



Virtualization – Key Technology Enabler to Maximize ROI

Pulse2010

The Premier Service Management Event

Optimizing the World's Infrastructure

July 06, New Delhi, India

Agenda

- *Virtualization Basics*
- *IBM Leadership in IT Virtualization*
- *What does Virtualization Bring to your Enterprise*



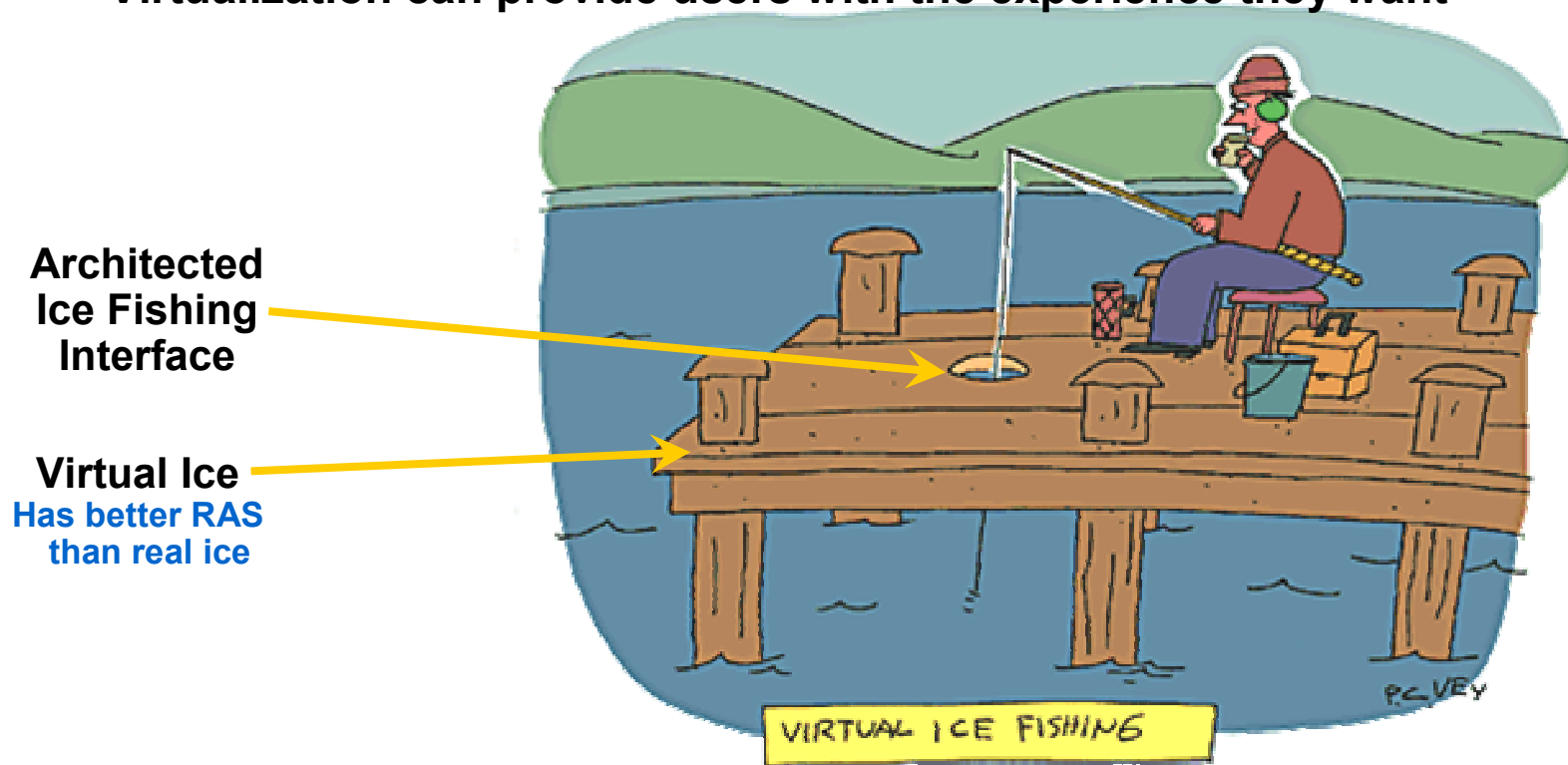
What is Virtualization?

- ***Logical representation of resources not constrained by physical limitations***
 - ***Enables user flexibility***
 - ***Centrally manage many virtual resources as one***
 - ***Dynamically change and adjust across the infrastructure***
 - ***Create many virtual resources within single physical device***
 - ***Eliminates trapped capacities***



