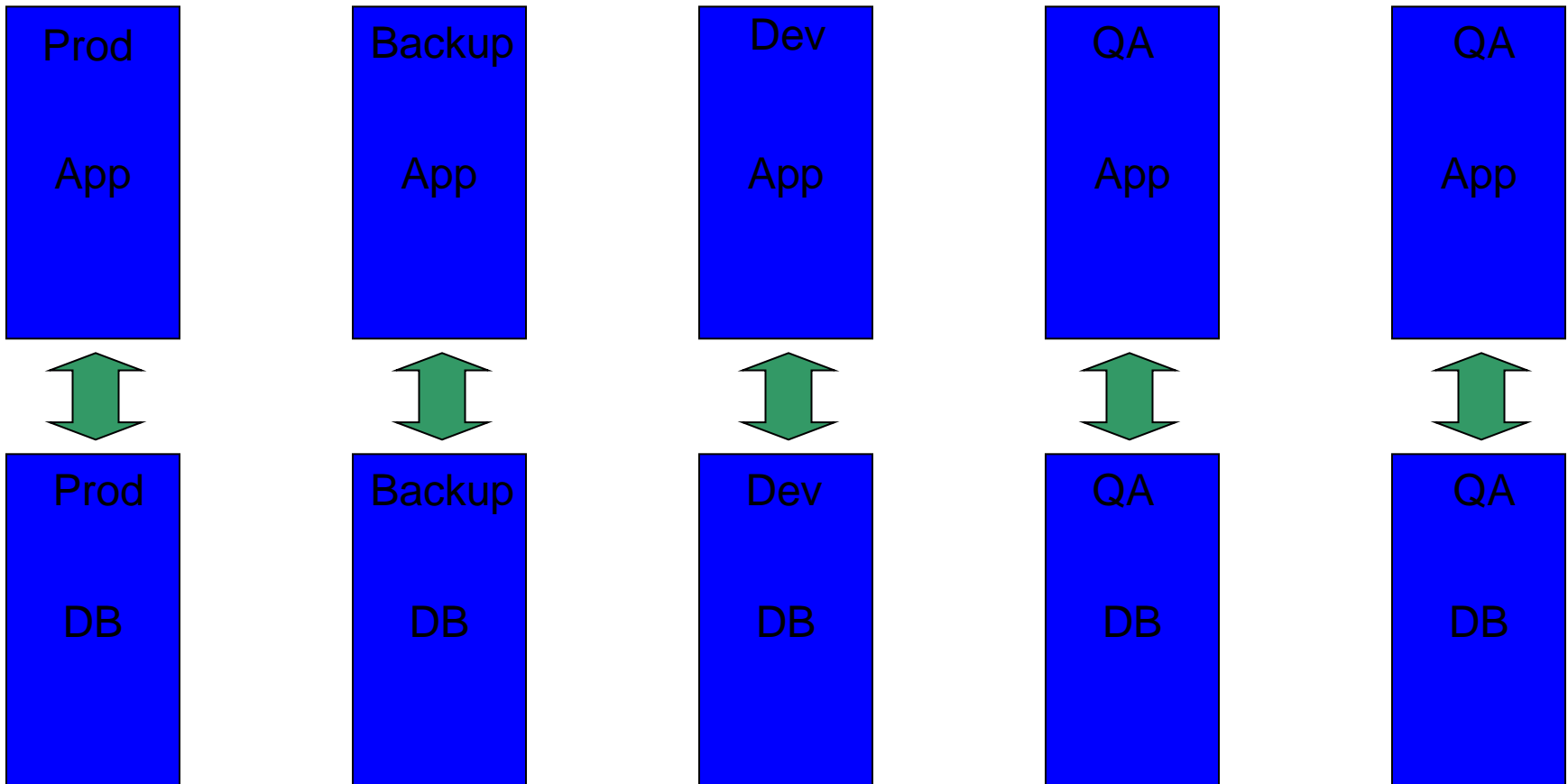
Typical company IT energy costs have been rising 15% per year over the last 5 years

Today, each dollar of new servers cost $0.52 to power and cool and is forecast to increase to $0.71 in the next four years

Spending (US$B)

Installed Base (M Units)

■ Power and cooling costs x8
■ Server mgmt and admin costs x4
■ New server spending

$300
$250
$200
$150
$100
$50
$0

50
45
40
35
30
25
20
15
10
5
0

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Source: IDC, Virtualization 2.0: The Next Phase in Customer Adoption, Doc #204904, Dec 2006

It's time to start thinking differently about infrastructure.

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The Business as Usual Implementation Strategy

