Como reducir la complejidad de las inversiones en servidores

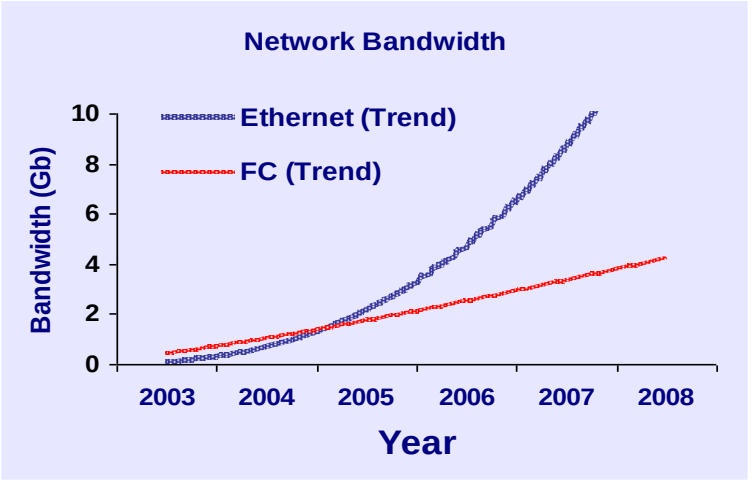
Rául Bernal Cohén
STG Power Competitive Product Manager

Agenda

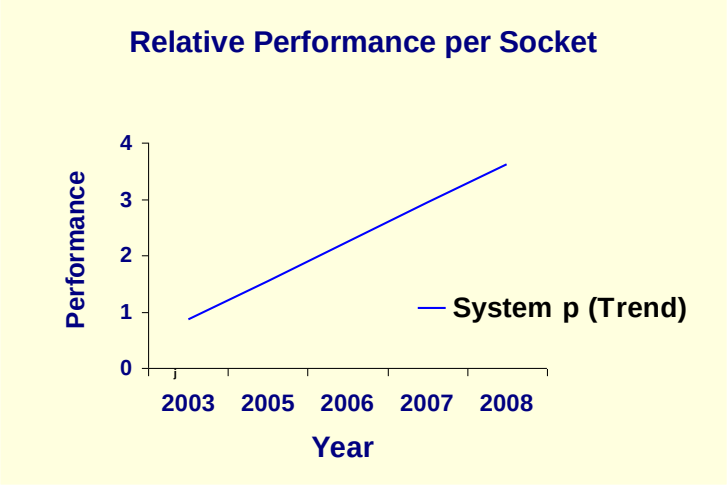
- **Industry Trends**
- **Use of Virtualization for minimize Total Cost of Ownership**
- **Why IBM Infrastructure for Virtualization?**
- **Next Era of Computing - IBM Pure Systems**

Industry Trends: Increasing Capacity

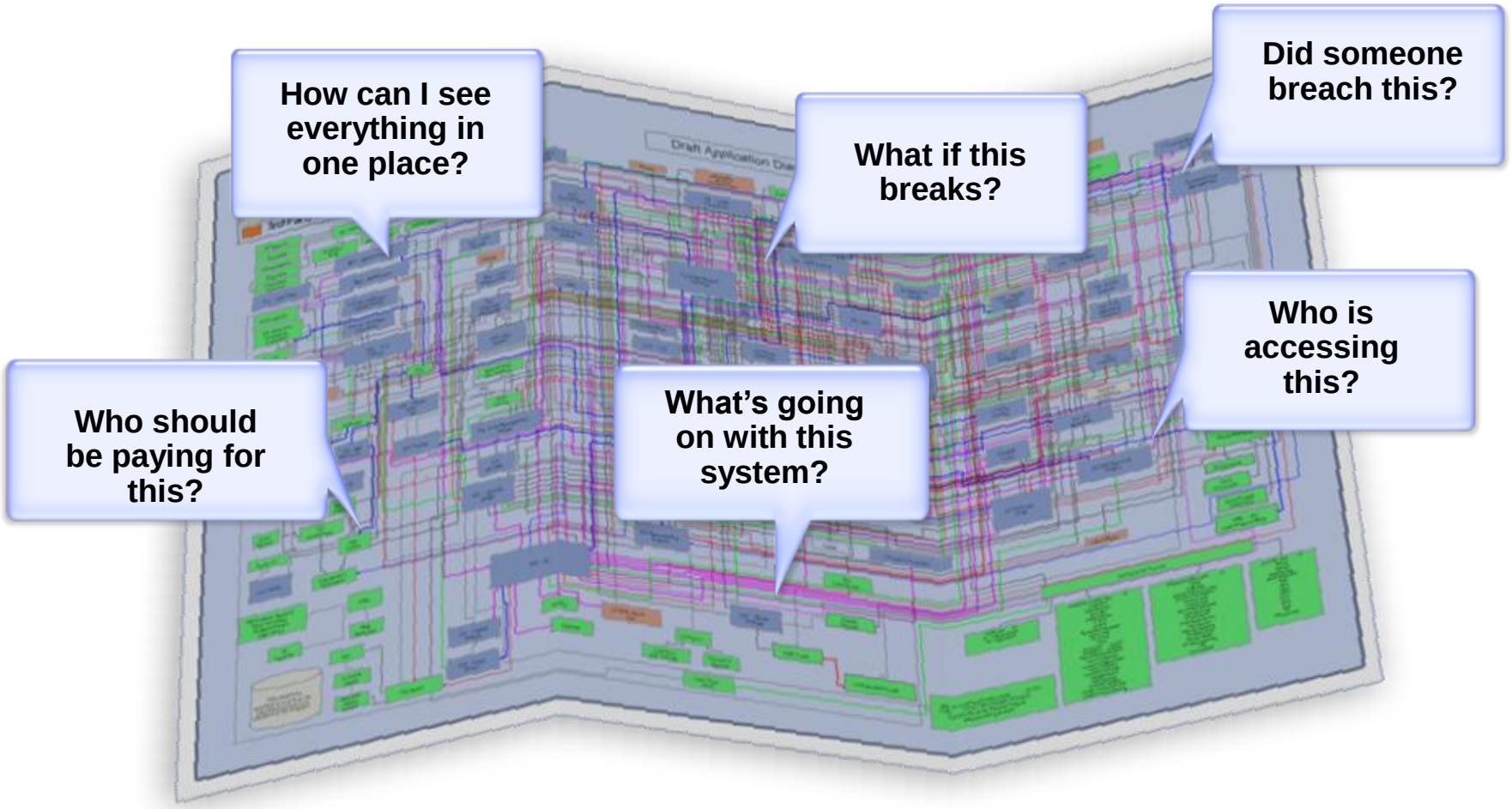
- Significant growth in capacity
  - Network bandwidth has grown 100x in less than 10 years
  - Fibre Channel bandwidth has grown 4x in 5 years.
  - CPU performance per socket has grown almost 4x in 4 years.



- Result
  - Over allocated server and network capacity
  - Significant power and cooling requirements
  - The increasing microprocessor performance per socket will both drive and enable the growing use of virtualization

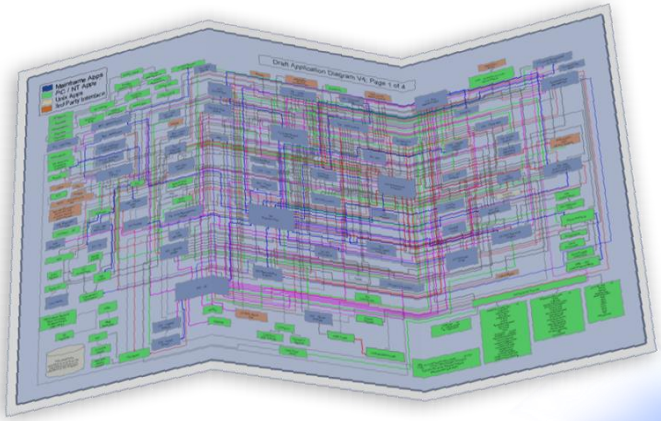


Is this familiar?



Source: IBM client engagement experience

How do I make THIS run there?



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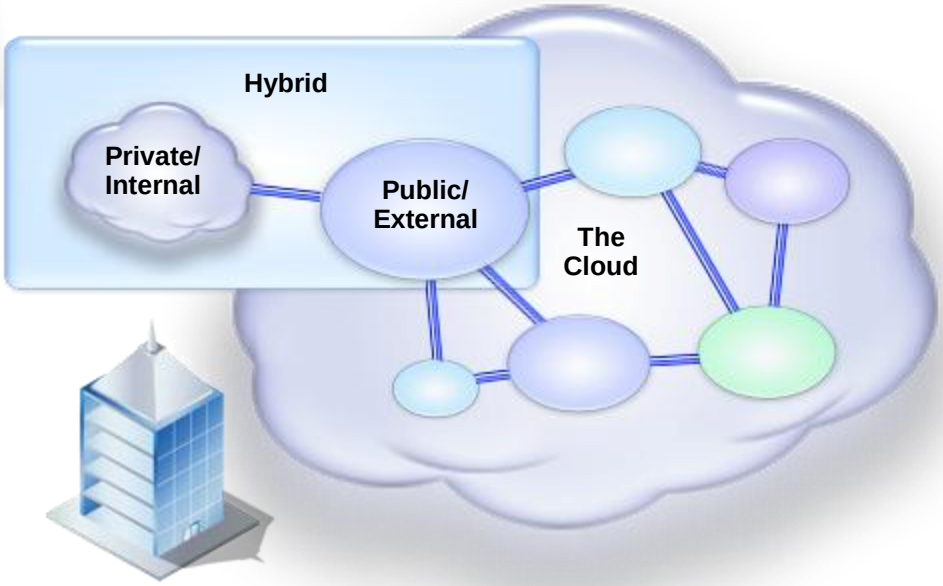
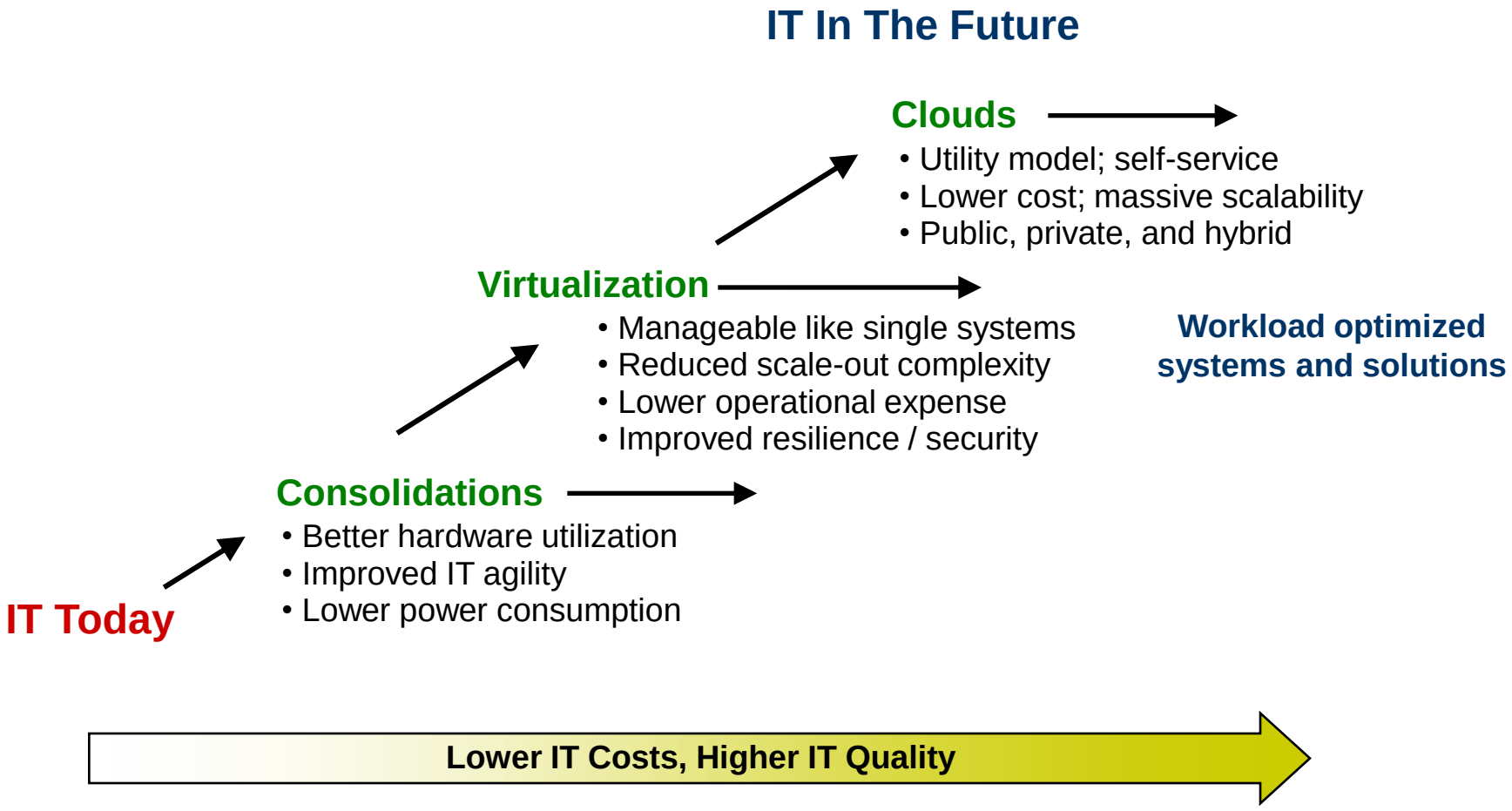