Virtualization Gives Users Idealized Resources

Virtualization can provide users with the experience they want

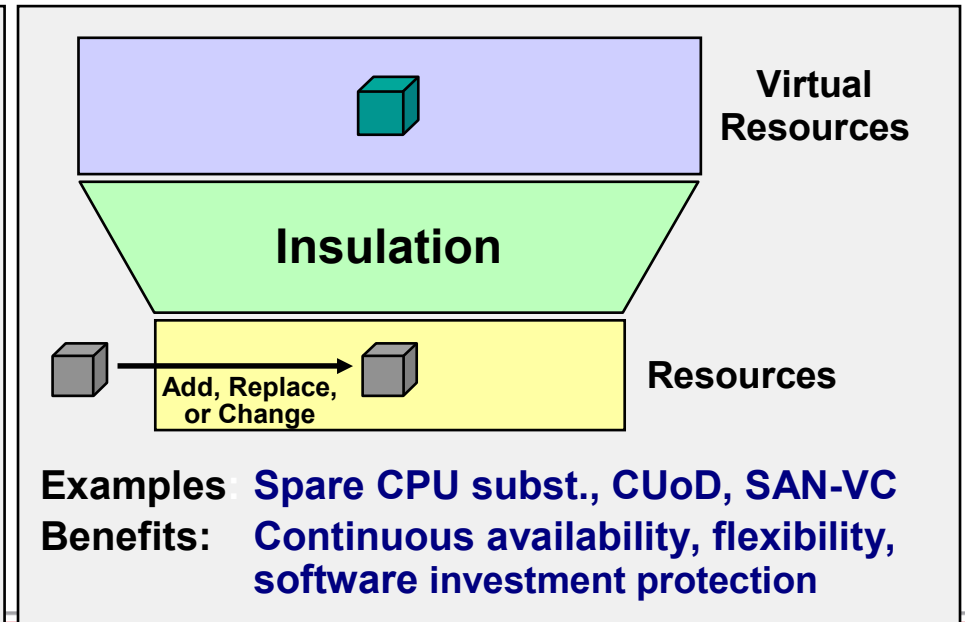
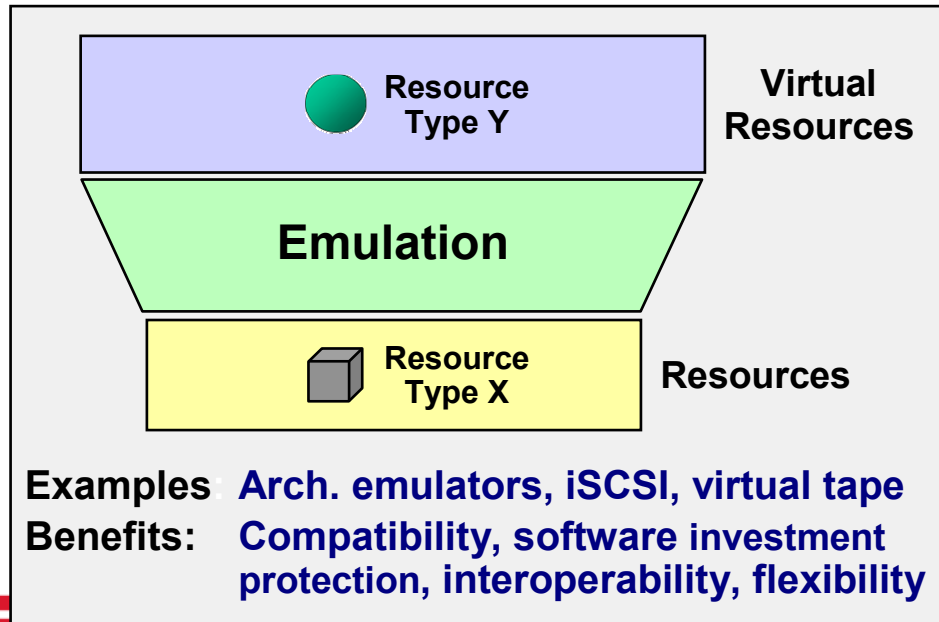
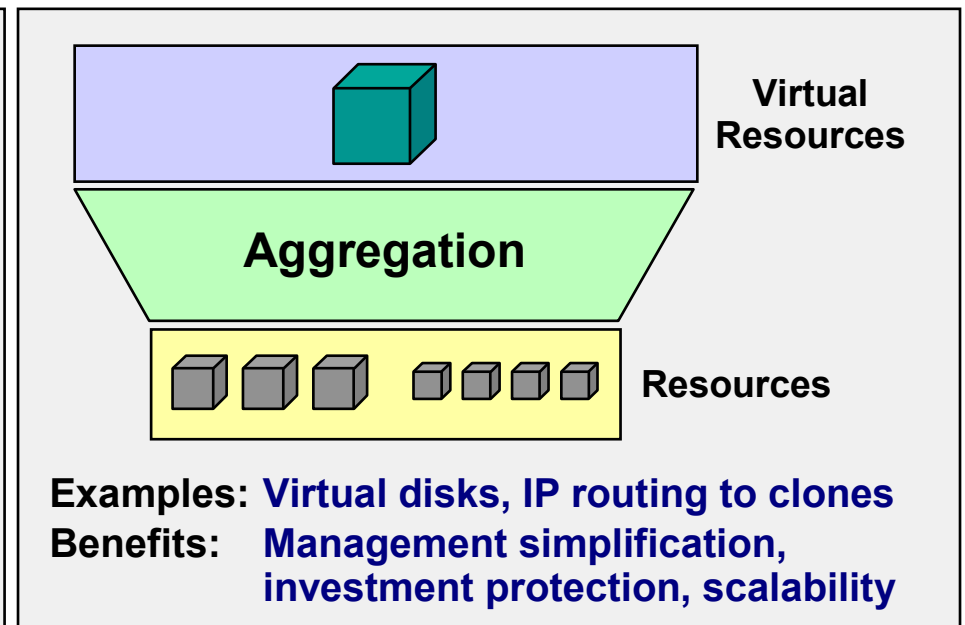
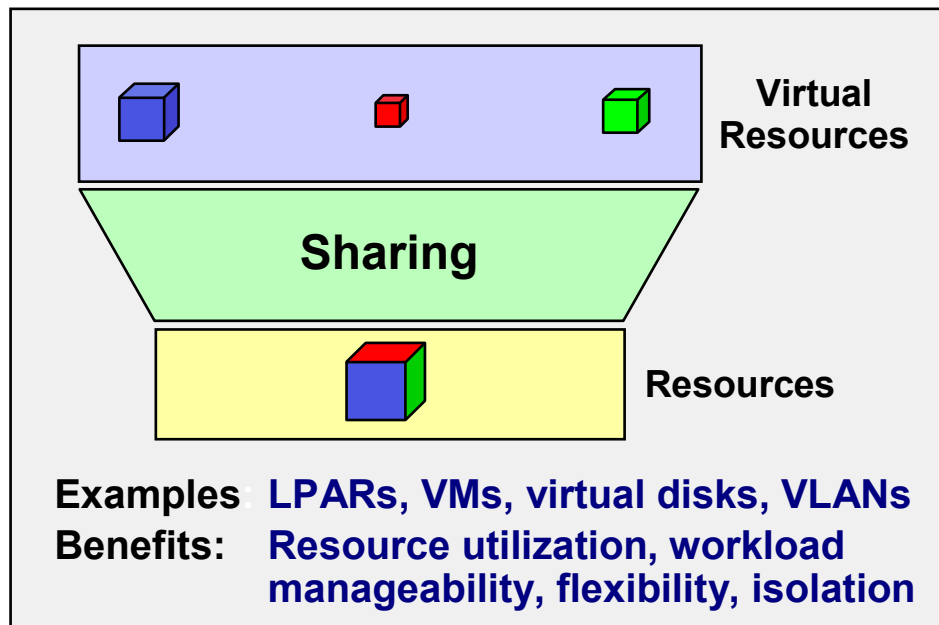


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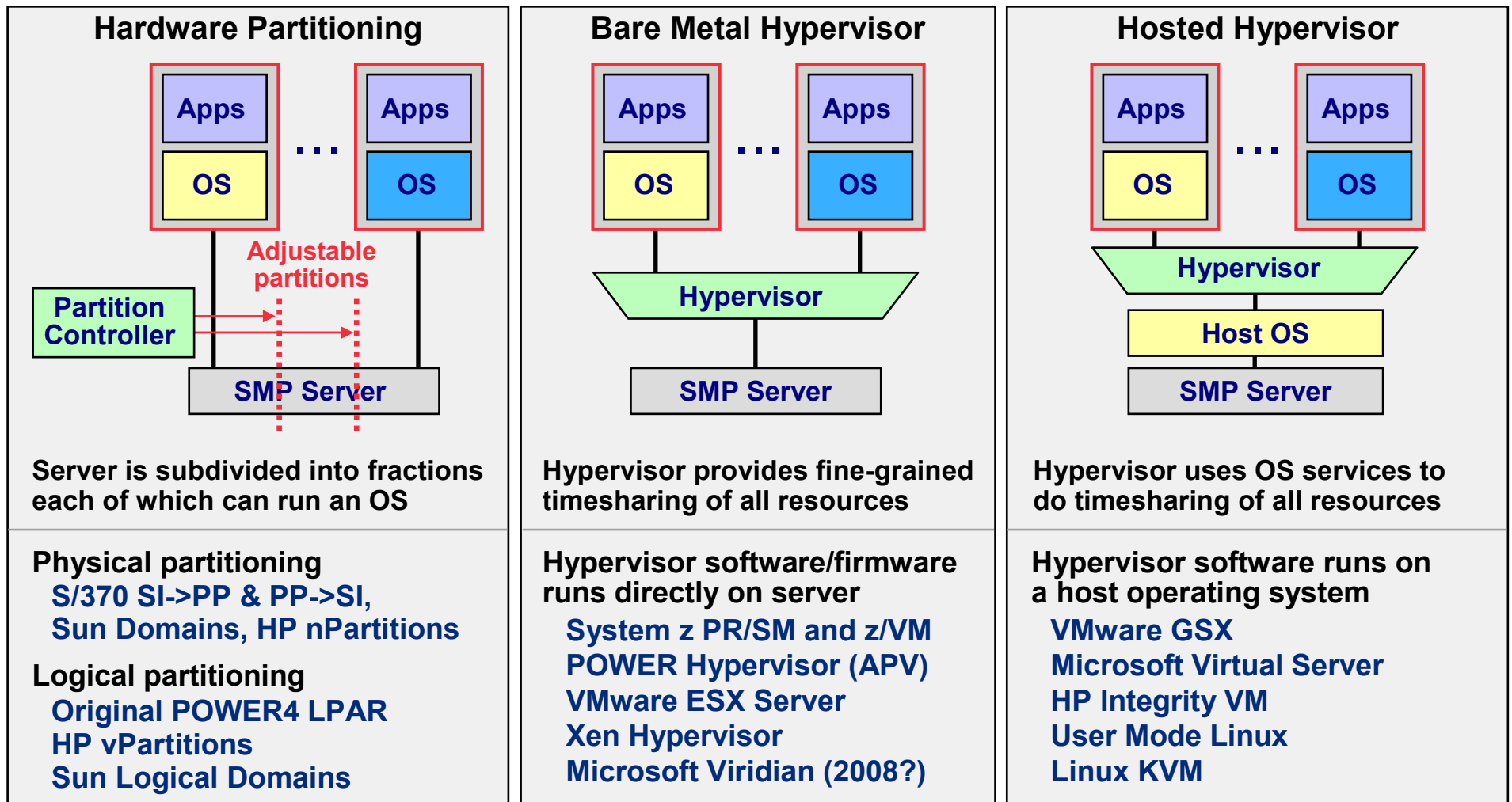
- **From the Merriam-Webster Online Dictionary:**
 - **Main Entry:** *vir-tu-al*
 - **Function:** adjective
 - **Etymology:** Middle English, possessed of certain physical virtues, from Medieval Latin *virtualis*, from Latin *virtus* strength, virtue
 - **1** : being such in essence or effect though not formally recognized or admitted <a virtual dictator>