Prod App	Backup App	Dev App	QA App	QA App

Prod DB	Backup DB	Dev DB	QA DB	QA DB

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The Value of Virtualization

Reduce costs by increasing asset utilization

Redeploy talent to manage your business, not your infrastructure

Rapidly provision new servers

Drive new levels of IT staff productivity
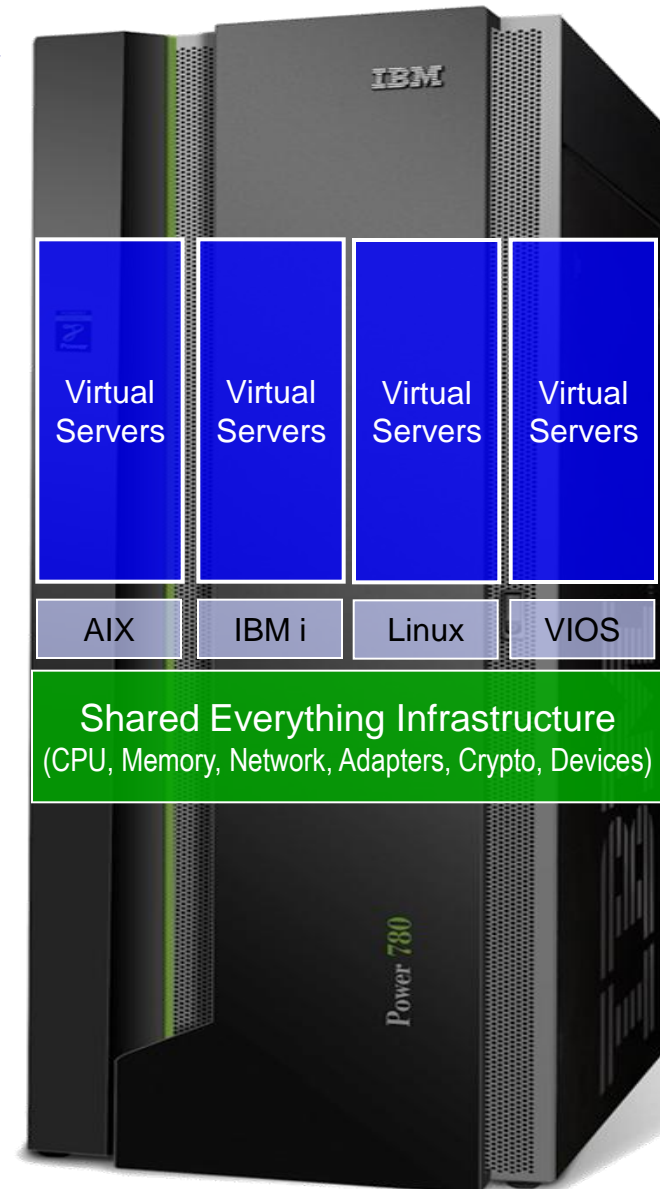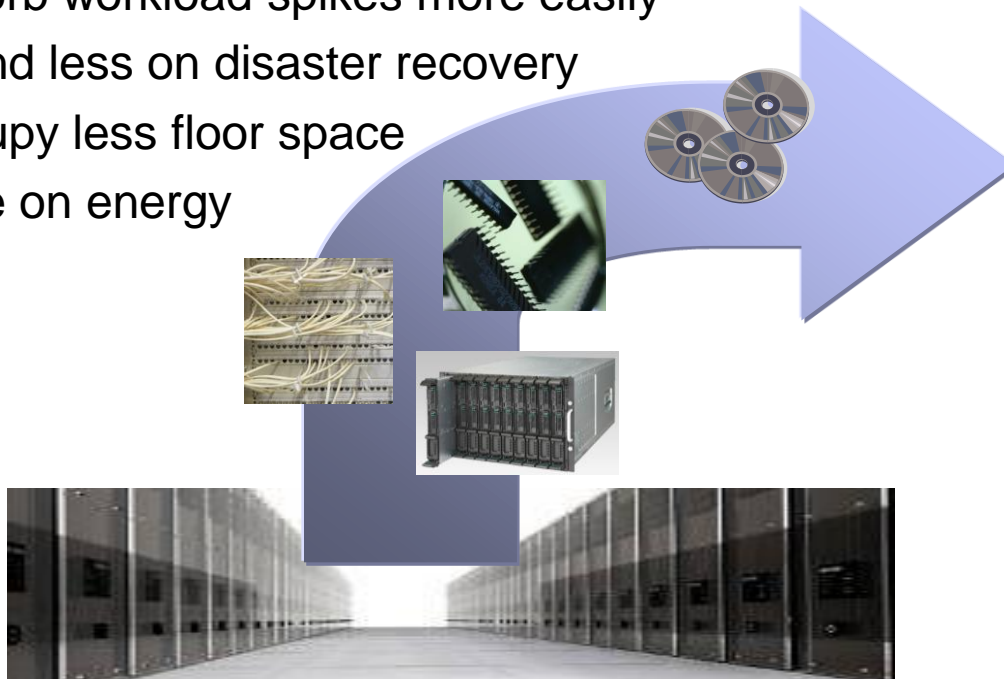
Simplify server management and operations

Database

Application

Web

DNS

File/Print

Email

Firewall

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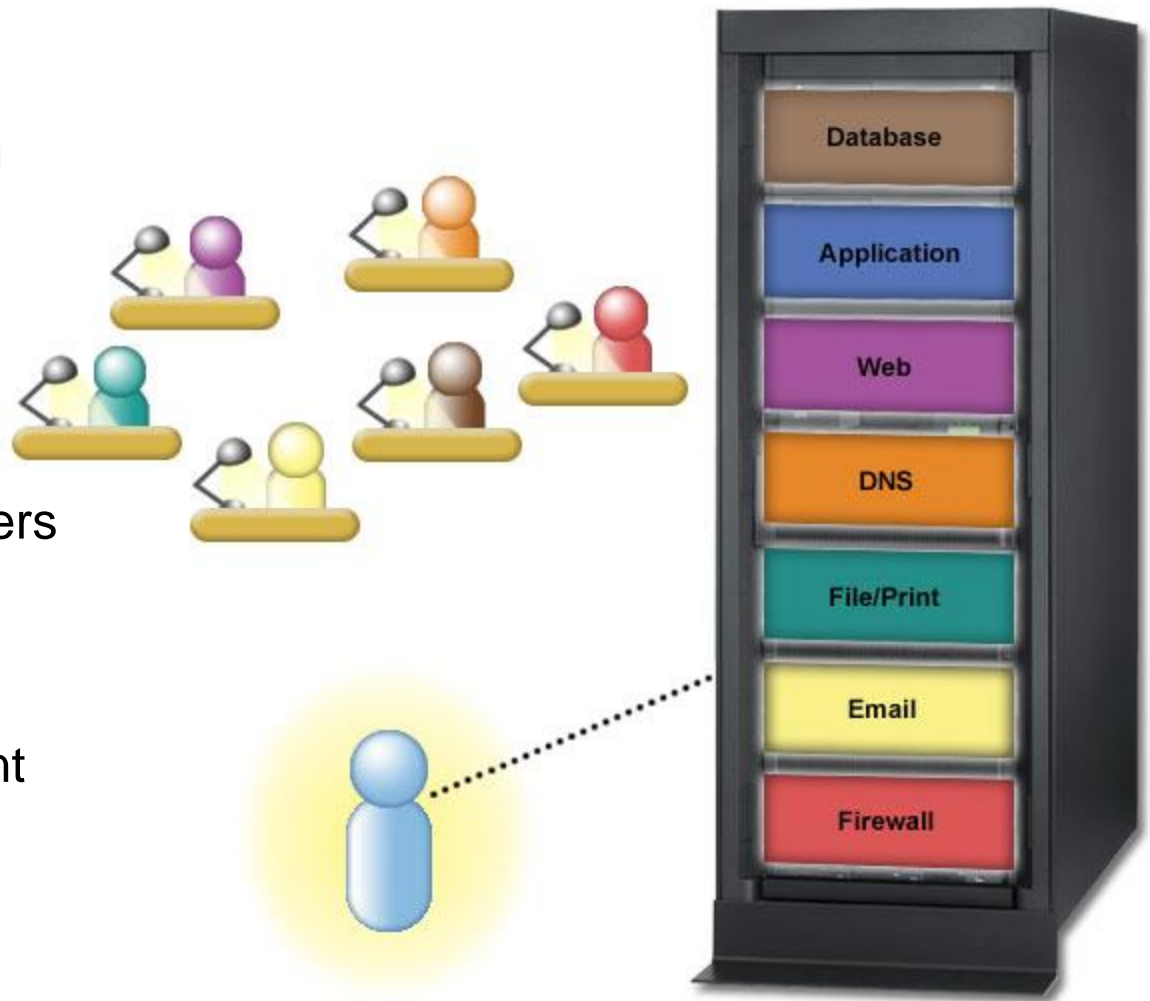
PowerVM on IBM Power Systems