Progressive Phases of IT Transformation



Virtualization and integration will be used to reduce IT complexity and cost and to improve IT qualities (agility, resilience, security, …)

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- Why IBM Infrastructure for Virtualization?
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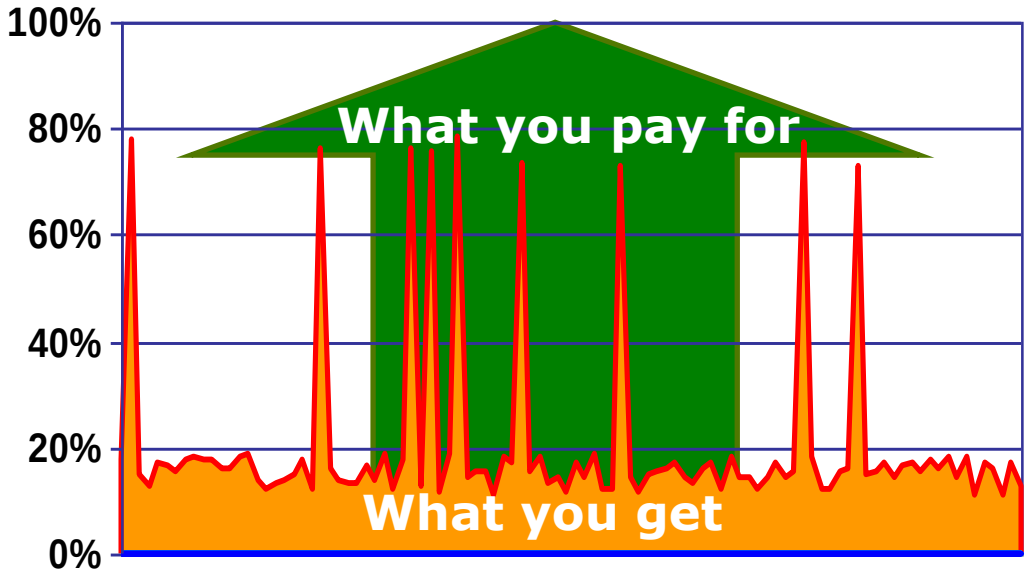
Typical small server utilization

Typical UNIX or x86 serving running a single operating environment is 10 - 20% utilized

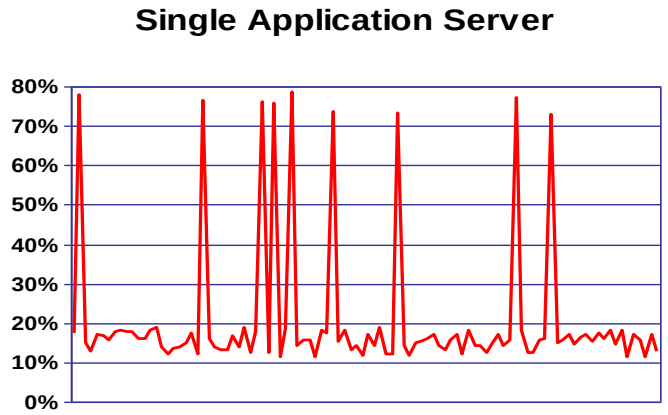
- Configuration planned for growth (20% unused?)
- Configuration planned for peaks (50% unused?)
- System waits for I/O and memory access even when it is working (20% unused?)

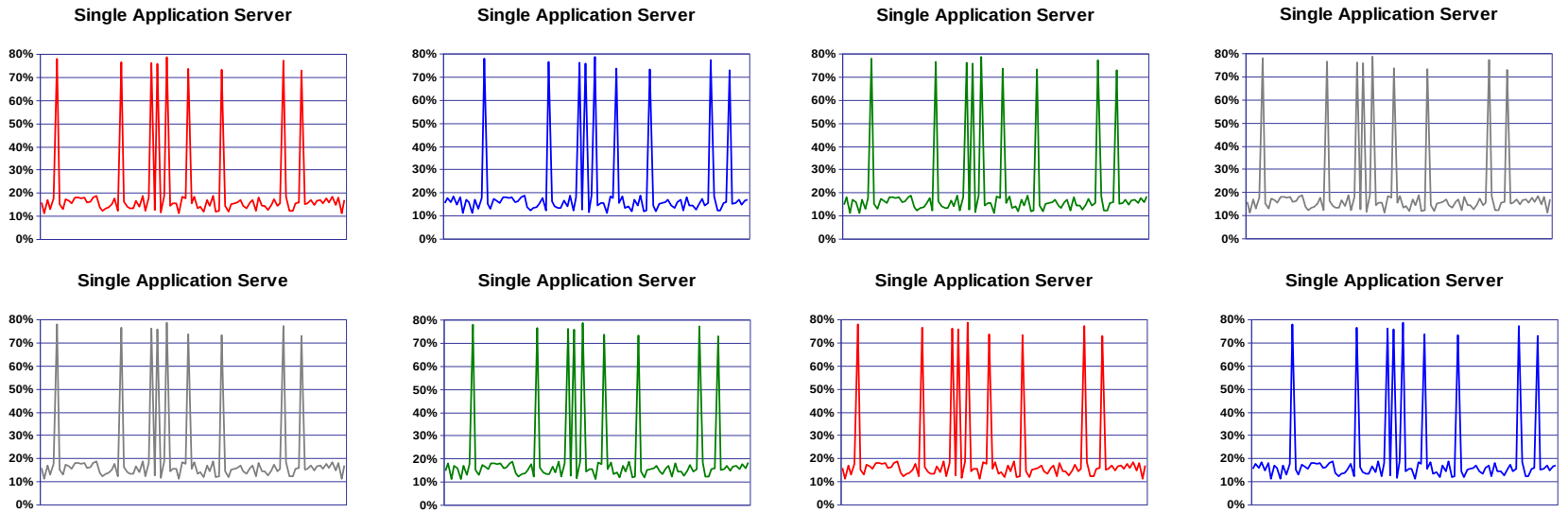


Result is that 80% of the hardware, software, maintenance, floor space, and energy that you pay for, is wasted

Typical Scale-out Approach

- Single workload on a single system
  - Assumed average utilization of 20%
  - Assumed peak of 4X
  - Peaks are assumed to be random
- Eight separate workloads on eight identical systems
  - Same assumptions



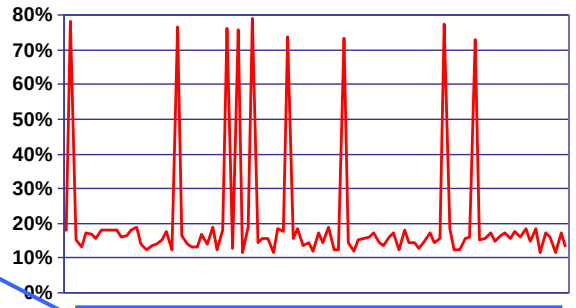


Result is 8X the hardware, software, maintenance, and floor space *that you pay for, is wasted*

Same Scenario with Physical Server Consolidation

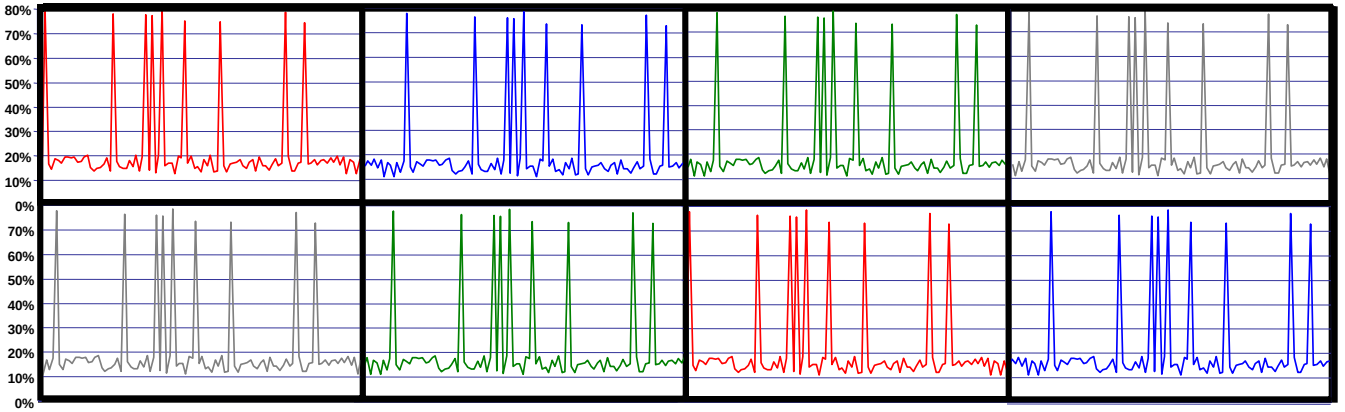
- Single workload on a single system
  - Average Utilization: 20%
- 8 separate workloads on one partitioned system
  - Average utilization is still 20%
- 8 times the hardware in one physical system

Single Application Server



Utilization remains the same due to no resource sharing

Partitioned Application Server with eight fixed partitions



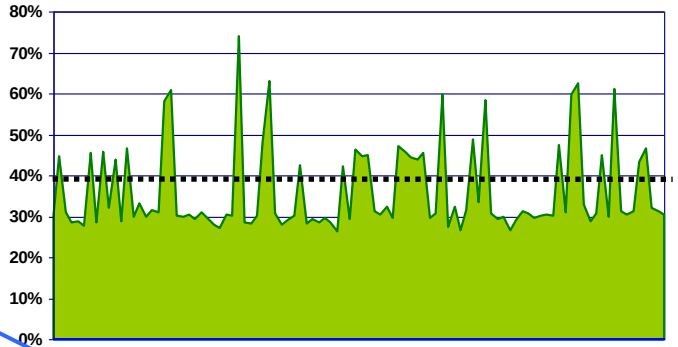
Result is 8X the hardware and software *that you pay for, is wasted*