Virtualization Functions and Benefits



Server Virtualization Approaches



- **Outlook:**
- *Bare metal hypervisors with high efficiency and availability will become dominant for servers*
- *Hosted hypervisors will be mainly for clients where host OS integration is important*
- *Hardware partitioning will die out as an approach*



Virtualization leadership



- **100 percent** of IBM mainframes are delivered virtualization ready
- **82 percent** of IBM System i5 595 servers are ordered with logical partitioning
- **Over 40,000** UNIX, mainframe and System i companies exploit systems-level virtualization
- IBM System x clients deploy over **1,000 virtual servers** a day
- **IBM is the leading reseller** of VMware
- **3,000 storage virtualization clients**, adding more than five every day
- More than **3,400 virtual tape systems** supporting one exabyte of data
- ServerWatch awarded **IBM Virtualization Manager Best Virtualization Tool** in their annual Product Excellence Awards for 2007
- IBM System x3950 won **Best of Show** at the 2007 WMworld event
- **Hundreds** of in-depth total cost of ownership studies

Source: IBM Virtualization Sparklers, IBM Press, 2007



Why IBM Virtualization

- Over 40 years experience with virtualization technologies
- Industry's first and leading mainframe virtualized tape system
- Industry leading disk block virtualization system
- Complete range of virtualization assessment, planning and implementation offerings
- IBM offers an integrated range of virtualization and management offerings to address all portions of the IT infrastructure



IBM IT Infrastructure Virtualization

“The combination of server and storage virtualization makes sense and over time should become requisite in the data center, in one form or another. In fact, the more pervasive that server virtualization becomes, the greater contrast it will create with non-virtualized storage environments and the inefficiency of these solutions will become more apparent.”

Enterprise Strategy Group, January 2008

- Server virtualization only one part of the answer
- IBM has proven best practices and strategy required for comprehensive virtualization plan
- IBM has best of breed offerings for end-to-end infrastructure virtualization



Server virtualization alone enhances only a portion of the IT infrastructure

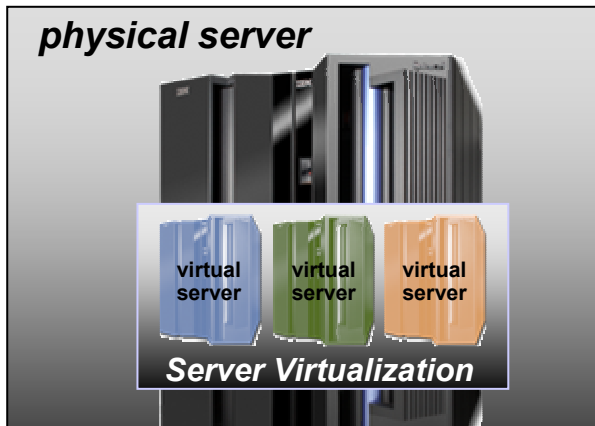
IBM Virtualized Information Infrastructure



Users



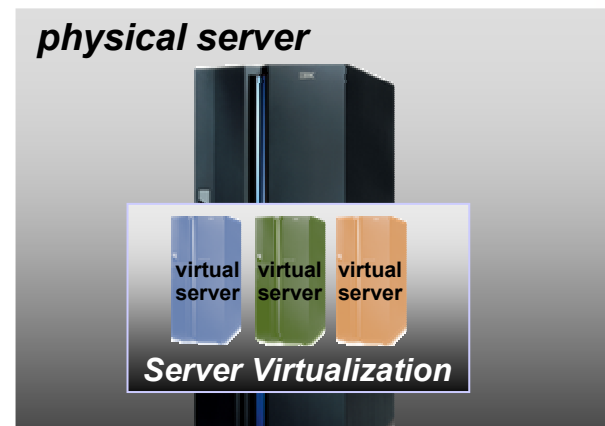
Applications



physical server

virtual server virtual server virtual server

Server Virtualization



physical server

virtual server virtual server virtual server

Server Virtualization

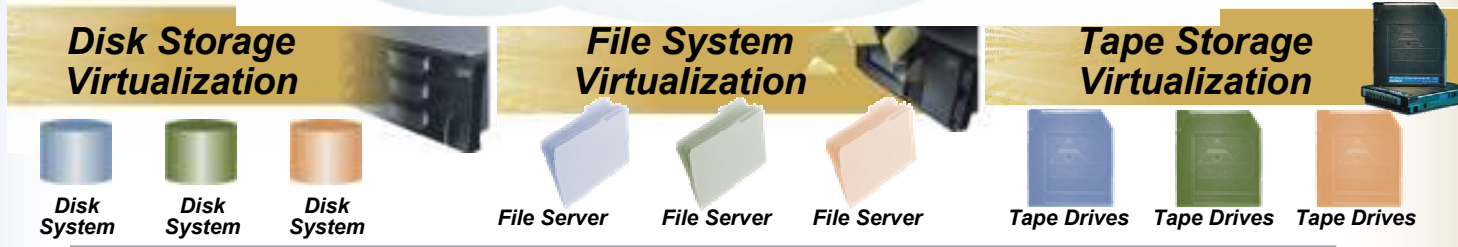


File Virtualization



Storage Network(s)