Saving Money and Reducing Complexity Helping You "Do More with Less"

- Consolidate more cores per CPU

- Run more software at less expense

- Manage more virtual servers with fewer people

- Deploy new servers and applications faster

- Absorb workload spikes more easily

- Spend less on disaster recovery

- Occupy less floor space

- Save on energy

Virtual Servers	Virtual Servers	Virtual Servers	Virtual Servers
AIX	IBM i	Linux	VIOS

Shared Everything Infrastructure
(CPU, Memory, Network, Adapters, Crypto, Devices)

Power 780

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PowerVM Client Success: GHY International
Consolidating infrastructure benefits midsize business

Business challenge:

Predicting that international trade would increase as economic conditions improve, customs brokerage GHY International wanted to update its IT infrastructure to provide headroom for business growth.

Solution:

GHY International deployed an IBM® Power® 750, running IBM AIX®, IBM i, and Linux® on a single POWER7® system using IBM PowerVM™ and a separate IBM System x® 3850 and VMware environment for Windows®.

Benefits:

- Enhanced scalability: IBM Power 750 delivers over four times the capacity of current server

- Easy manageability: A four-person IT team now spends just five percent versus 95 percent of its time on server management

- Better energy efficiency: reduces electricity and cooling requirements with three operating systems running on one box

"With PowerVM, we went from 95 percent to only 5% of our time managing or reacting to our environment. And saved the business hundreds of thousands of dollars in licensing and application fees."

— Nigel Fortlage, vice president of IT and CIO, GHY International

PowerVM Client Success: Winn-Dixie
Strengthening the infrastructure with an IBM consolidation solution

Business challenge

Winn-Dixie, a Jacksonville, Florida-based grocery chain based with more than 600 retail locations throughout the southeastern U.S., needed a cost-effective and easily managed solution to replace its aging distributed IT infrastructure and quickly enable disaster recovery.

Solution

The solution consolidated more than 600 stand-alone servers at individual grocery stores into a centralized data center at Winn Dixie headquarters using IBM AIX® and IBM PowerVM™ virtualization technologies to support 16 stores on a single
IBM BladeCenter® JS22 blade server, mirrored to a nearby facility as well as to a remote disaster recovery location.

Benefits

- Redirected $5 million capital cost savings to store remodelling

- Improved application performance by 5 to 10 times, enabling better service

- Reduced disaster recovery time from days to hours

"We thought the IBM solution gave us the most flexibility not only for now, but going forward. It accommodated our existing application portfolio while providing a very rich upgrade path in our infrastructure."

– Barry Kirk, director of architecture, Winn-Dixie

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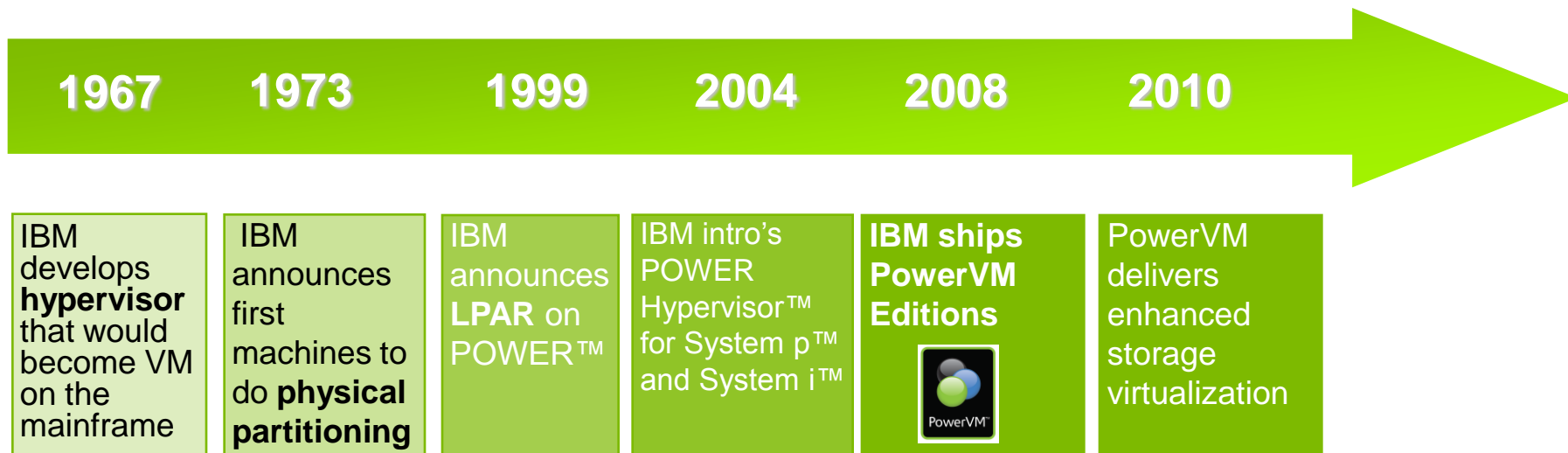
Virtualization

... the creation of a <u>virtual</u> (rather than the actual physical) version of something, such as a <u>server</u>, processor, storage device (tape or disk), network resources, or I/O.