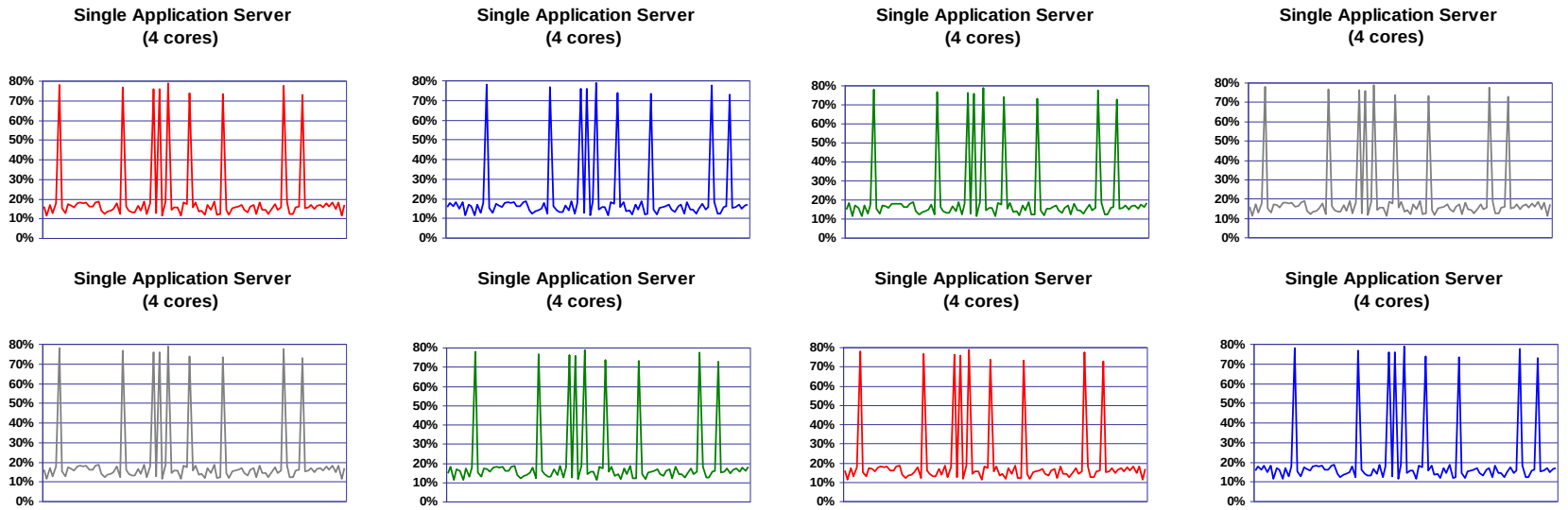
Same Scenario with Virtualized Server Consolidation
(Shared resources)

- Eight separate workloads on eight identical systems
  - Average utilization is 20%
- Eight separate workloads on one system*
  - Average utilization is 39%

32 cores reduced to 16 cores (2 to 1)

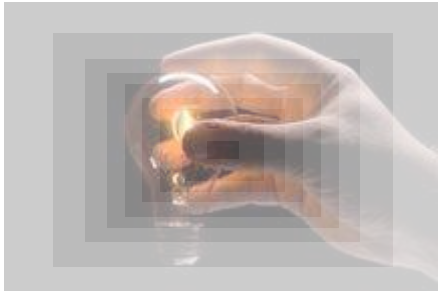
8 to 1 Systems Consolidation (16 cores)





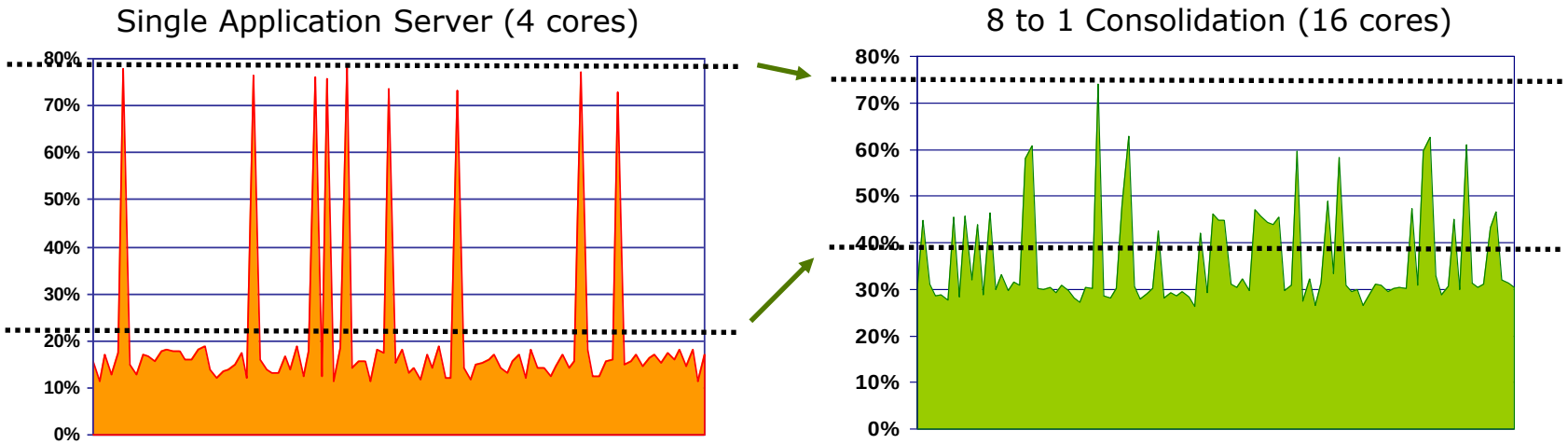
* Assumes independent workloads

The effect of sharing system resources



- Average utilization per system almost doubles
  - 20% to 39%
- Peak usage actually drops
  - 79% to 76%
- Any single application now has access to more resource
  - Previous peaks, capped at 4 cores, can now go to 16 cores
  - Critical workloads can now be prioritized and enabled to run faster
  - Batch jobs, for instance, now run faster, due to the ability to access more capacity

* 16 cores of unused capacity eliminated and applications run faster



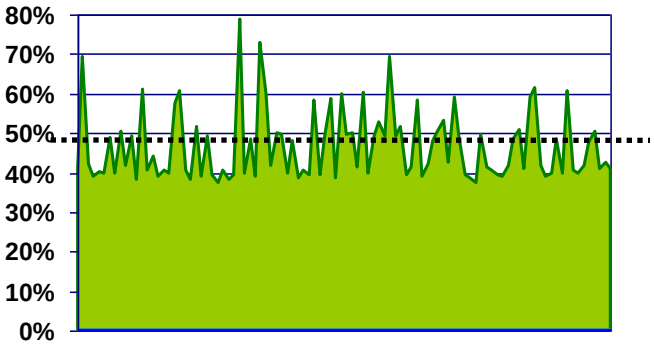
* Assumes independent workloads

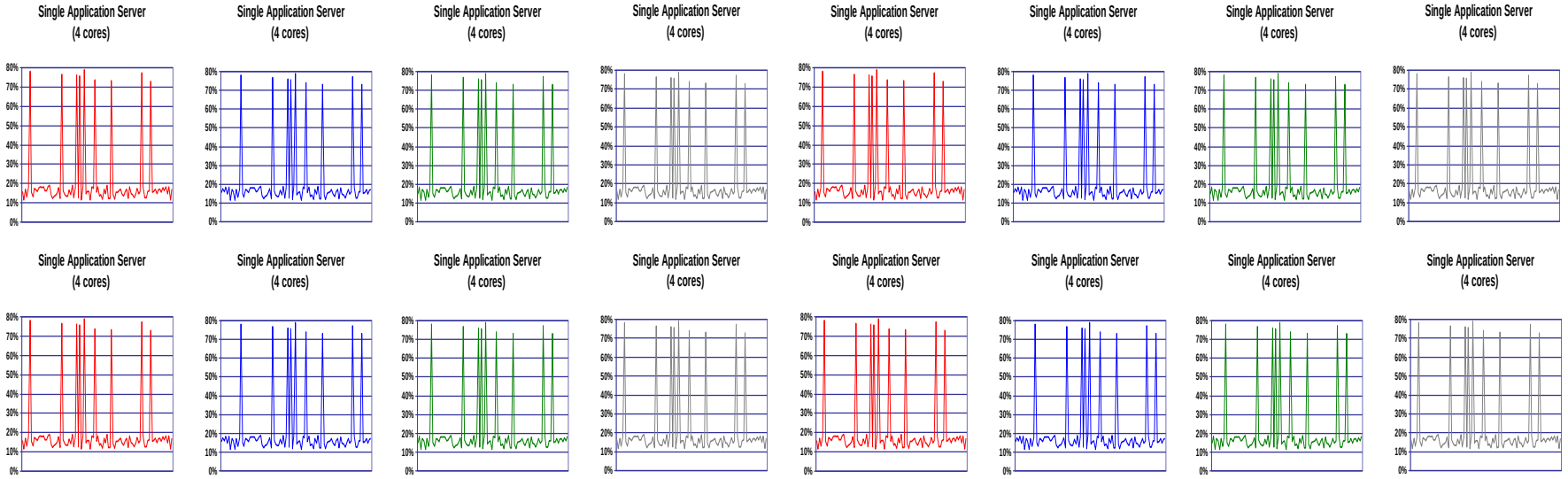
Larger Scenario with Virtualized Server Consolidation
(Shared resources)

- Sixteen separate workloads on sixteen identical systems
  - Average utilization is 20%
  - Peak is 79%
- Sixteen separate workloads on one system*
  - Average utilization is 48%
  - Peak is 78%

64 cores reduced to 24 cores (2.65 to 1)

16 to 1 Systems Consolidation (24 cores)





* Assumes independent workloads

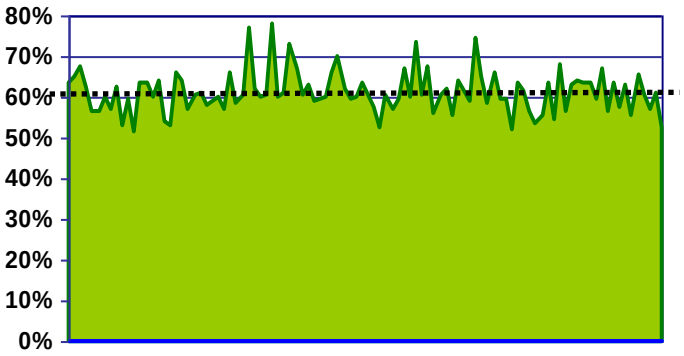
Very Large Scenario with Virtualized Server Consolidation

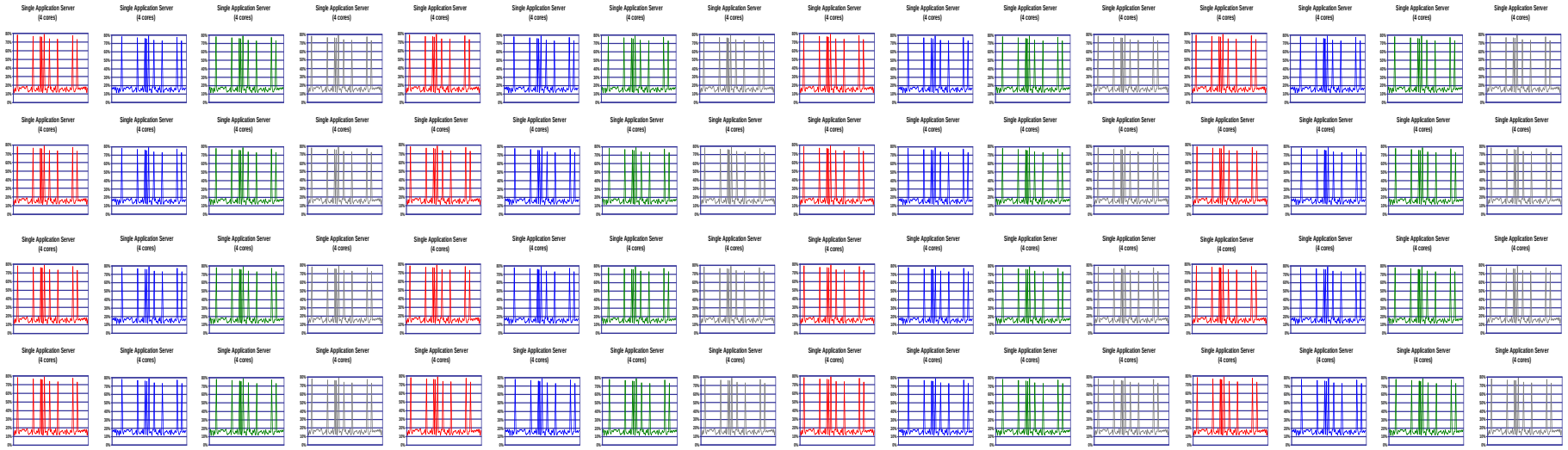
(Shared resources)