Network Virtualization



Disk Storage Virtualization

Disk System Disk System Disk System

File System Virtualization

File Server File Server File Server

Tape Storage Virtualization

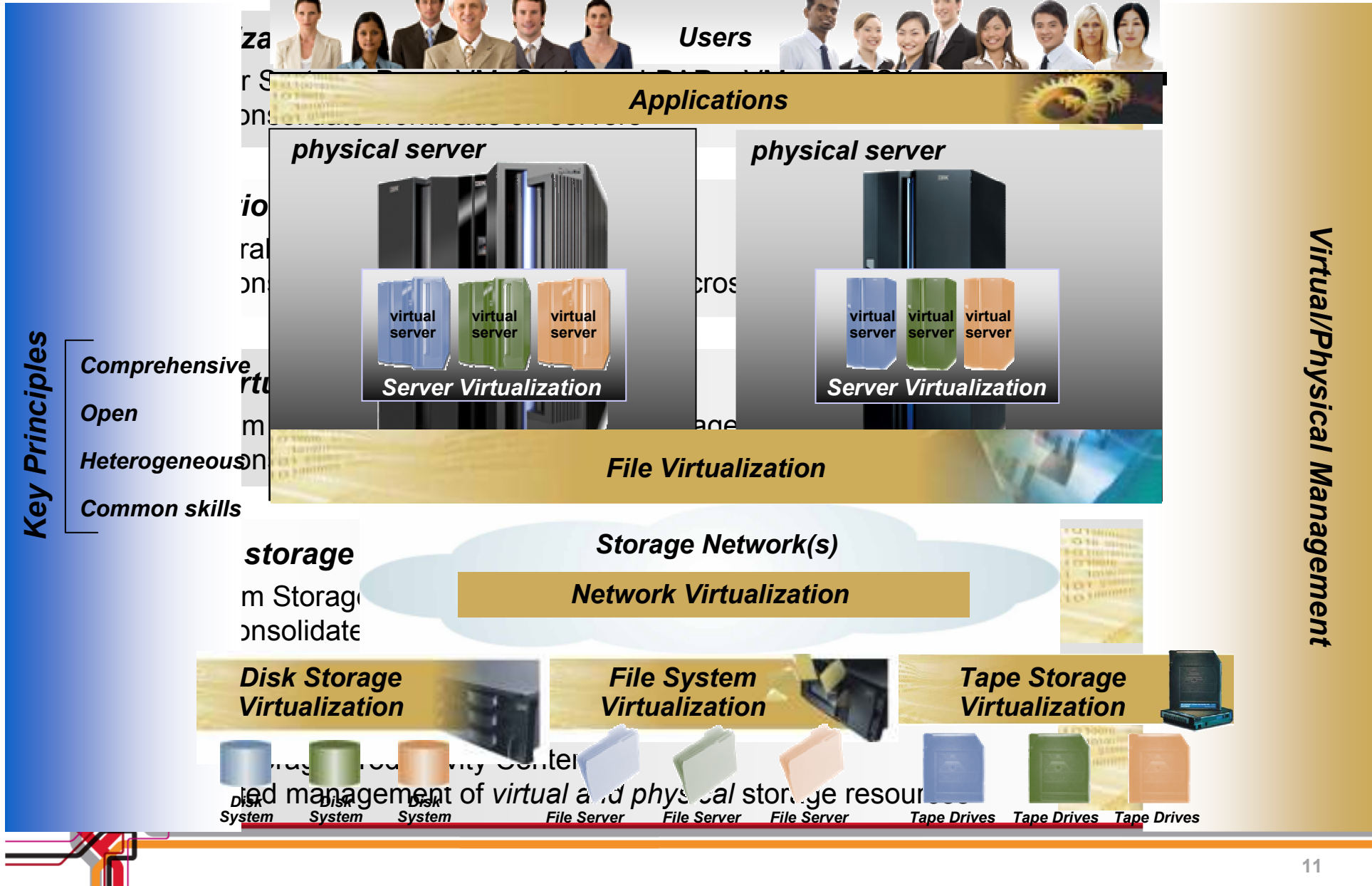
Tape Drives Tape Drives Tape Drives

Key Principles

- Comprehensive
- Open
- Heterogeneous
- Common skills

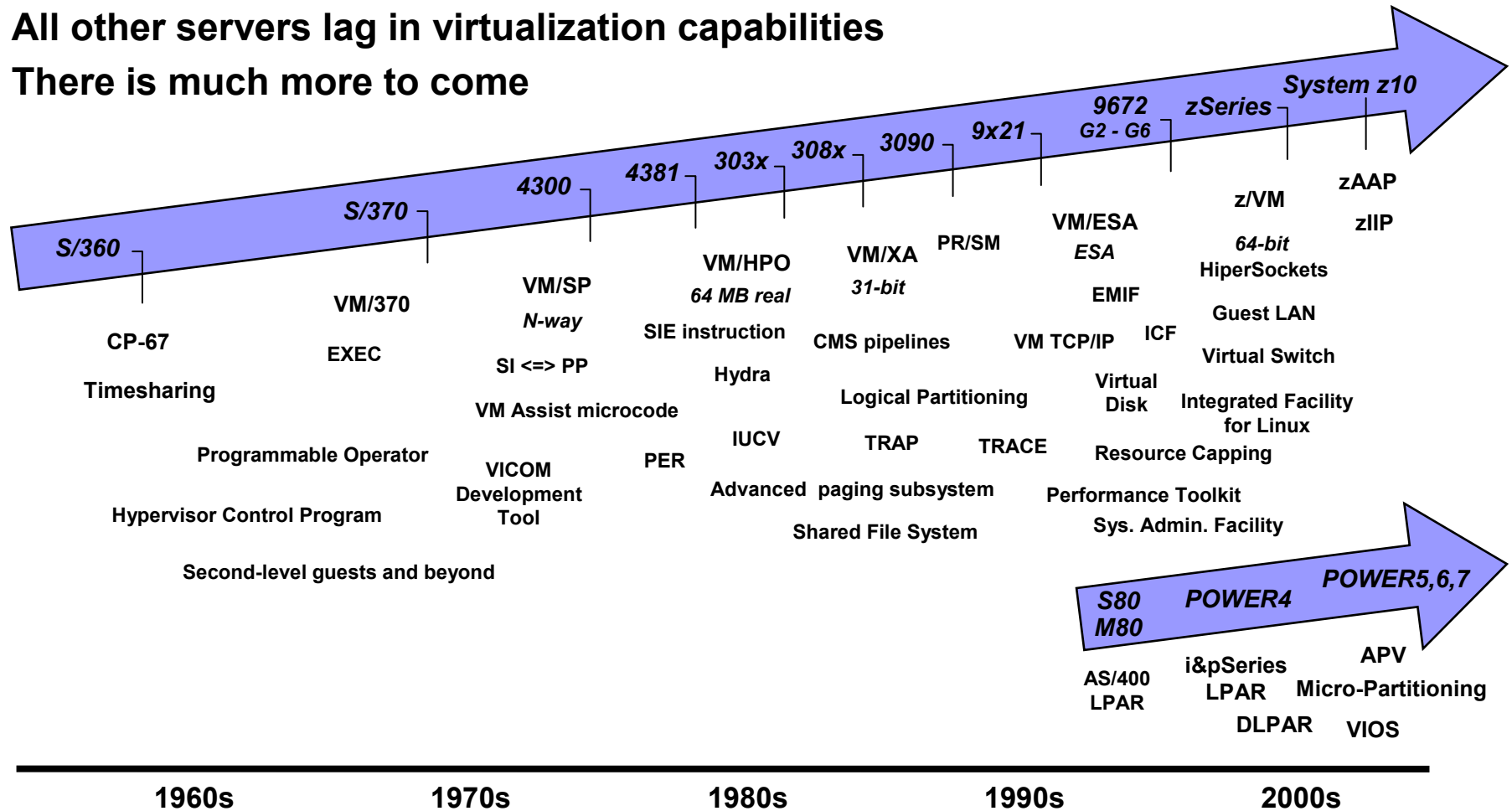
Virtual/Physical Management

IBM's Comprehensive Virtualization Offerings

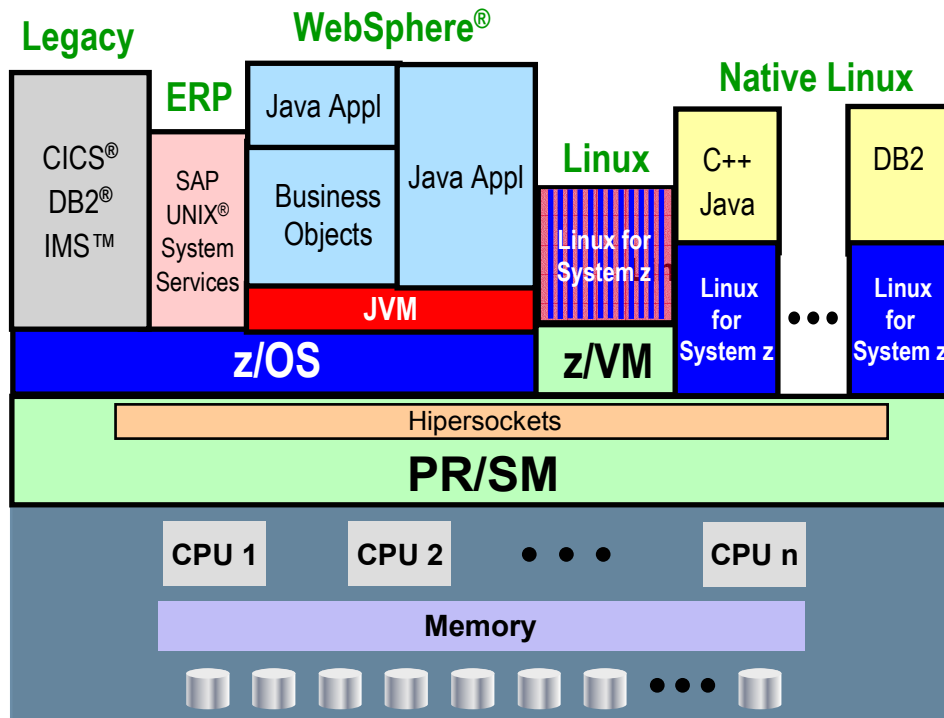


System z – Forty Years of Continuing Innovation

- Virtualization was pioneered and perfected on IBM mainframes
- System z continues to set the gold standard in virtualization
- Systems i & p have an advanced PR/SM-like hypervisor
- All other servers lag in virtualization capabilities
- There is much more to come



System z – The Ultimate Virtualization Resource

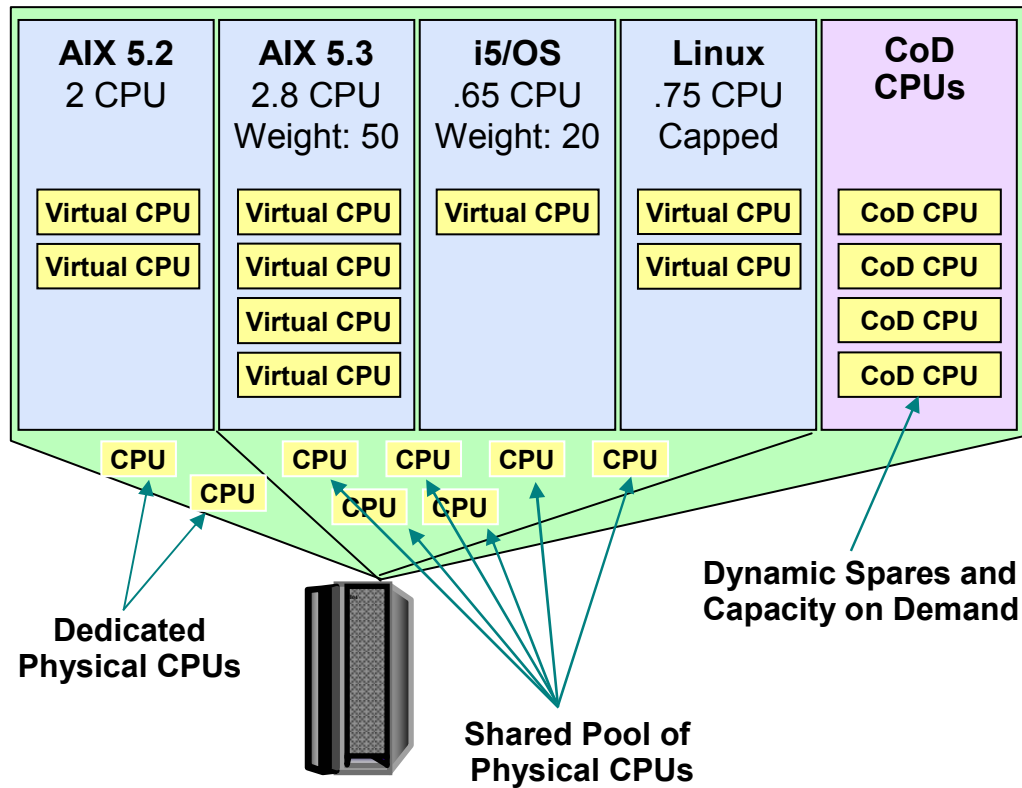


- Utilization often > 80%