VIRTUAL ICE FISHING
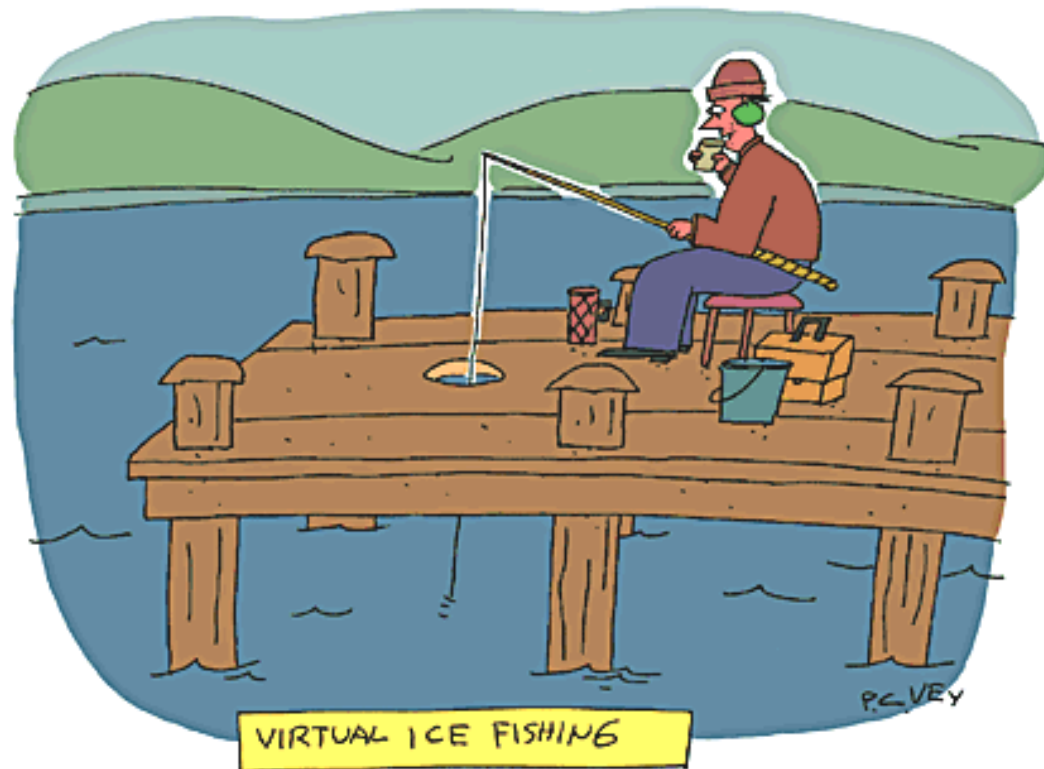
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PowerVM builds on IBM's virtualization leadership

A 40-year track record in virtualization innovation continues with PowerVM™

1967   **1973**   **1999**   **2004**   **2008**   **2010**

IBM develops **hypervisor** that would become VM on the mainframe	IBM announces first machines to do **physical partitioning**	IBM announces **LPAR** on POWER™	IBM intro's POWER Hypervisor™ for System p™ and System i™	**IBM ships PowerVM Editions**	PowerVM delivers enhanced storage virtualization

The Power Systems team has integrated PowerVM world-class virtualization into every server – based on best practices gained from IBMers who created the 'gold standard' of mainframe virtualization.
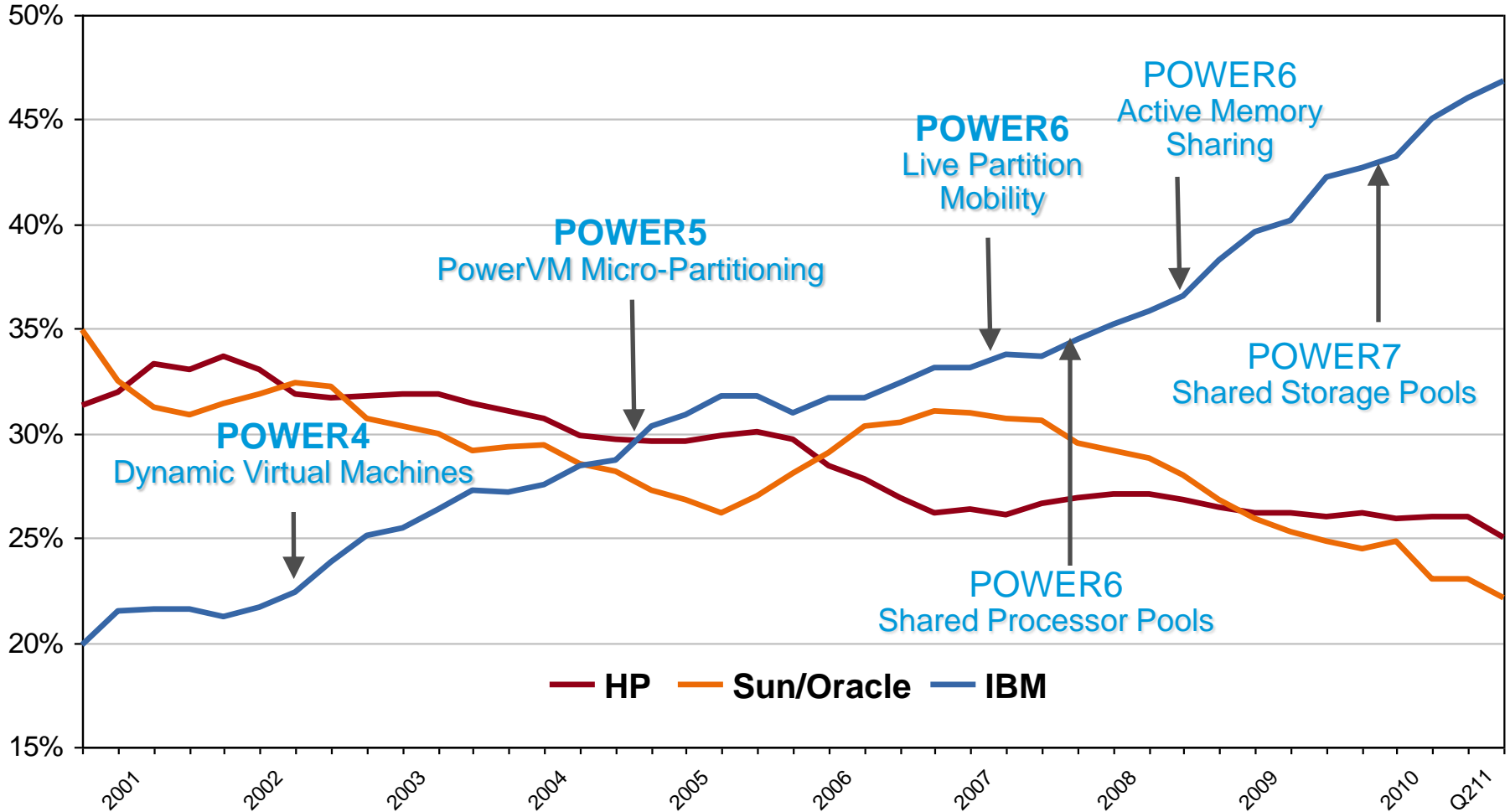
Power is virtualization without limits