- 64 separate workloads on 64 identical systems
  - Average utilization is 20%
  - Peak is 79%
- 64 separate workloads on one system*
  - Average utilization is 61%
  - Peak is 78%

256 cores reduced to 72 cores (3.5 to 1)

64 to 1 Systems Consolidation (72 cores)

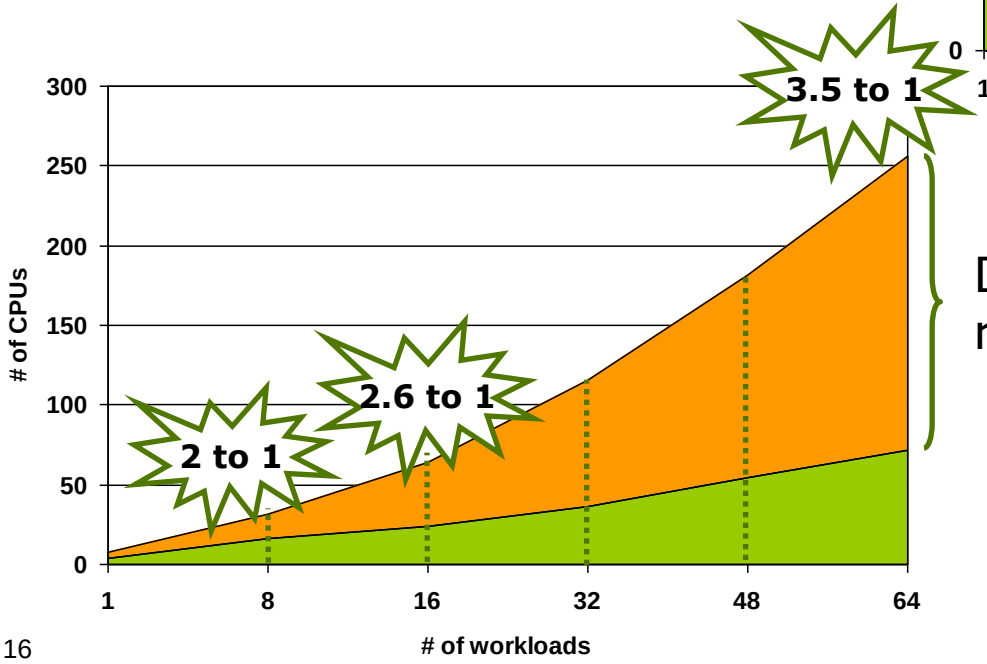


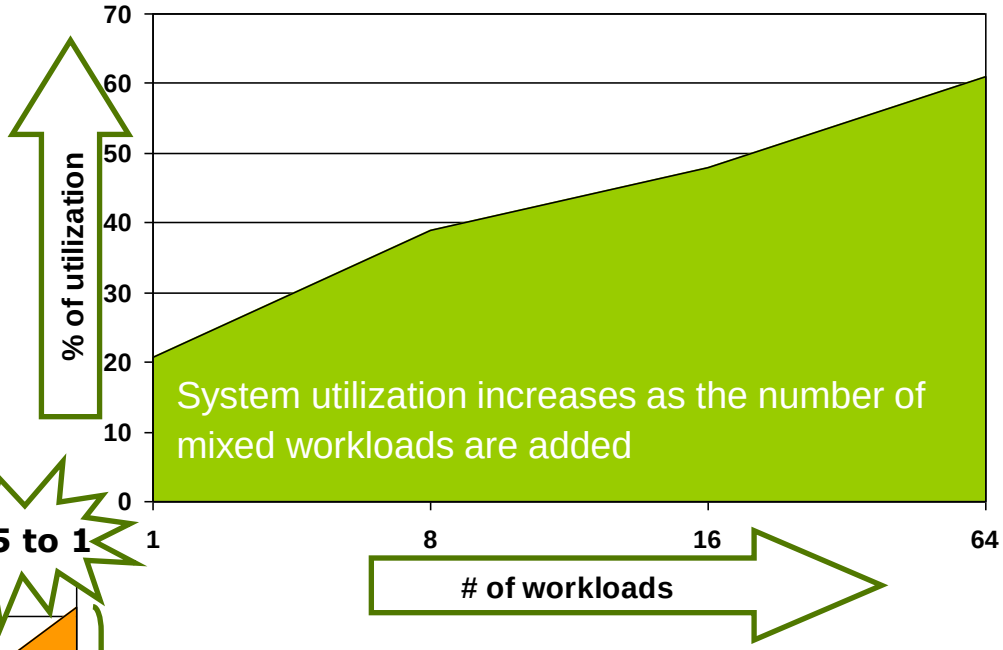


* Assumes independent workloads

Virtualization enables higher system usage through consolidation and workload smoothing

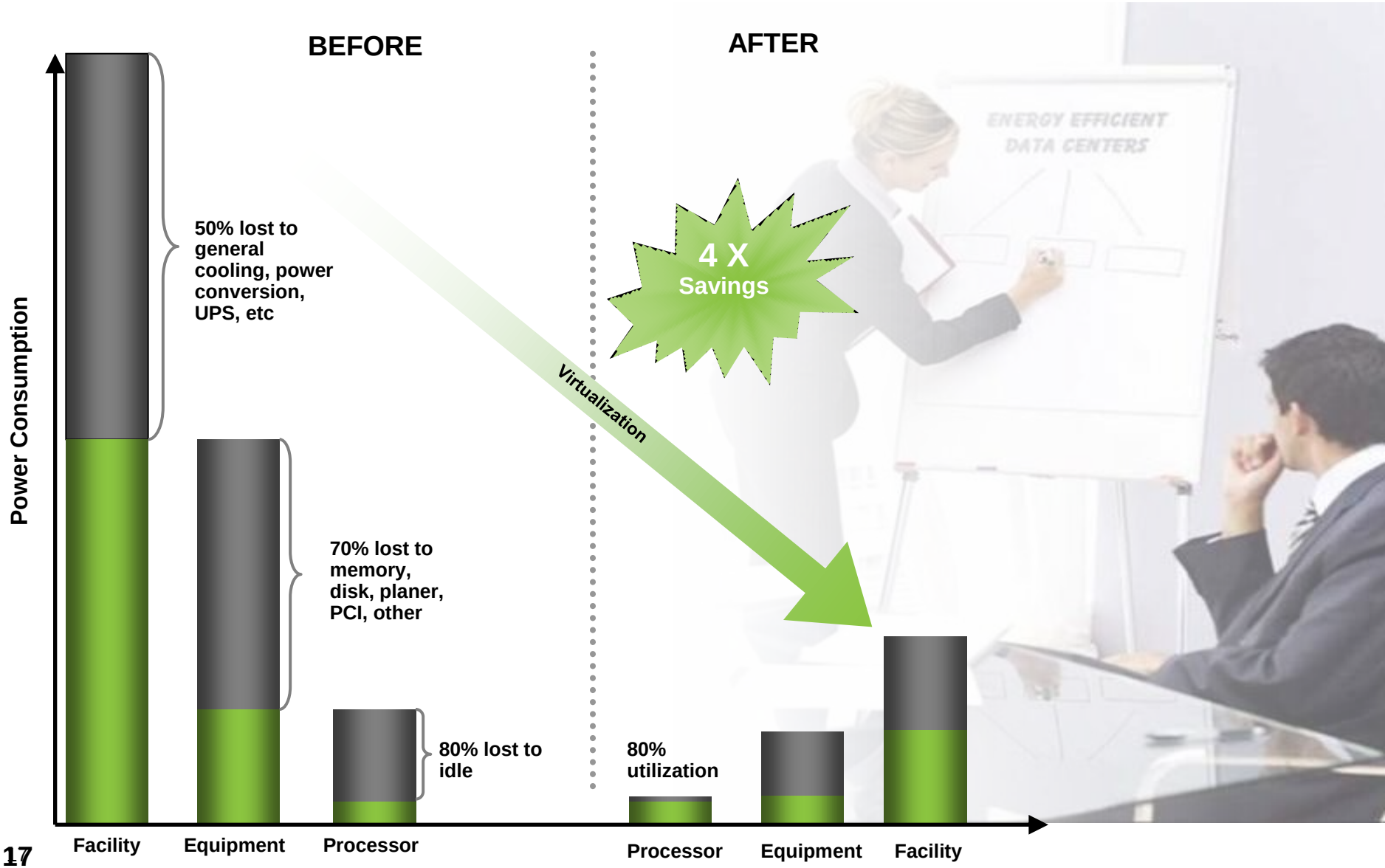
- The amount of “leverage” increases as the number of workloads are added
- The potential for savings increases with the amount of consolidation





Delta in system capacity as a result of shared resources

Immediate impact of consolidation on power consumption – Example



Consolidation boosts utilization and provides energy savings

Server Virtualization

Up to 30-70% TCO savings

- **Up to 33-50% floor space and facility costs**
- **33-70% hardware costs**
- **Up to 50% maintenance costs**
- **Up to 33% support costs**

Storage Virtualization

Up to 25% less capacity needed

- **Up to $50,000 power savings per 1,000TBs of installed storage**
- **Up to 60% migration costs savings**
- **Up to 300% increase in utilization**

Desktop Virtualization

Up to 40% overall TCO savings

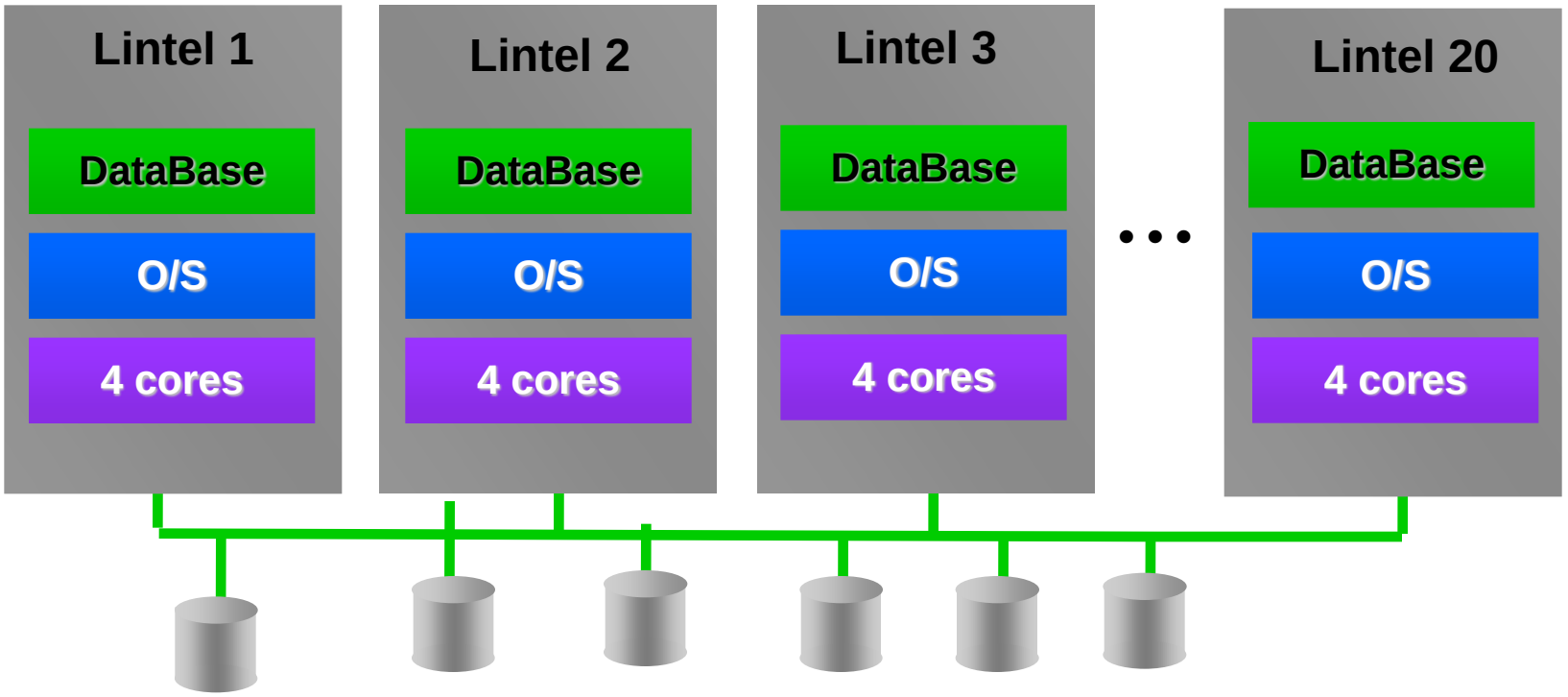
- **Up to 45% power savings**
- **Up to 90% deskside support**
- **Up to 50% on helpdesk**
- **Up to 75% in security and user administration**