- Handles peak workload utilization of up to 100% without service degradation for high priority workloads

- Massive, robust consolidation platform; virtualization is built in, not added on
- Up to 60 logical partitions on PR/SM; 100's to 1000's of virtual servers on z/VM
- Hipersockets for memory-speed communication, as well as Virtual Hipersockets via Guest LANs in z/VM
- Most sophisticated and complete hypervisor function available
- Intelligent and autonomic management of diverse workloads and system resources based on business policies and workload performance objectives



POWER7 – CPU/Memory Virtualization



• 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 of physical memory
- Dedicated physical memory
- Adjustable via DLPAR (for AIX and i5/OS)

• Capacity On-Demand

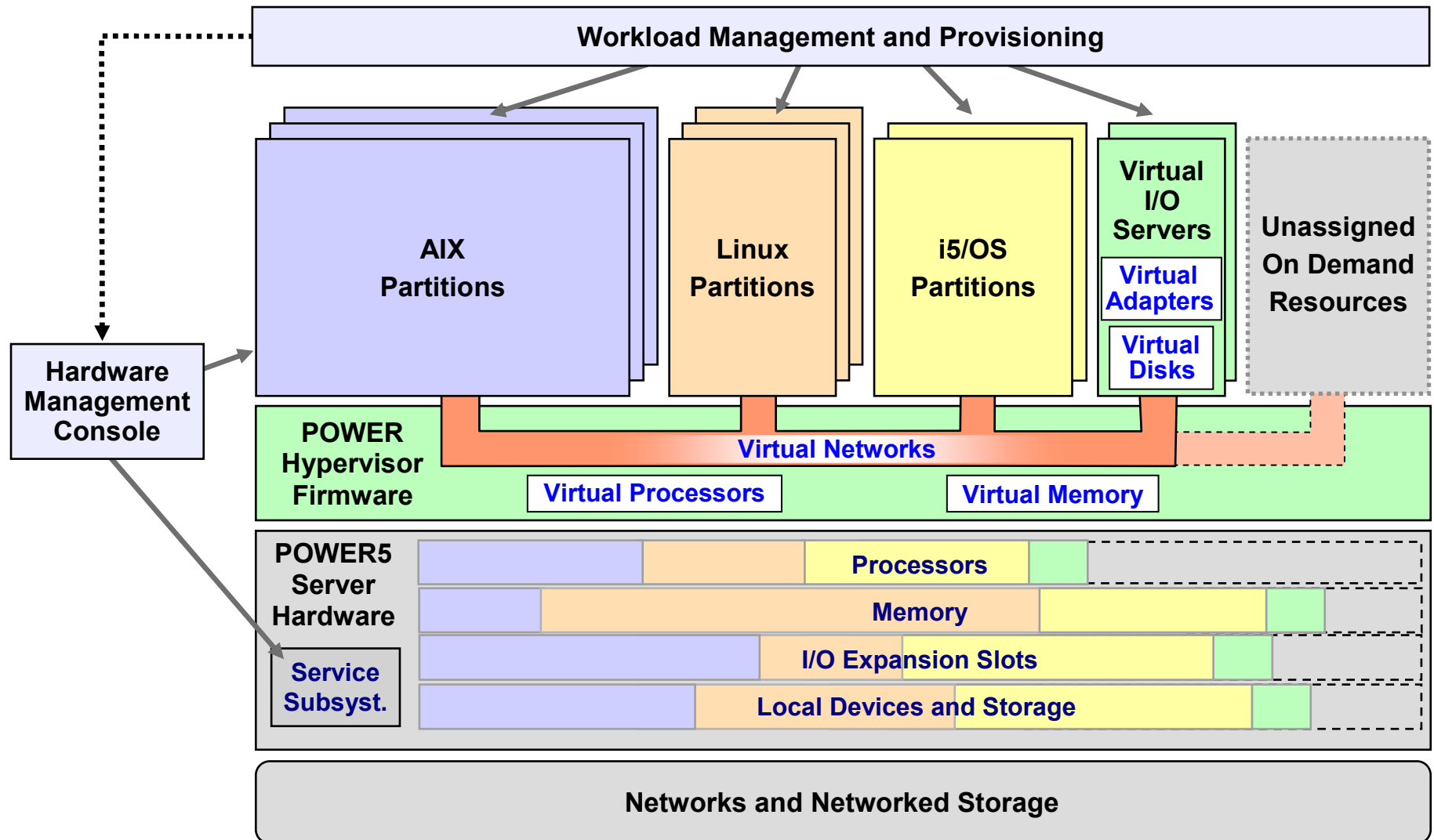
• Scaling

- ◆ Up to 254 partitions
- ◆ Partitions up to 64W SMP

* Available on pSeries and OpenPower servers via the Advanced POWER Virtualization features