13   **Power is performance redefined**

PowerVM accelerates Power Systems success

Exploiting the superior economics of Power drove the historic shift in the UNIX server market

PowerVM™

UNIX Server Rolling Four Quarter Average Revenue Share

POWER6
Active Memory
Sharing

POWER6
Live Partition
Mobility

POWER5
PowerVM Micro-Partitioning

POWER4
Dynamic Virtual Machines

POWER7
Shared Storage Pools

POWER6
Shared Processor Pools

— HP — Sun/Oracle — IBM

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 Q211

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Source: IDC Server Tracker, August 2011   **© 2011 IBM Corporation**

Why Virtualize workloads with PowerVM?

Creating a virtualized workload with PowerVM is simple:
- Create a new PowerVM logical partition (LPAR) or virtual machine (VM)
- Install the operating system (AIX, IBM i or Linux) in the VM
- Install the workload application(s) in the VM
- Configure the operating system and applications as required

At this point, the completed virtualized workload can be stored, copied, archived or modified just like any other file

The benefits of virtualizing workloads with PowerVM in this way include:
- **Rapid provisioning** – deploying the ready-to-run workload is a quick and easy process
- **Scalability** – deploying multiple copies of the same workload type is simplified
- **Recoverability** – bringing a workload back online after an outage is fast and reliable
- **Consolidation** – many diverse workloads can be hosted on the same server

All of these benefits save system administrator time and resources
- In addition, workload consolidation offers significant IT infrastructure cost reductions

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Virtualization Scalability…
is Key to Achieving Consolidation Goals

The primary reason CIOs and IT managers deploy virtualization is for **server workload consolidation**

- Put simply, the more workloads that can be encapsulated within VMs and combined onto a single server, the higher the consolidation ratio and greater the **cost reduction**

- The integrated combination of the POWER architecture and PowerVM makes possible **far higher consolidation ratios** than alternative virtualization solutions

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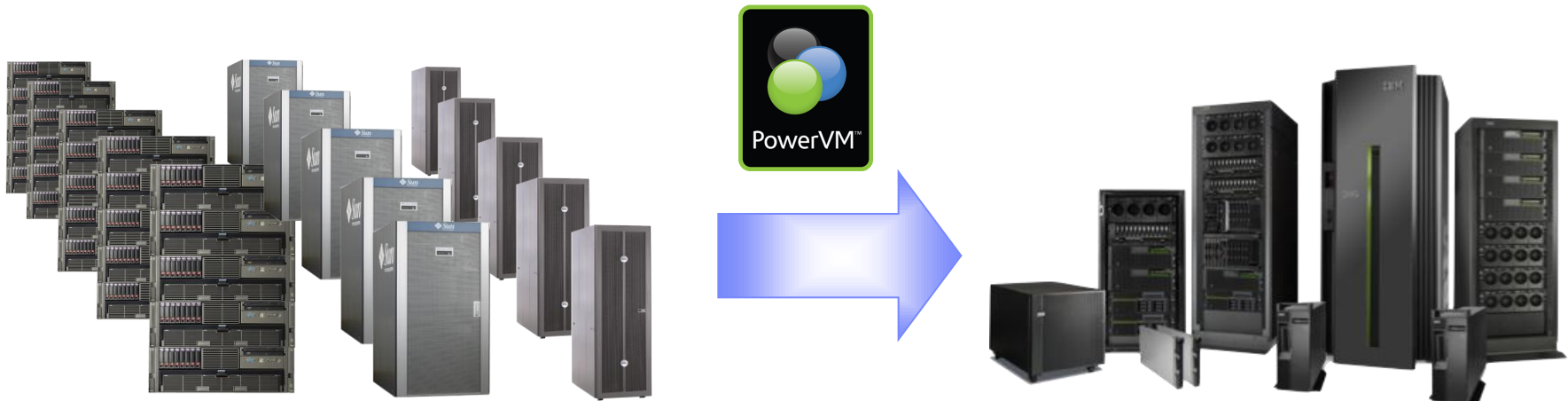
PowerVM Editions are tailored to client needs

PowerVM Editions
offer a unified
virtualization
solution for all
Power workloads

PowerVM Express Edition
- *Evaluations, pilots, PoCs*
- *Single-server projects*

PowerVM Standard Edition
- *Production deployments*
- *Server consolidation*

PowerVM Enterprise Edition
- *Multi-server deployments*
- *Cloud infrastructure*

PowerVM Editions	Express	Standard	Enterprise
Concurrent VMs	2 per server	10 per core (up to 1000)	10 per core (up to 1000)
Virtual I/O Server	✓	✓ ✓	✓ ✓
NPIV	✓	✓	✓
Suspend/Resume		✓	✓
Shared Processor Pools		✓	✓
Shared Storage Pools		✓	✓
Thin Provisioning		✓	✓
Live Partition Mobility			✓
Active Memory Sharing			✓