Lintel - 20 Individual DB Servers

4 cores of potential resource x 30% utilization = 1.2 cores used per DB

Total cores used by DataBase on 20 servers = 24 cores

DB License Requirement: 80 Core Licensing

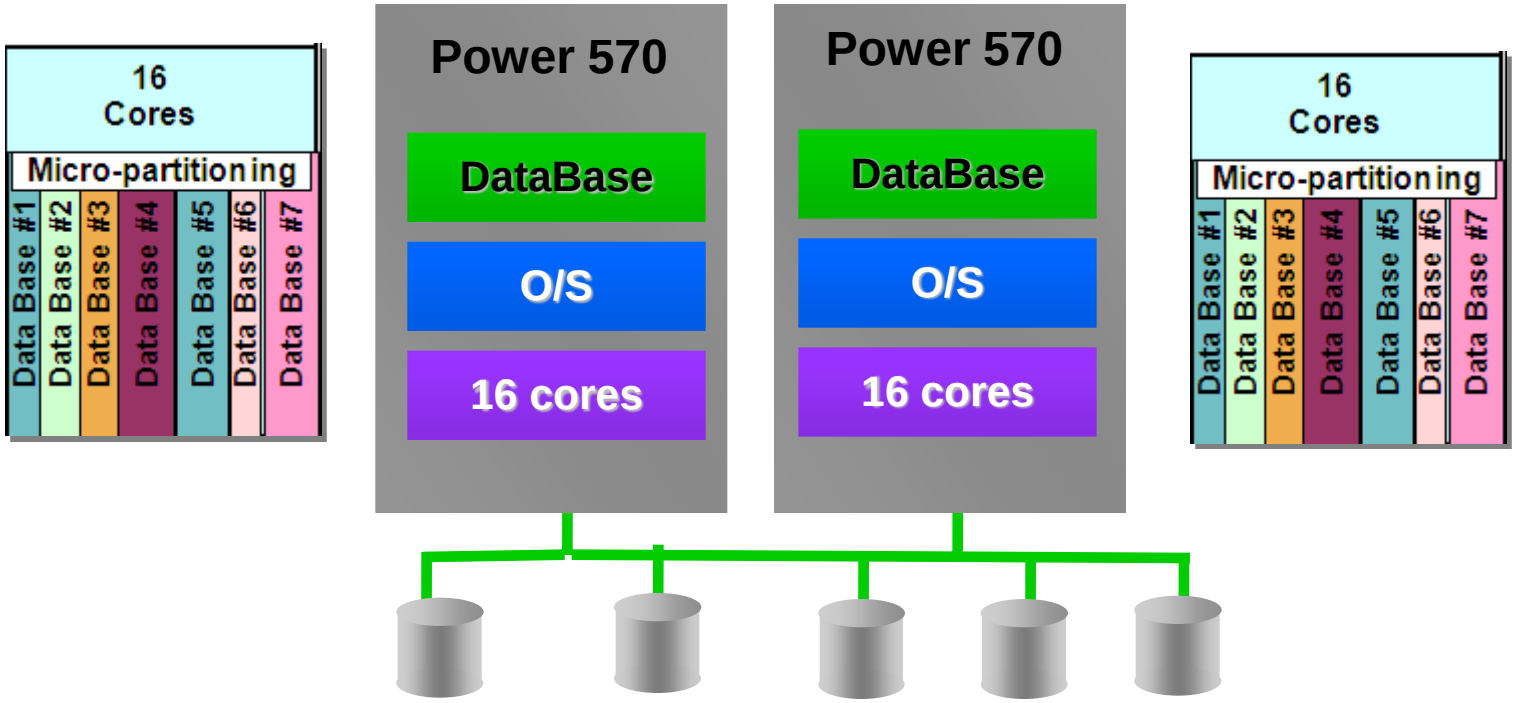


IBM Power- 20 Individual DB's

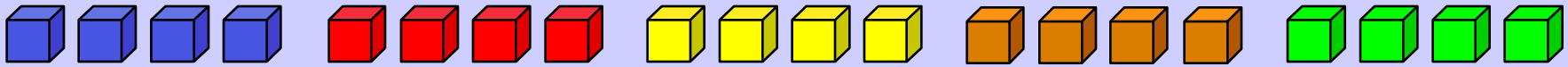
32 cores of potential resource x 75% utilization = 1.2 cores per DB
Total cores used by DataBase on 2 servers = 32 cores

DB Core License: 2 Power Servers = 32 Core Licencing

Consolidation on Enterprise Class Infrastructure



Virtualization Concept



Virtual Resources

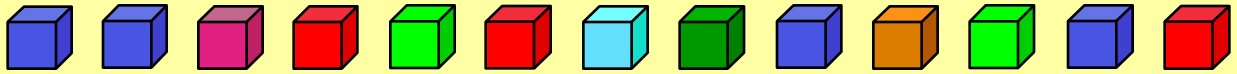
- Substitutes for real resources: same interfaces/functions, different attributes.
- Often of part of the underlying resource, but may span multiple resources.

Virtualization – a substitution process

- Creates virtual resources from real resources.
- Primarily accomplished with software and/or firmware.

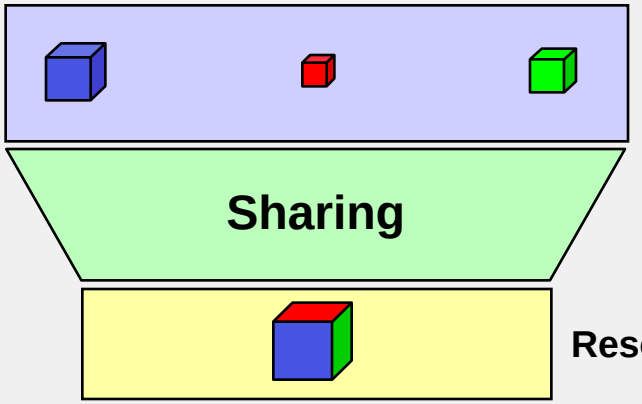
Resources

- Components with architected interfaces/functions.
- Usually physical. May be centralized or distributed.
- Examples: memory, disk drives, networks, servers.

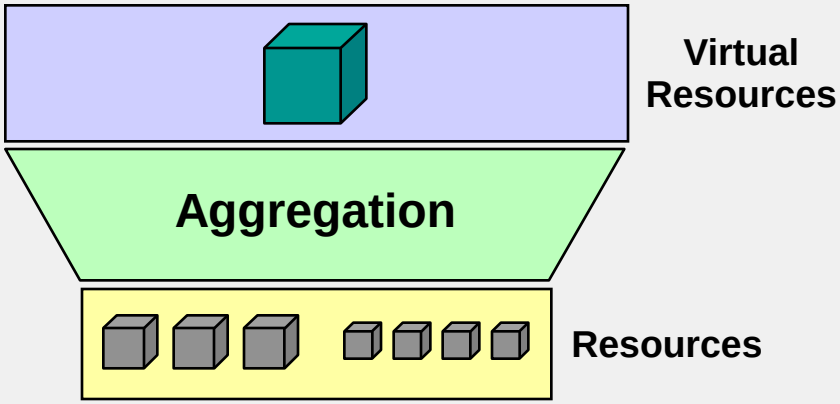


- **Separates presentation of resources to users from actual resources**
- **Aggregates pools of resources for allocation to users as virtual resources**

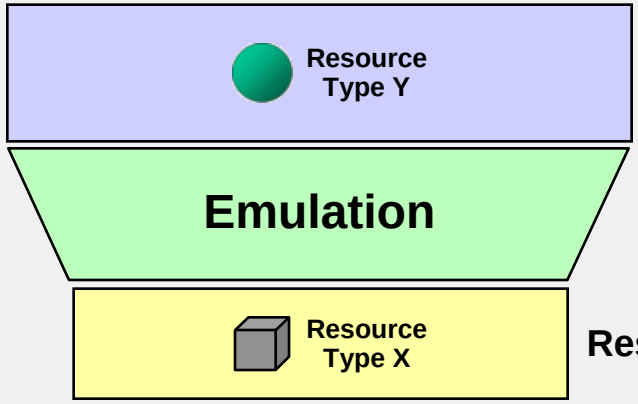
Virtualization Functions and Benefits



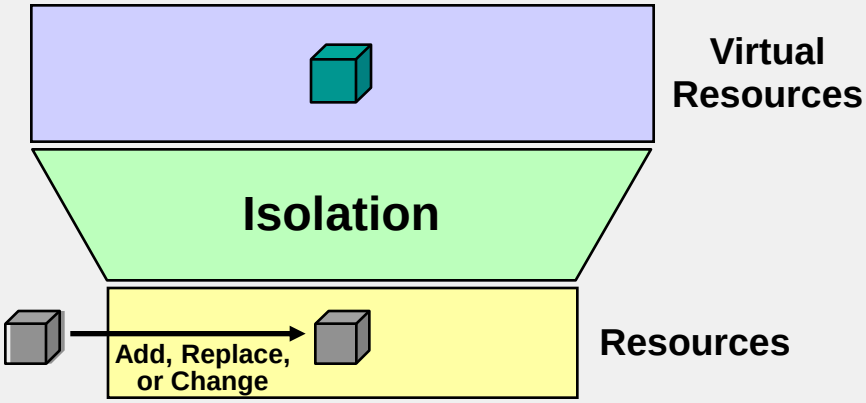
Examples LPARs, VMs, virtual disks, VLANs
Benefits: Resource utilization, workload manageability, flexibility, isolation



Examples: Virtual disks, IP routing to clones
Benefits: Management simplification, investment protection, scalability



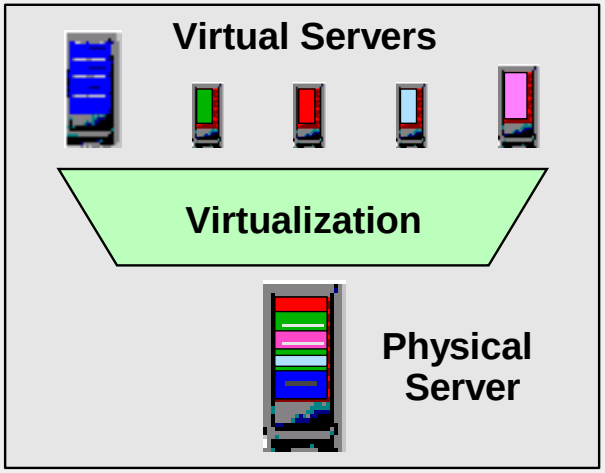
Examples Arch. emulators, iSCSI, virtual tape
Benefits: Compatibility, investment protection, interoperability, flexibility



Examples Spare CPU subst., CUoD
Benefits: Continuous availability, flexibility, investment protection

Server Virtualization

Roles:
- Consolidations
- Dynamic provisioning/hosting
- Workload management
- Workload isolation
- Software release migration
- Mixed production and test
- Mixed OS types/releases
- Reconfigurable clusters
- Low-cost backup servers