POWER Hypervisor With Virtual I/O Servers

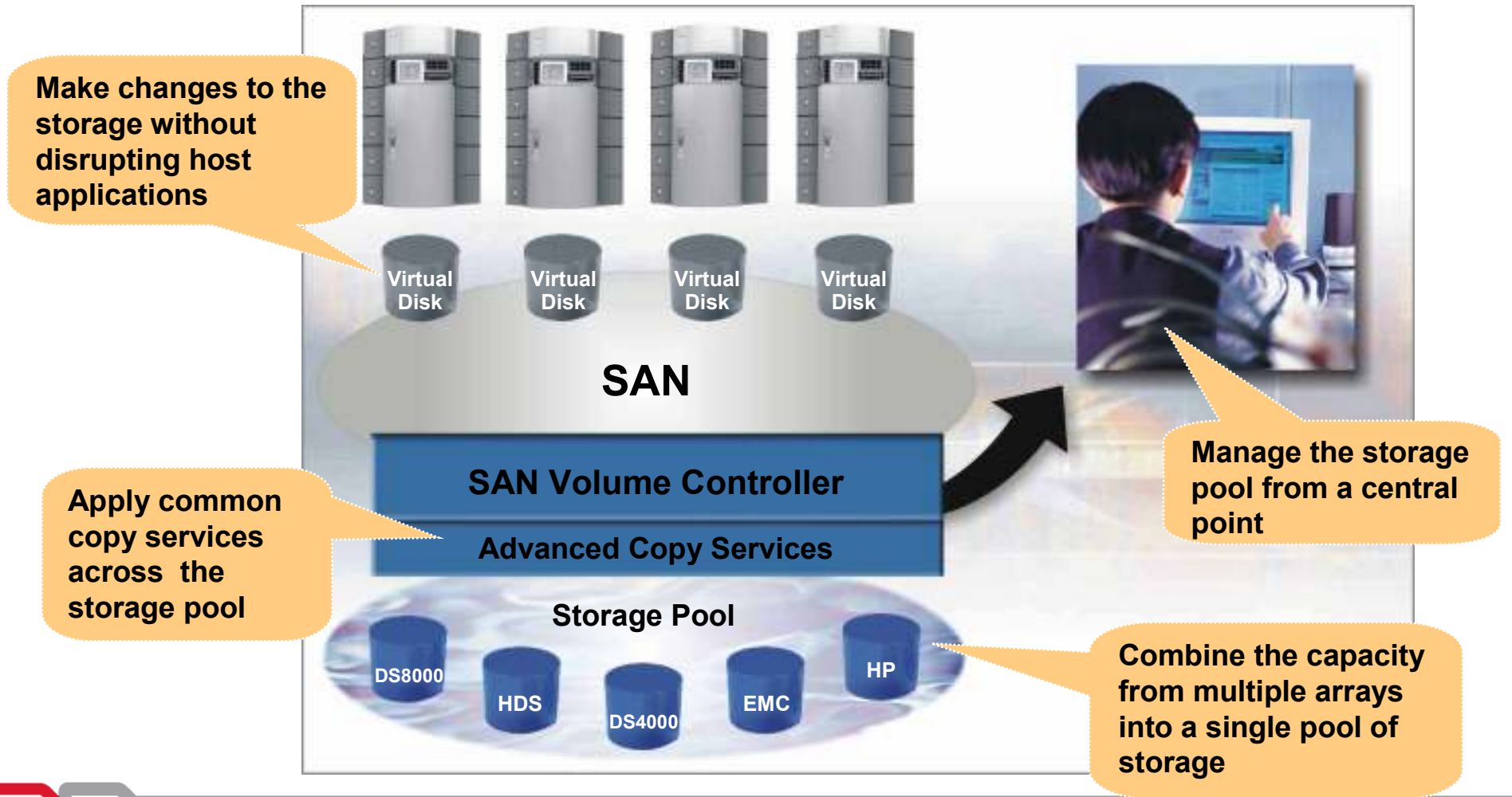


Virtualization of POWER5 servers is accomplished using two layers of firmware:

- A thin core hypervisor that virtualizes processors, memory, and local networks
- One or more Virtual I/O Server partitions that virtualize I/O adapters and devices