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Shared Storage Pools allow flexible VIOS linking

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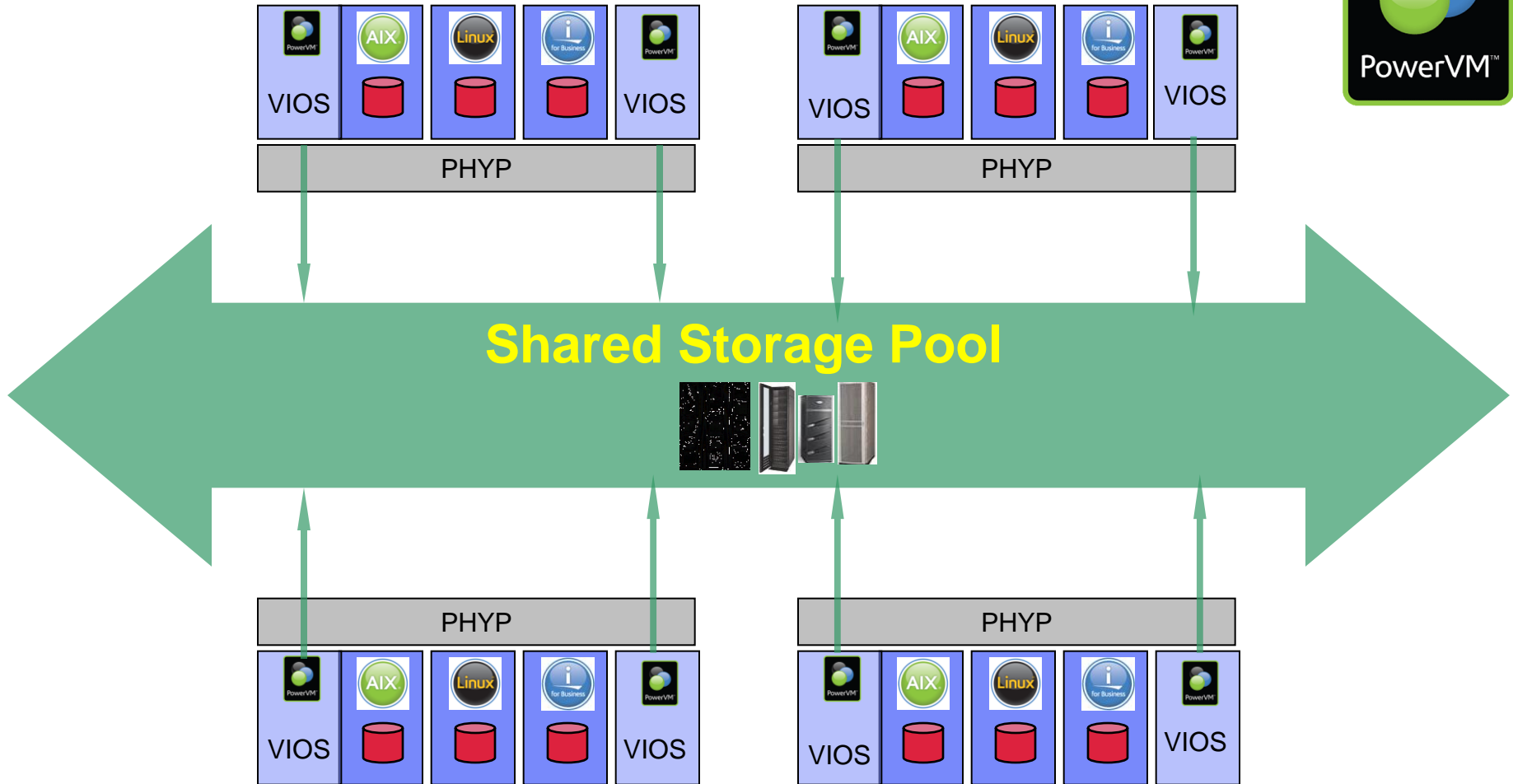
Live Partition Mobility improves service levels

Business and IT security and resiliency are as critical as ever, and must be dynamic and intelligent in order to match the speed of business change

PowerVM Live Partition Mobility
- Move running AIX and Linux partitions between systems

Virtualized SAN and Network Infrastructure
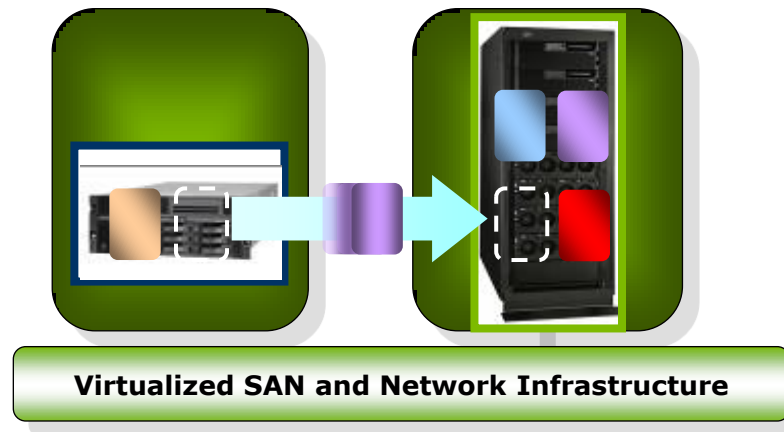
Eliminate planned outages and balance workloads across systems

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Active Memory Sharing optimizes resources

Dynamically adjusts memory available on a physical system for multiple virtual images based on their workload activity levels:

- Different workload peaks due to time zones
- Mixed workloads with different time of day peaks (e.g. CRM by day, batch at night)
- Ideal for highly-consolidated workloads with low or sporadic memory requirements

Available with PowerVM Enterprise Edition

- Supports AIX, IBM i and Linux workloads

Blends Power Systems hardware, firmware and software enhancements to optimize resources