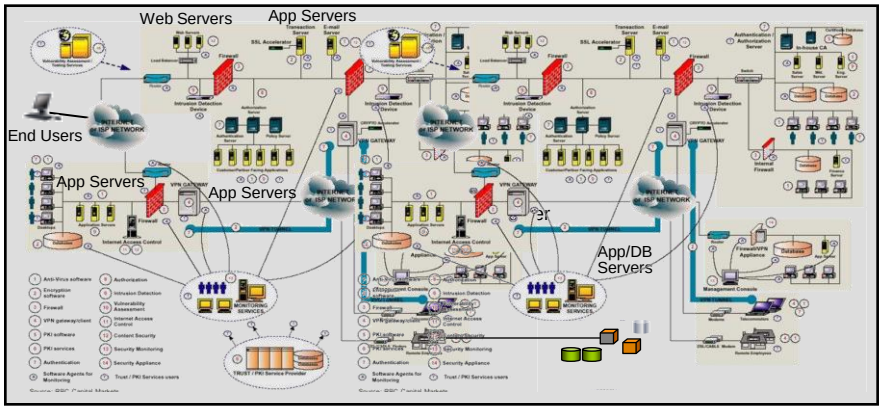
Benefits:
- Higher resource utilization
- Greater usage flexibility
- Improved workload QoS
- Higher availability / security
- Lower cost of availability
- Lower management costs
- Improved interoperability
- Legacy compatibility
- Investment protection

In the final analysis, the virtualization benefits take three forms:

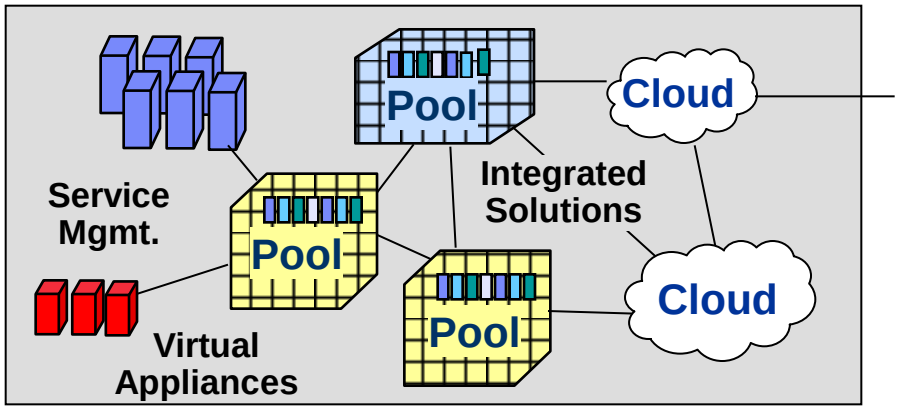
- **Reduced hardware costs**
  - Higher physical resource utilization
  - Smaller footprints
- **Improved flexibility and responsiveness**
  - Virtual resources can be adjusted dynamically to
    and to optimize service level achievement
  - Virtualization is a key enabler of on demand opera
- **Reduced management costs**
  - Fewer physical servers to manage
  - Many common management tasks become much easier

- However, server virtualization introduces some complexity and requires skills
- This partially offsets the benefits, but the net gains are generally substantial

IT Today – Complex Sprawl



Fully Virtualized IT In The Future



Many small dedicated servers	→	Much more powerful shared servers
Servers managed individually	→	Pools manageable as single systems
Low resource utilization	→	High resource utilization
Rigid physical configurations	→	Flexible virtual configurations
Server, storage, network silos	→	Unified service management
Wasted energy and floor space	→	Energy and space efficiency
HW changes impact SW assets	→	SW assets insulated from HW
Extensive do-it-yourself	→	Ready-to-use integrated solutions
Complex, fragile IT architecture	→	Modular, fault tolerant IT architecture
Build-to-order by IT department	→	Cloud utility model and self-service

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- **Why IBM Infrastructure for Virtualization?**
- Next Era of Computing - IBM Pure Systems

Systems to match your consolidation and virtualization needs

System z

System z

- Industry leading data server and platform standard for virtualization, resiliency, security, and workload integration and management

Power Systems

Power Systems

- Industry leading high performance server with fastest growing commercial UNIX

System x

System x

- Industry's original enterprise modular platforms – BladeCenter and eXA – for server, storage and network integration and consolidation

System Storage

System Storage

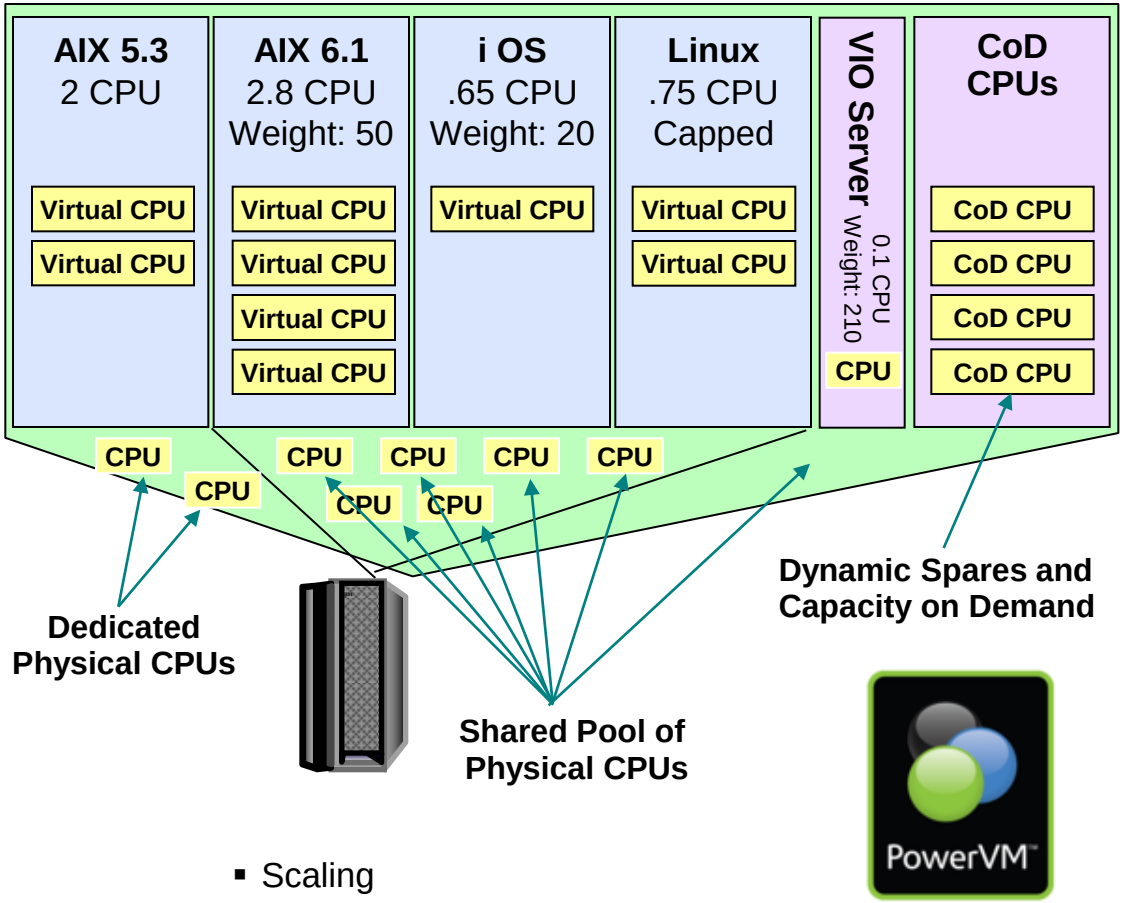
- Industry leading enterprise disk and tape performance, resiliency, and availability

PowerVM Builds on IBM's History of Virtualization Leadership

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

1967	1973	1987	1999	2004	2007	2008
IBM develops **hypervisor** that would become VM on the mainframe	IBM announces first machines to do **physical partitioning**	IBM announces **LPAR on the mainframe**	IBM announces **LPAR** on POWER™	IBM intro's POWER Hypervisor™ for System p™ and System i™	IBM announces POWER6™, **the first UNIX® servers with Live Partition Mobility**	**IBM announces PowerVM**

PowerVM Enterprise-Grade Virtualization for Power Systems



- **Processors**
  - Dedicated or shared processors
  - Fine-grained resource allocation
  - Shared processor controls*
    - # of virtual processors
    - Entitlements
    - Capped and uncapped
    - Weights
  - Adjustable via DLPAR
- **Memory**
  - From 128MB to all physical memory
  - Dedicated physical memory
  - Active Memory Sharing (≥POWER6)
  - Active Memory Expansion (POWER7)
  - Adjustable via DLPAR
- **IO – dedicated or shared (VIO)**

- Scaling
  - Up to 254 (1000) partitions
  - Partitions up to 64w (256w) SMP

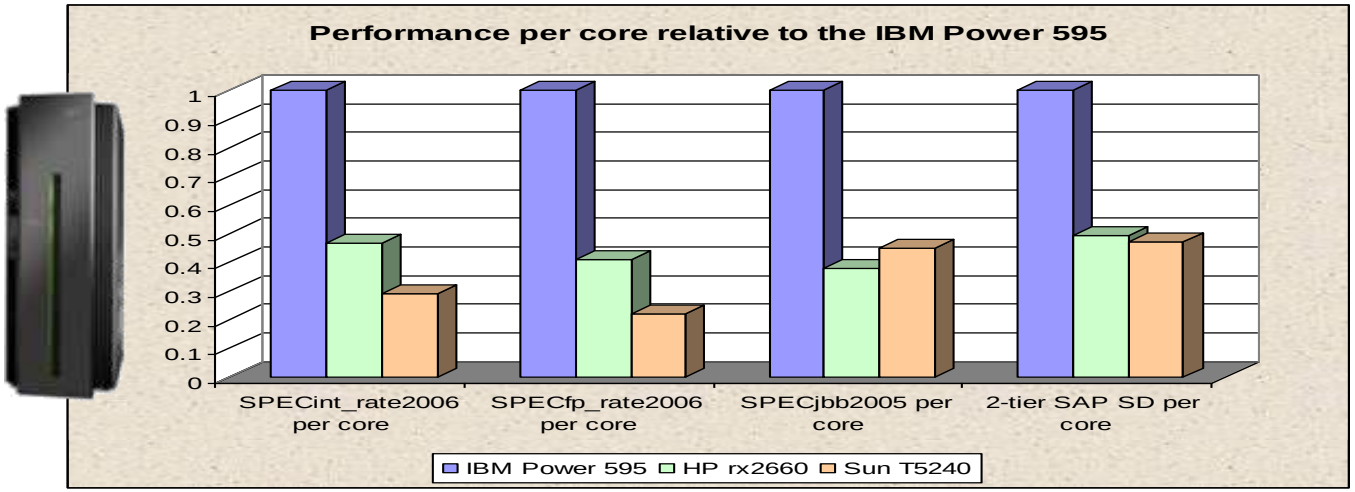
- Capacity On-Demand
- Live Partition Mobility **(≥POWER6)**
- Group Capping **(≥POWER6)**

Power Systems Impact on Server Consolidation Concepts

- 3X reduction in number of cores is possible with POWER™ and PowerVM in a virtualized consolidation environment

assuming all of the cores have equal performance

- What if the new cores have better performance?



- IBM POWER technology with PowerVM has the potential to reduce the number of cores by ***six fold or more***

See “Power 595 performance results” in backup for full details

REDUCE COST by consolidating with Power Systems

- Resource sharing
  - Sharing system resources through virtualized consolidation ***reduces unused system overhead***
  - Virtualized consolidated systems are evidenced by ***high utilization rates***
  - High utilization means ***less hardware***

- Environmentally friendly
  - ***Less power and cooling*** is required
  - ***Less floor space*** is required
- Fiscally responsible
  - Fewer processor cores drives ***less software costs***
  - Newer systems are ***more reliable*** and less costly to maintain than older systems
  - Fewer systems translates to ***reduced people costs***

Reduce cost with environmental efficiency

83%

savings on energy costs with 28% more performance at a fraction of the price using a single **IBM Power 750** instead of a 64-core HP Integrity Superdome.

Superdome or Super Power?