IBM System Storage SAN Volume Controller



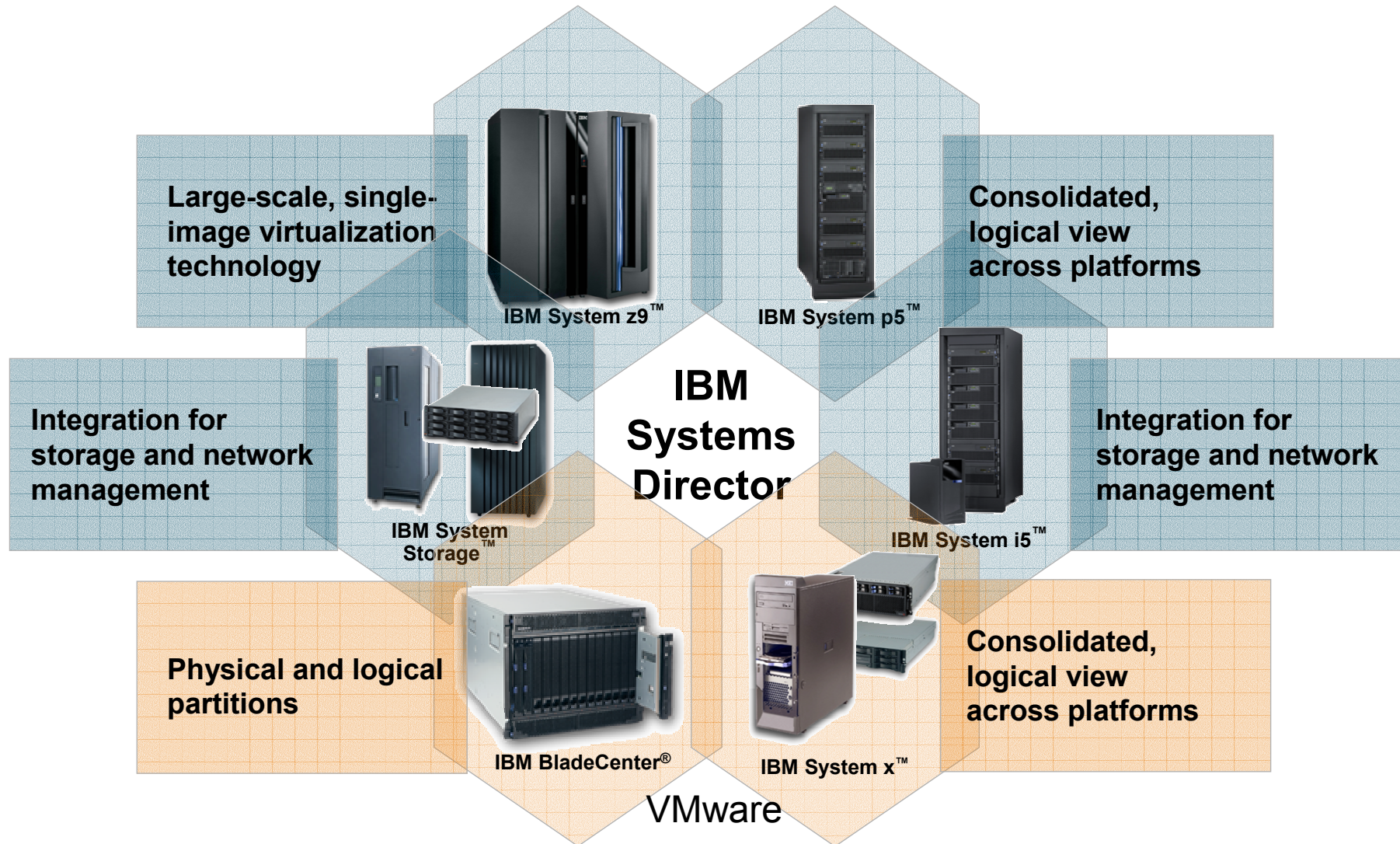
System p Virtualization Superiority

Feature	System p APV	HP IVM	Sun LDomS	VMware ESX
Hypervisor is core firmware	Yes	No	Yes	No
Hypervisor is thin layer – not OS based	Yes	HP-UX App	Yes	Linux deriv.
Hypervisor maturity – always active on since 2004	Yes	No	No	No
I/O error isolation/recovery – VIOS's, TCE's, multipathing	Yes	No	I/O LDomS	No
Partitions scalable from nothing to everything (up to 64W)	Yes	Max 4W	Max 8W	Max 4W
Maximum virtual CPU as fraction of physical CPU	1	1	0.25	1
Ability to fully and dynamically share processor resources	Yes	No	No	Yes
Ability to dedicate all resources	Yes	No	Yes?	No
Dynamic LPAR resources (CPUs, memory, and I/O)	Yes	No	CPUs only	No
Ability to specify entitled capacity – (min, desired, max)	Yes	No	No	No
Capped and uncapped partitions	Yes	No	No	No
Partition mobility	Nov. 2007	No	No	Yes
Automatic partition N-way minimization for efficiency	Yes	No	No	No

- **System p APV has many important features that are lacking on other platforms**



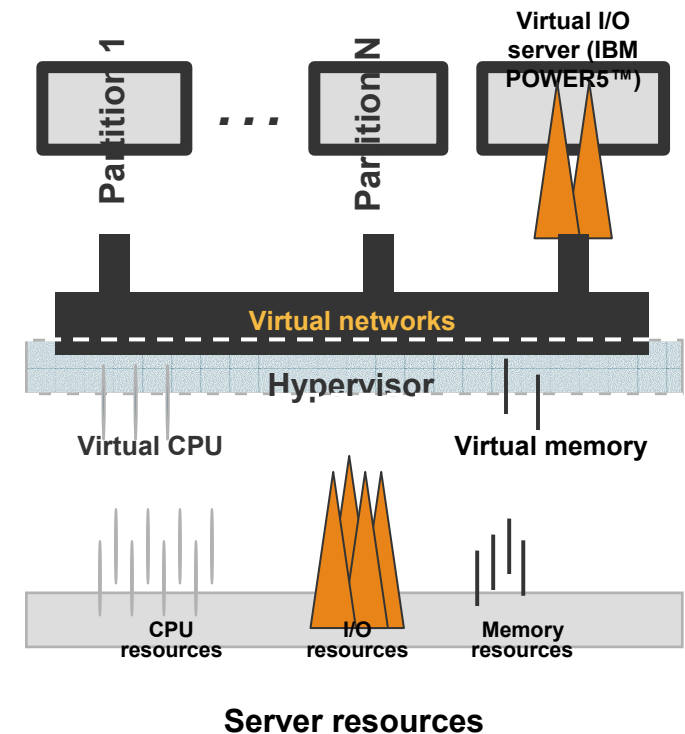
What do IBM virtualization technologies provide?



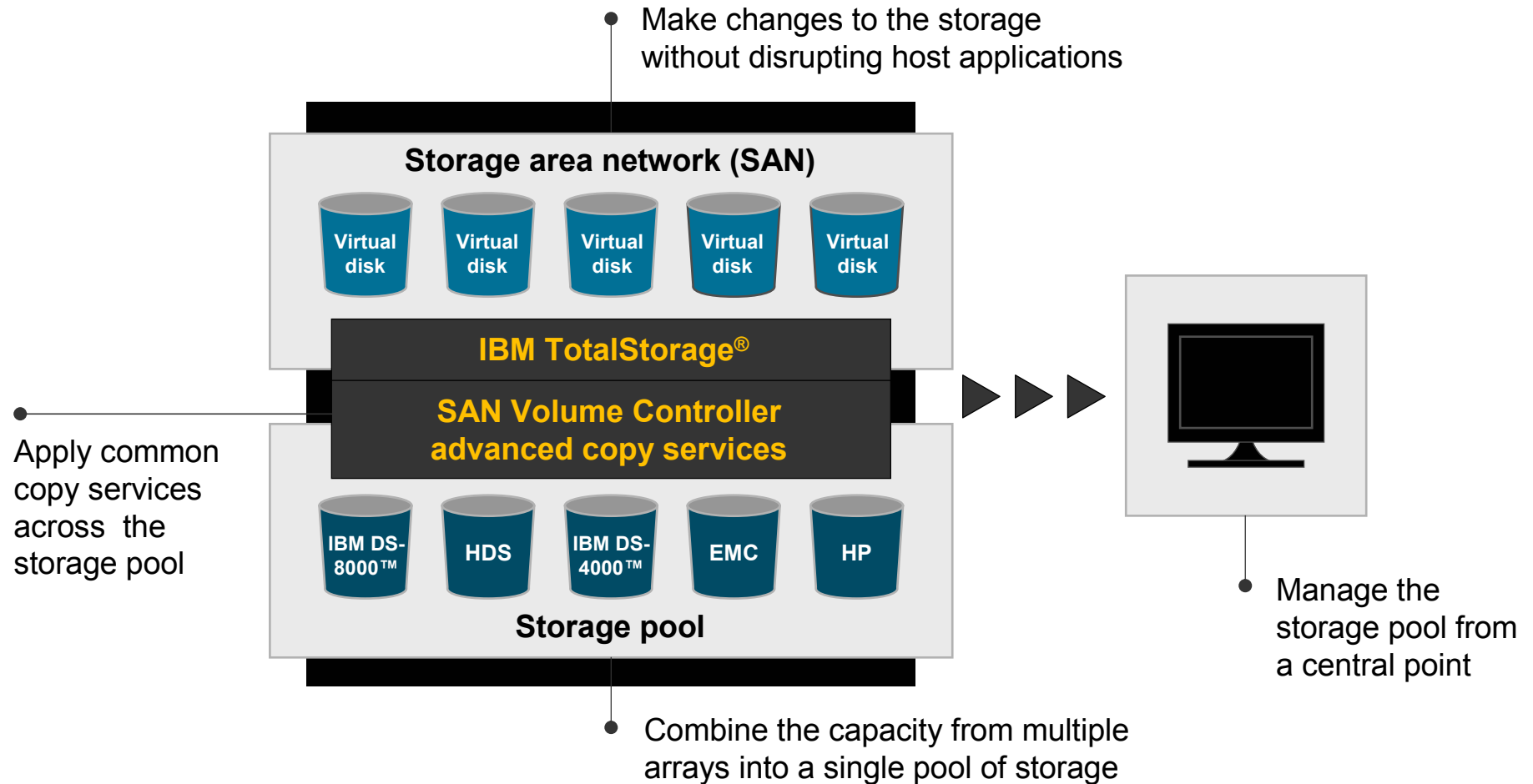
How can I better utilize the servers I have?