- Supports over-commitment of logical memory
- Overflow managed by VIOS paging device
- Two VIOS partitions can be used for redundancy
- Compatible with Live Partition Mobility
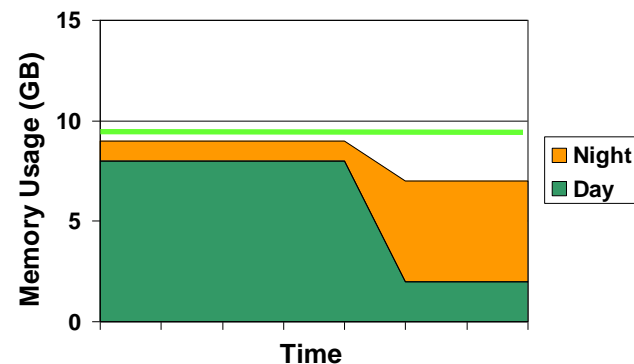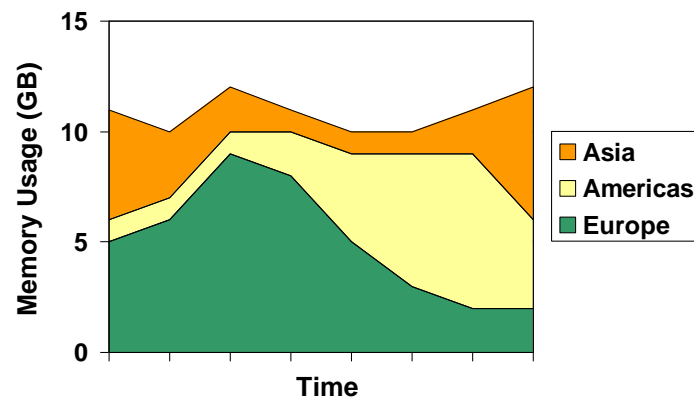
VMControl Editions: Add value to PowerVM on Power Systems

VMControl	VMControl Express Edition	VMControl Standard Edition	VMControl Enterprise Edition
Virtualization Capabilities	**Manage** resources	**Automate** virtual images	**Optimize** system pools
PowerVM	AIX · i for Business · Linux	AIX · Linux	AIX · Linux
Create/manage virtual machines (x86, PowerVM and z/VM)	✓	✓	✓
Virtual machine relocation	* ✓	✓	✓
Capture/import, create/remove standardized virtual images		✓	✓
Deploy standard virtual images		✓	✓
Maintain virtual images in a centralized library		✓	✓
Create/remove system pools and manage system pool resources			✓
Add/remove physical servers within system pools			✓

*** VM relocation is not supported for IBM i workloads**

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Positive Feedback: Analyst commentary on PowerVM

For Infrastructure & Operations Professionals

August 27, 2010

Q&A: Impact Of IBM's POWER7 And PowerVM On Workload Optimized Systems Design
PowerVM Is A Critical Advantage For IBM's Power Systems
by Brad Day
with Robert Whiteley and Lauren E. Nelson

EXECUTIVE SUMMARY

IBM's POWER7 system — arguably the most dramatic server design development since the first POWER4 dual-core microprocessor architecture — makes advanced virtualization stacks a core differentiator in creating next-generation *workload-optimized* systems architecture. However, for many I&O professionals, the feature and functions of microprocessors and/or microarchitectures won't be enough to put advanced virtualization stacks like POWER7 on their purchasing shortlists. Instead, you should seek the benefits of a balanced systems architecture design. IBM's clear leadership position in the traditional Unix area — coupled with its more advanced PowerVM virtualization stack — will continue to be the core reason to adopt IBM technology. The PowerVM stack also gives POWER7 advantages over other hypervisor-based systems alternatives and, most importantly, the ability to equally support complex, mixed-application workloads across multiple operating systems. And finally, another key component of short-listing POWER7 will be attacking the I&O objective of lowering the life-cycle costs in owning an enterprise computing footprint.

QUESTIONS

1. What metrics should be used to measure advanced virtualization architectures?
2. What are the primary benefits of PowerVM running on Power Systems?
3. Which version of System Director's VMControl product is right for me?
4. What aspects of the new POWER7 systems functionality leverage PowerVM?

POWER7 AND POWERVM IMPROVE IBM'S POSITION IN THE VIRTUALIZATION MARKET

IBM's Power Systems server continues to evolve. It differentiates from distributed x86 and other RISC and Itanium 2 architectures with sustained advantages in scalable availability and scalable performance. Over the past three years, IBM made large strides with the convergence of System i and System p and the lure of successfully attracting Linux ISVs. With the introduction of POWER7, IBM made another significant leap in big-iron balanced systems design and the continued innovations around the PowerVM virtualization stack. Power Systems is retaking center stage with enterprises traditionally favoring Unix but whose objective may also include the consolidation and virtualization of both Linux- and Unix-led applications. It's a single server system design that can also offer an advanced virtualization stack in support of a more varied and mixed set of applications workloads — making virtualization the key ingredient in creating a more *workload-optimized* balanced systems architecture. And finally,

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"IBM's clear leadership position in the traditional Unix area — coupled with its more advanced PowerVM virtualization stack — will continue to be the core reason to adopt IBM technology. The PowerVM stack also gives POWER7 advantages over other hypervisor-based systems alternatives and, most importantly, the ability to equally support complex, mixed-application workloads across multiple operating systems."
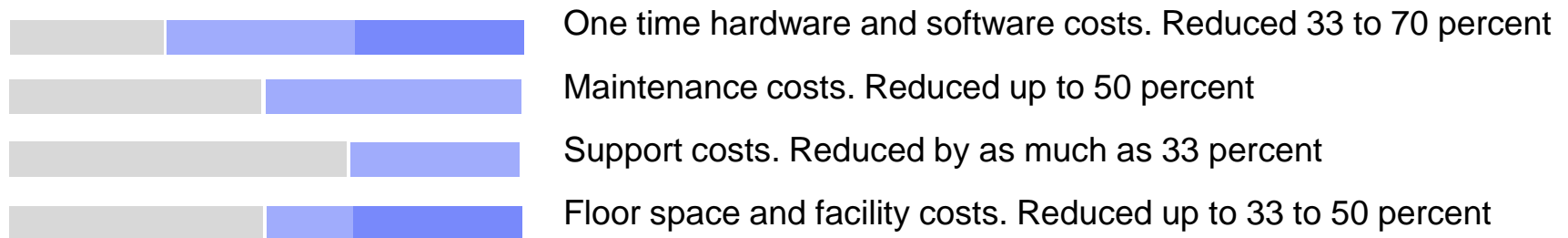
❖*Brad Day, Forrester Research*
❖*(August 2010)*