HP Integrity Superdome 64c

- 1.6GHz dual-core Itanium2 in a 30”, 42U frame
- Maximum energy requirement of **11,586 Watts**
- **SPECint_rate2006: 824**

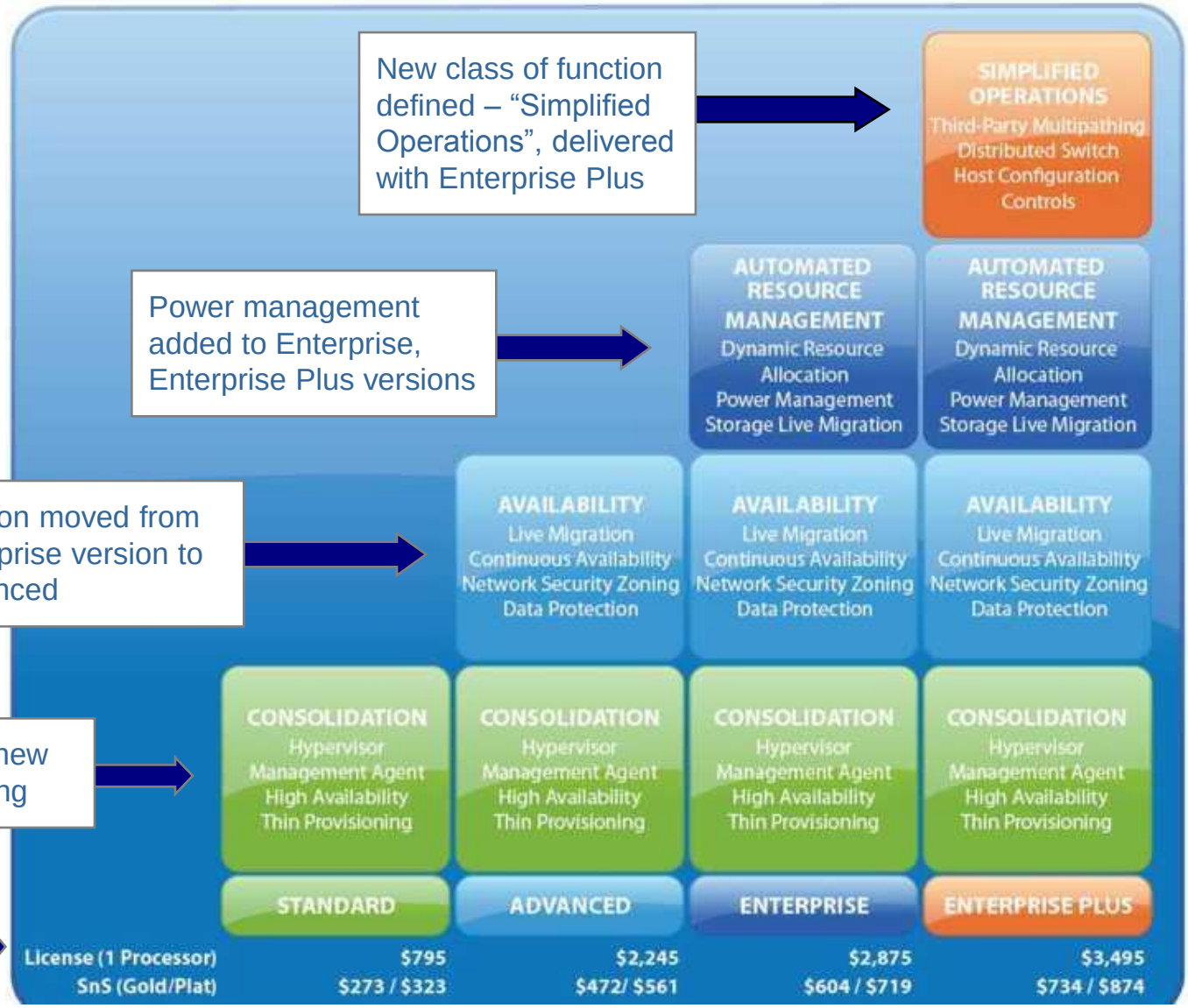
IBM Power 750 Express

- 4 socket, 32 Core 4U
- POWER7 Processors
- Maximum energy requirement of **1,950 Watts**
- **SPECint_rate2006: 1060**

See Power 750 server compared to HP Integrity Superdome substantiation detail.
Source: SPECiint_rate2006. For the latest SPEC benchmark results, visit http://www.spec.org.

VMware vSphere

VMware is using a host of new functionality to extend offerings into higher price points, as well as differentiate low-cost entry products with advanced functionality.



PowerVM Leads VMware in Scalability and Flexibility

Scalability Factors	VMware ESX 3.5 *(in VMware Infrastructure 3)*	VMware ESX 4.0 *(in VMware vSphere 4)*	PowerVM
Virtual CPUs per VM	4	8	64 (256 on POWER7)
Memory per VM	64G	256G	4096G (more on POWER7)
Virtual NICs per VM	4	10	256
Virtualization Overhead	Substantial	Still Substantial	Minimal

Flexibility Factors	VMware ESX 3.5 *(in VMware Infrastructure 3)*	VMware ESX 4.0 *(in VMware vSphere 4)*	PowerVM
Dynamic virtual CPU changes	No	Add (but not Remove)	Yes
Dynamic memory changes	No	Add (but not Remove)	Yes
Dynamic I/O device changes	No	No	Yes
Direct access to I/O devices from within VM	No	Some (with Nehalem)	Yes
Cross-platform virtualization	No	No	Yes – Lx86
Simultaneous live migrations	4	4	8

Source: http://www.vmware.com/files/pdf/key_features_vsphere.pdf

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- Why IBM Infrastructure for Virtualization?
- **Next Era of Computing - IBM Pure Systems**

Clients have tried various approaches to close the gap

	Client-tuned Systems	Appliances	Cloud
Benefits	Flexibility Control	Simplicity Rapid Deployment	Agility Elasticity
Challenges	Time and Expense Required	Single Purpose	Shared Dependence

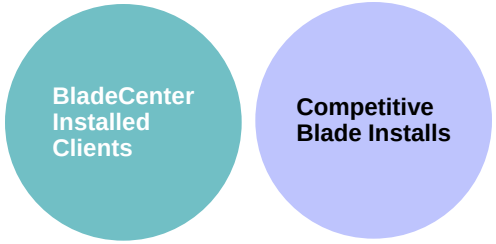
What if you could have the best of all three?

ANNOUNCING:

The world's first family of expert integrated systems

Pure Systems Family

Blade Opportunity



Flex System

- Advanced Blade architecture
- The entry point into the Pure family with upgrade path to PureFlex

Segment: Blade Opportunity

Sales Focus:
- IBM BladeCenter transition
- Competitive blade transition – HP, CISCO, Dell

Led by STG

Infrastructure & Cloud

PureFlex

- Integrated Infrastructure System
- Factory integration of Compute (x86 and Power), Storage, Networking, and management

Segment: Infrastructure & Cloud

Sales Focus:
- Infrastructure Consolidation
- Scalable cloud deployment
- x86, POWER, Competitive UNIX
- Infrastrcuture as a Service: Exadata, VBlock, HP Converged Infrastructure

Led by STG

Application & Cloud

PureApplication

- Integrated Application Platform
- Factory integration of infrastructure + middleware (DB2, Websphere)

Segment: Application & Cloud

Sales Focus:
- Application optimization
- Accelerate application clouds
- Existing DB2 / Websphere
- Competitive – Oracle DB / Weblogic / Exalogic / Exadata

Led by SWG

Announcing the first two members of the IBM PureSystems family

PureFlex

Infrastructure System: Expert at sensing and anticipating resource needs to optimize your infrastructure

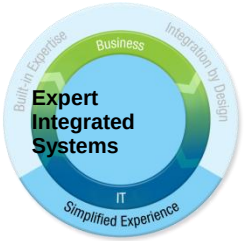
PureApplication

Platform System: Expert at optimally deploying and running applications for rapid time-to-value

Built-in expertise ▪ Integration by design ▪ Simplified experience

Simplified experience

Reduce time, effort and risk throughout the solution lifecycle

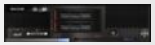


Starts at Acquisition: A continuum of value from building blocks to systems

IBM Flex System

Chassis
14 half-wide bays for nodes

Compute Nodes
Power 2S/4S*
x86 2S/4S



Storage Node
V7000
Expansion inside or outside chassis

Management Appliance
Optional

Networking
10/40GbE, FCoE, IB
8/16Gb FC

Expansion
PCIe
Storage

IBM PureFlex System

Pre-configured, pre-integrated infrastructure systems with compute, storage, networking, physical and virtual management, and entry cloud management with integrated expertise.

IBM PureApplicationSystem

Pre-configured, pre-integrated platform systems with middleware designed for transactional web applications and enabled for cloud with integrated expertise.

Integrated Compute Nodes

No compromise designs for full performance

Support multiple architectures using up to 14 POWER7 or x86 nodes per chassis

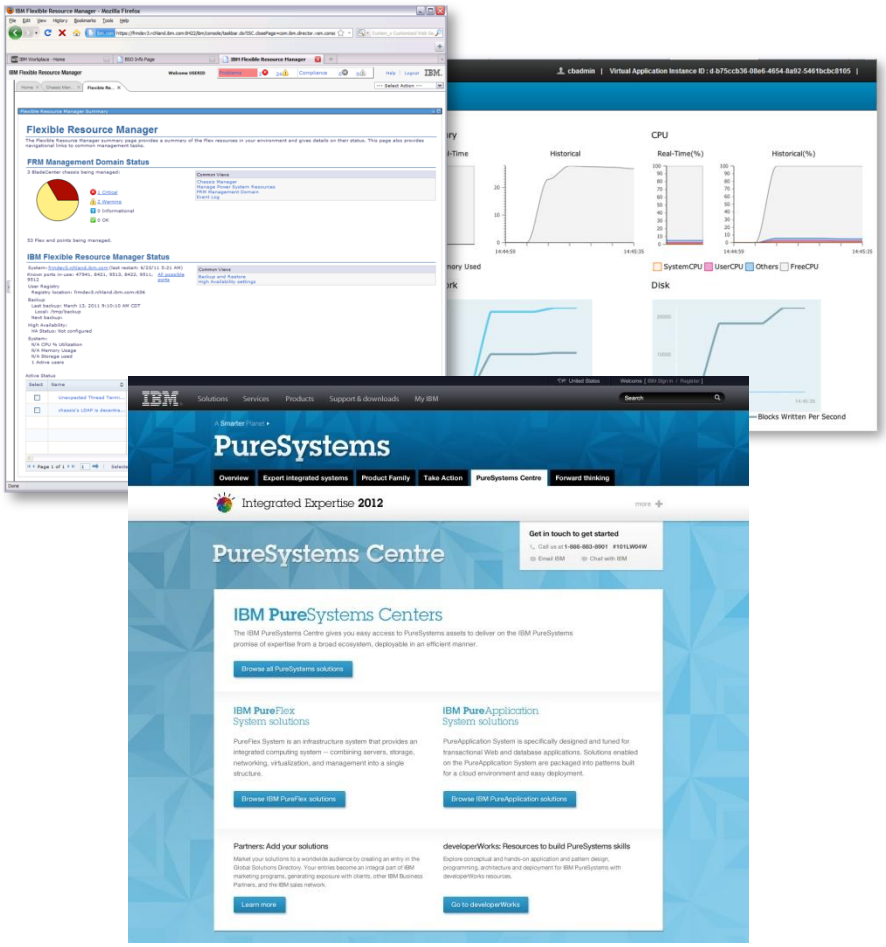
Support for applications across 4 operating environments

Secure startup for both physical and virtual environments

POWER7
AIX®, i®, Linux®

x86
Linux®,Windows®

IBM PureSystems simplified experience

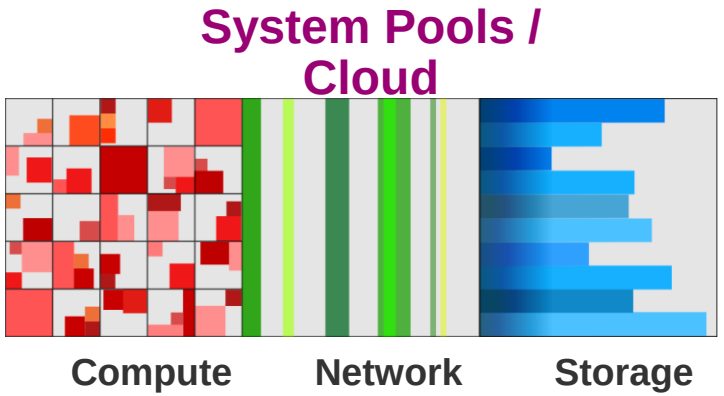


New client experience:

- **Single product streamlines ordering, tracking, receiving, installing and running**
- **Factory installed, fully packaged solutions drive simple setup (pull it out of the box, plug it in and boot it up)**
- **Management integration across system**
- **Single point of contact for support**
- **Upgrade with zero downtime based on integrated patches and system design**
- **PureSystems Centre – an online catalog of applications and patterns.**
- **A broad open ecosystem of optimized solutions**

Designed for Cloud

Dramatically improve system utilization



4-click setup for rapid deployment

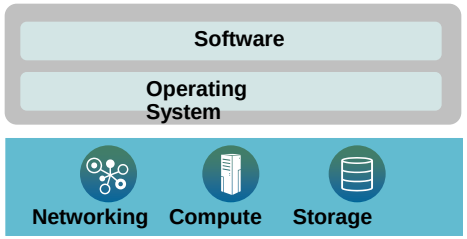
Cloud management across multiple architectures and hypervisor environments

Speed SAP server provisioning from weeks to minutes

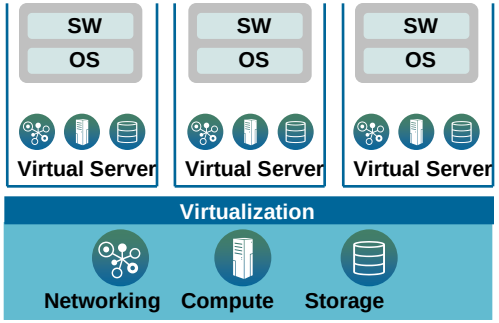
Designed for Cloud with resource pooling and automated provisioning expertise

Dramatically improve system utilization and administrator productivity

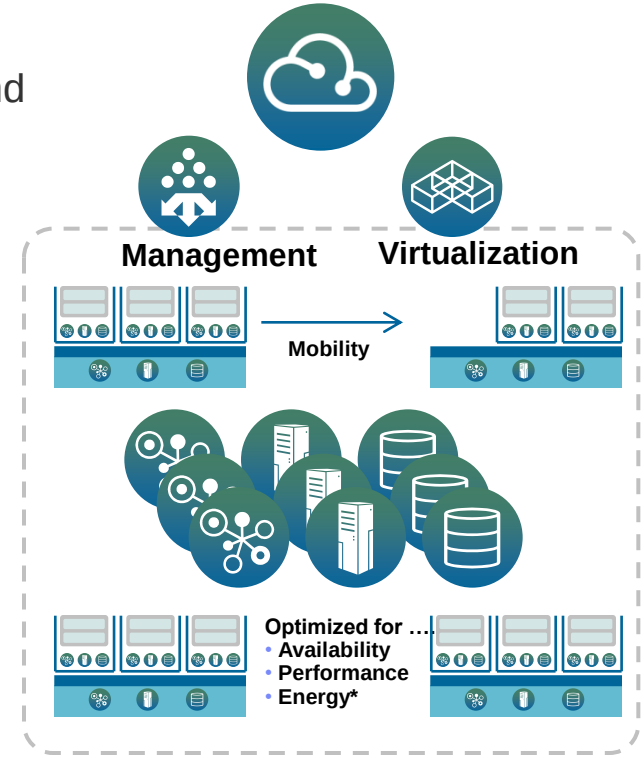
- **Manage Services** instead of Servers, Network and Storage
- **System Pools*** are a set of resources that make up a service and can be acted upon as a group for Placement, Maintenance, etc.
- Provisioning of CPU, memory, storage* and networking* with **automatic virtual machine placement and optimization**
- Utilization monitoring and policies to **support performance, utilization or energy* optimized pooling**



Systems



Virtual Systems



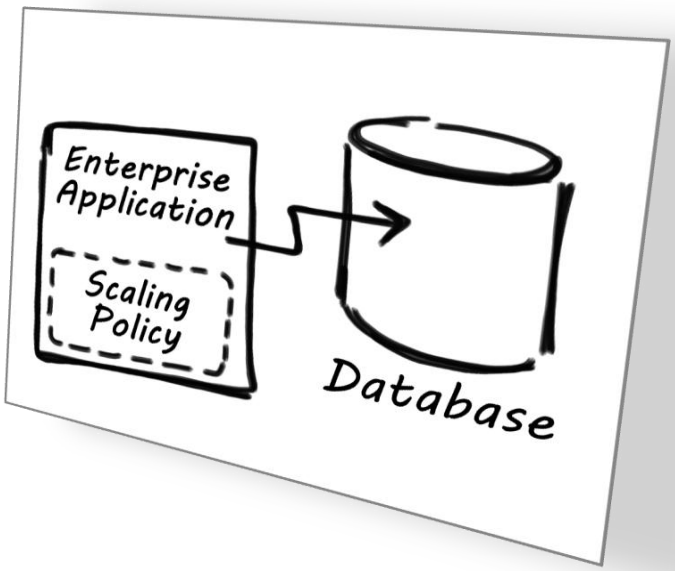
System Pools / Cloud

Manage a pool of system resources or a cloud as simply as managing a single system

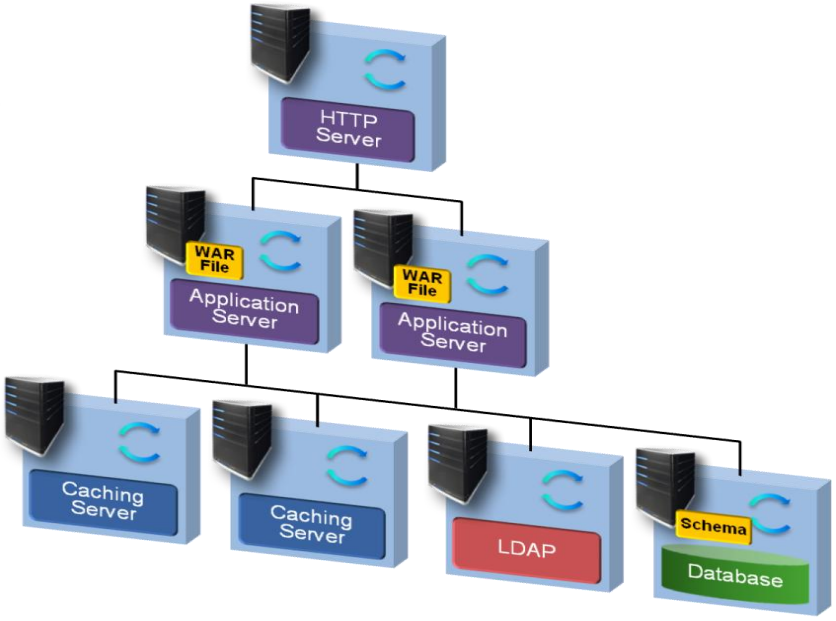
*Some capabilities planned for future delivery

Patterns accelerate business value

What the business wants…



What's required…



Use IBM patterns of expertise throughout the system

Premier Business Partner
Ready For PureSystems

Capture your own expertise

IBM PureSystems extensible with “patterns of expertise”

Including built-in cloud capabilities

	IBM PureFlex System	IBM PureApplication System	
Application Patterns and Images Available patterns images from IBM and Partners	Images available for client tuning	100+ ISV business applications Business intelligence Business process management Web experience *More to come in 2012…*	*Available through PureSystems Centre*
Platform Patterns Expertise across the middleware and infrastructure	Images available for client tuning	Web application deployment Database deployment	*Built-in with flexibility*
	Cloud platform management		
Infrastructure Patterns Expertise across the compute resources	Provisioning Storage optimization Scalability Upgradability		

IBM PureSystems enables multiple client initiatives

Optimize

Better tune and automate systems and applications to improve application performance, scalability and reliability

Innovate

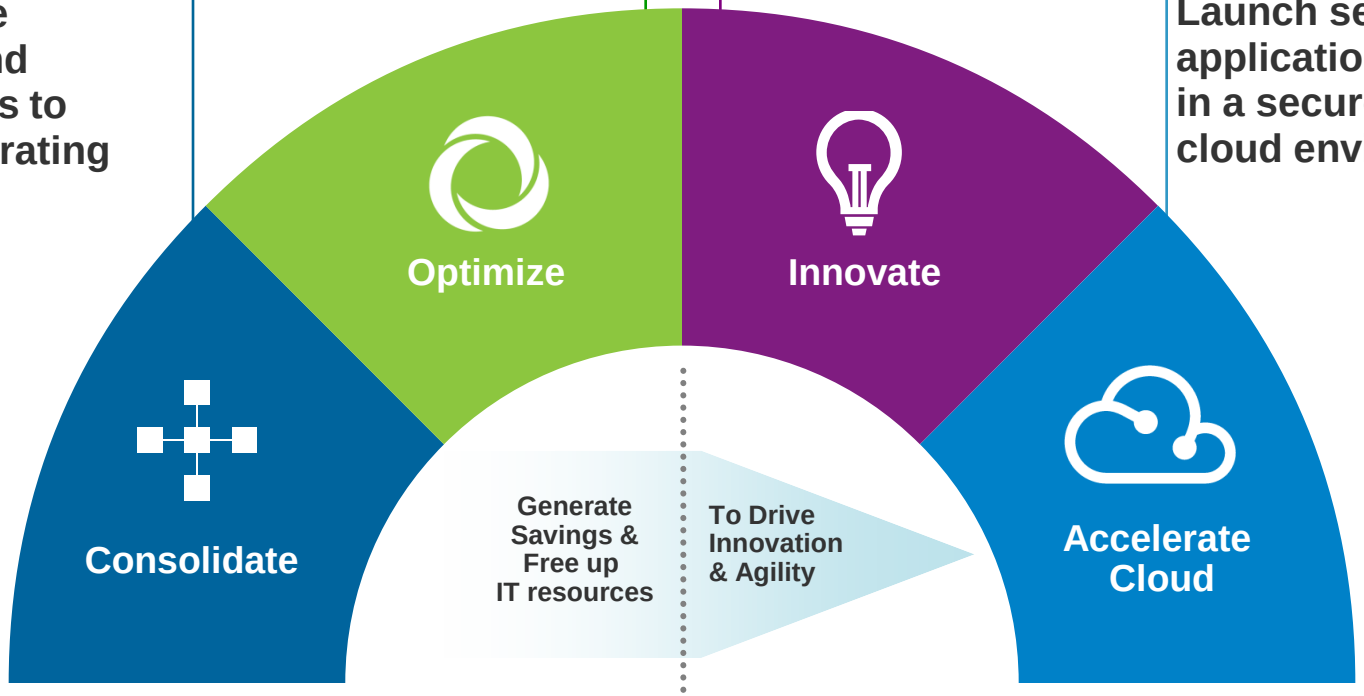
More rapidly deliver new applications and services to meet new business needs

Consolidate

More efficiently consolidate systems and applications to reduce operating expenses

Accelerate Cloud

Launch self-service applications efficiently in a secure, integrated cloud environment



Pure Systems: To deliver the core values you need

Integrated expertise overcomes traditional hurdles

From traditional	To PureSystems	Value delivered
Up and running in months	Complete infrastructure stack up-and-running in hours	Faster time to value
Over-purchase and provision	Built-in workload elasticity	Automated workload scalability
Multiple tools per component	Single point of management	Integrated system and software management
Piecemeal order and support of hardware and software	Complete, pre-integrated software and hardware	Simplified acquisition and support
Create custom solutions to work with what you have	Easy integration through open-standards computing	Integrated into current environment
Infrastructure complexity slows down change	Easily extendable and accommodating to change	Easily adapts to meet new needs
Multiple service points of contact and multiple updates	Single service point of contact and integrated updates	Improved lifecycle management

Hindi

Traditional Chinese

Thai

Russian

Thank you

Inglés

Arabic

Gracias

Obrigado

Brazilian Portuguese

Grazie

Italian

Danke

German

Merci

French

Simplified Chinese

Multume

Romanian

Korean

sc

Japanese