Optimize resources within a single server

- **Hypervisor technology offers:**
 - High resource utilization
 - Flexibility and responsiveness
 - Workload quality of service
- **State of the art virtualization with hypervisors**
 - IBM System z and IBM z/VM® technology
 - Gold standard for virtualization
 - IBM System p and IBM System i hardware
 - Unique capabilities including micro-partitioning, and dynamic partitions
 - Network virtualization, virtual input and output, multiple operating systems in a single server



How can I address the explosive growth of storage?



How can I optimize application performance?

	Workload virtualization	Information virtualization
Capabilities	<ul style="list-style-type: none">• Dynamic clusters for sharing• Enhanced service workload management• Application Edition Manager for new version testing	<ul style="list-style-type: none">• ObjectGrid for caching framework• Partitioning facility for defining application partitions
Benefits	<ul style="list-style-type: none">• Use server resources more effectively• Quickly adapt to changing workload• Increase utilization, while meeting agreed-upon service goals• Reduce complexity by automating selected administrative functions	<ul style="list-style-type: none">• Relieve load on back-end data store• Improve transaction throughput and response time• Achieve near-linear scalability• Reduce or eliminate the need for constant tuning



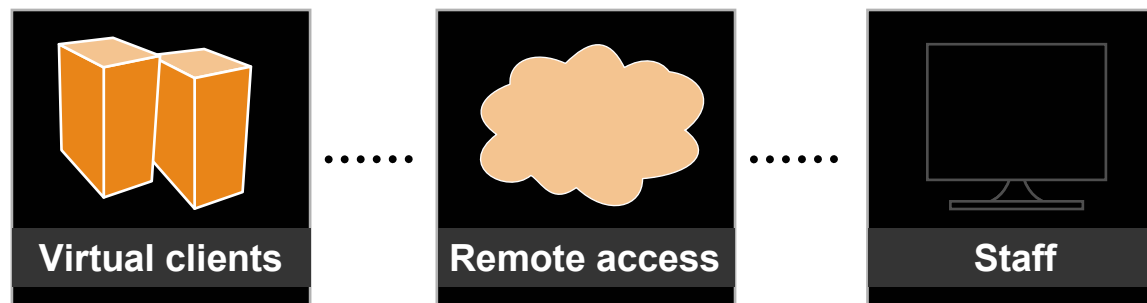
How can I simplify management of workstations?

IBM virtual client solution enables:

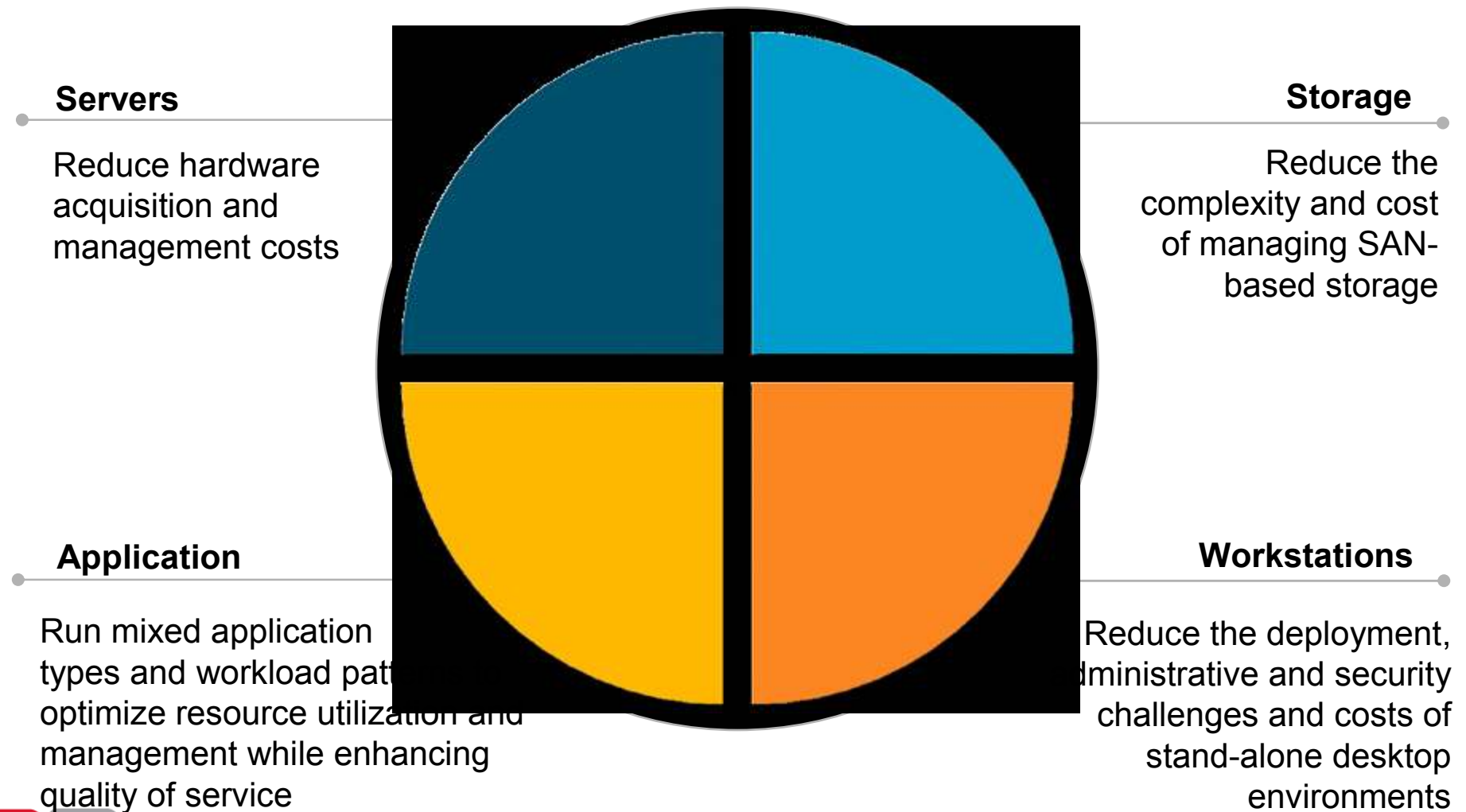
- Central management
- Back-end storage of the desktop
- Offline patching of the desktop
- Automated enforcement of security policies

Potential Benefits:

- Lowers support costs by enabling you to centralize management of all desktops
- Enables you to replace thick clients with lower-cost thin client
- Increases security by reducing the number of fat clients



Making best use of resources through virtualization



Summary

Value of Virtualized Infrastructure



- **Improve TCO**
 - Decrease management cost
 - Increase asset utilization
 - Link infrastructure performance to business goals
- **Access Through Shared Infrastructure**
 - Leverage common tools across many systems
 - Improve business resilience and security
 - Establish foundation for future data centers
- **Increase Flexibility**
 - Create pools of system resources
 - Maintain freedom of choice with open standards
 - Simplify by masking complexity
- **Green**
 - Lower energy costs
 - Reduce environmental impact
 - Increase capacity

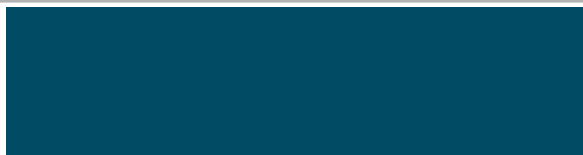


Questions...





Thank you



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