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Benefits

Virtualization and consolidation are the enablers of an efficient server and storage environment

Cost savings: Based on IBM's experience, the following represents the typical savings that organizations may realize*:

One time hardware and software costs. Reduced 33 to 70 percent

Maintenance costs. Reduced up to 50 percent

Support costs. Reduced by as much as 33 percent

Floor space and facility costs. Reduced up to 33 to 50 percent

IBM has helped clients take full advantage of a **highly virtualized** infrastructure*:

- Realize return on investment in six months or less
- Reduce total cost of ownership by 30 percent to 70 percent
- Increase server utilization rates of up to 80 percent (compared with the typical 5 to 15 percent)
- Realize consolidation ratios ranging from 8 to 1 to 30 to 1
- Lower power and cooling costs because fewer servers are needed
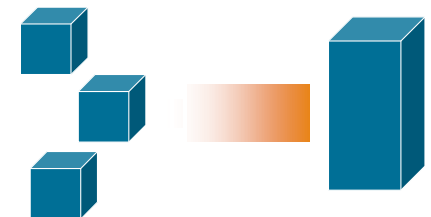
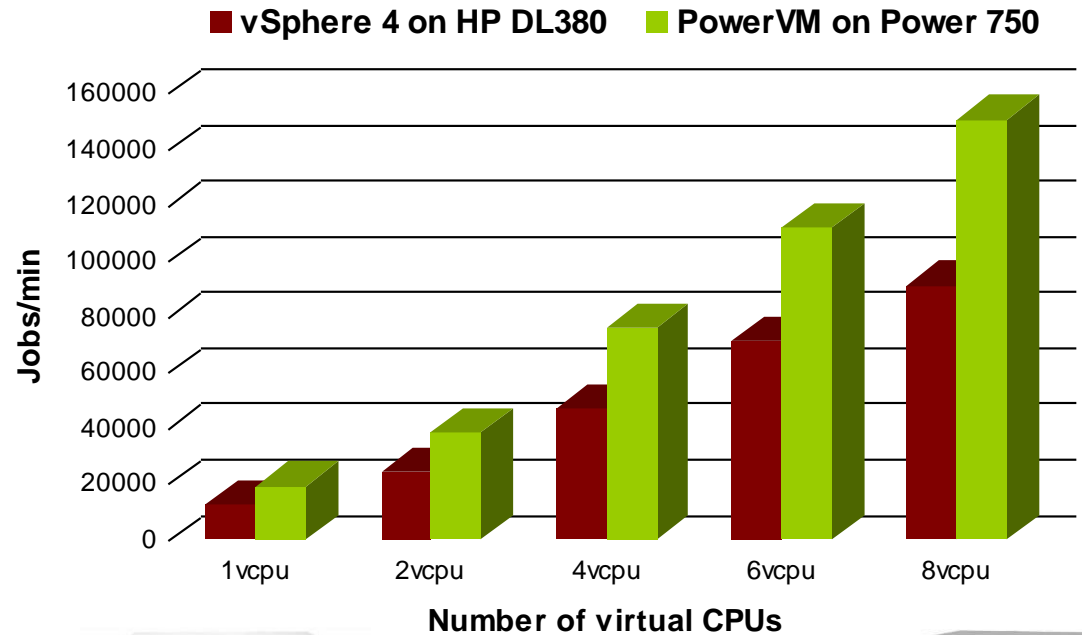* Source: Based on previous IBM engagements

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PowerVM on POWER7 delivers virtualization without limits with higher performance than VMware for the same virtual workloads

65%

PowerVM outperforms VMware by up to 65% on Power 750, running the same Linux workloads and virtualized resources*

PowerVM runs workloads more efficiently than VMware, with far superior resource utilization, price/performance, resilience and availability

PowerVM™

AIM7 Performance Benchmark
Single VM Scaling (Scale-up)

■ **vSphere 4 on HP DL380**   ■ **PowerVM on Power 750**

Jobs/min vs **Number of virtual CPUs** (1vcpu, 2vcpu, 4vcpu, 6vcpu, 8vcpu)

HP DL380 G6

Power 750

* **"A Comparison of PowerVM and VMware Virtualization Performance"**, April 2010
http://www.ibm.com/systems/power/software/virtualization/whitepapers/compare_perf.html

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PowerVM and POWER7 deliver a level of integration unmatched by VMware and x86

Client Needs	PowerVM	VMware vSphere 4 & 5
High Performance	**Built-in hypervisor means all industry-leading Power Systems benchmarks are fully virtualized**	**Degrades x86 workload performance by up to 30% compared to 'bare metal'**
Elastic Scalability	**Scales to support the most demanding mission-critical enterprise workloads**	**Imposes constraints that limit virtualization to small/medium workloads**
Extreme Flexibility	**Dynamically reallocates CPU, memory, storage and I/O without impacting workloads**	**Limited 'hot-add' of CPU and memory, with high risk of workload failures**
Maximum Security	**Embedded in Power Systems firmware and protected by secure access controls and encryption**	**Downloaded software exposes more attack surfaces, with many published vulnerabilities**
Platform Integration	**Designed in sync with POWER processor and platform architecture road maps**	**Third-party add-on software utility, developed in isolation from processor or systems**

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PowerVM Vision

- *PowerVM fully exploits capabilities of POWER7 server family*

- *PowerVM is the foundation for enterprise cloud computing*

- *PowerVM delivers leadership benchmark performance*

- *PowerVM optimizes resource utilization*

- *PowerVM is virtualization without limits*

Virtualization without Limits

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Gracias from Power Systems

Smarter systems for a Smarter Planet.

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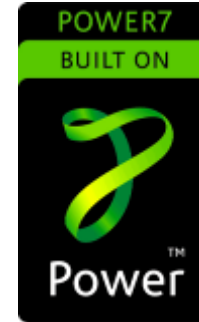
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Revised September 26, 2006

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Revised December 2, 2010

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