

Blade Servers & Virtualization

State of the Industry 2007

Industry Address

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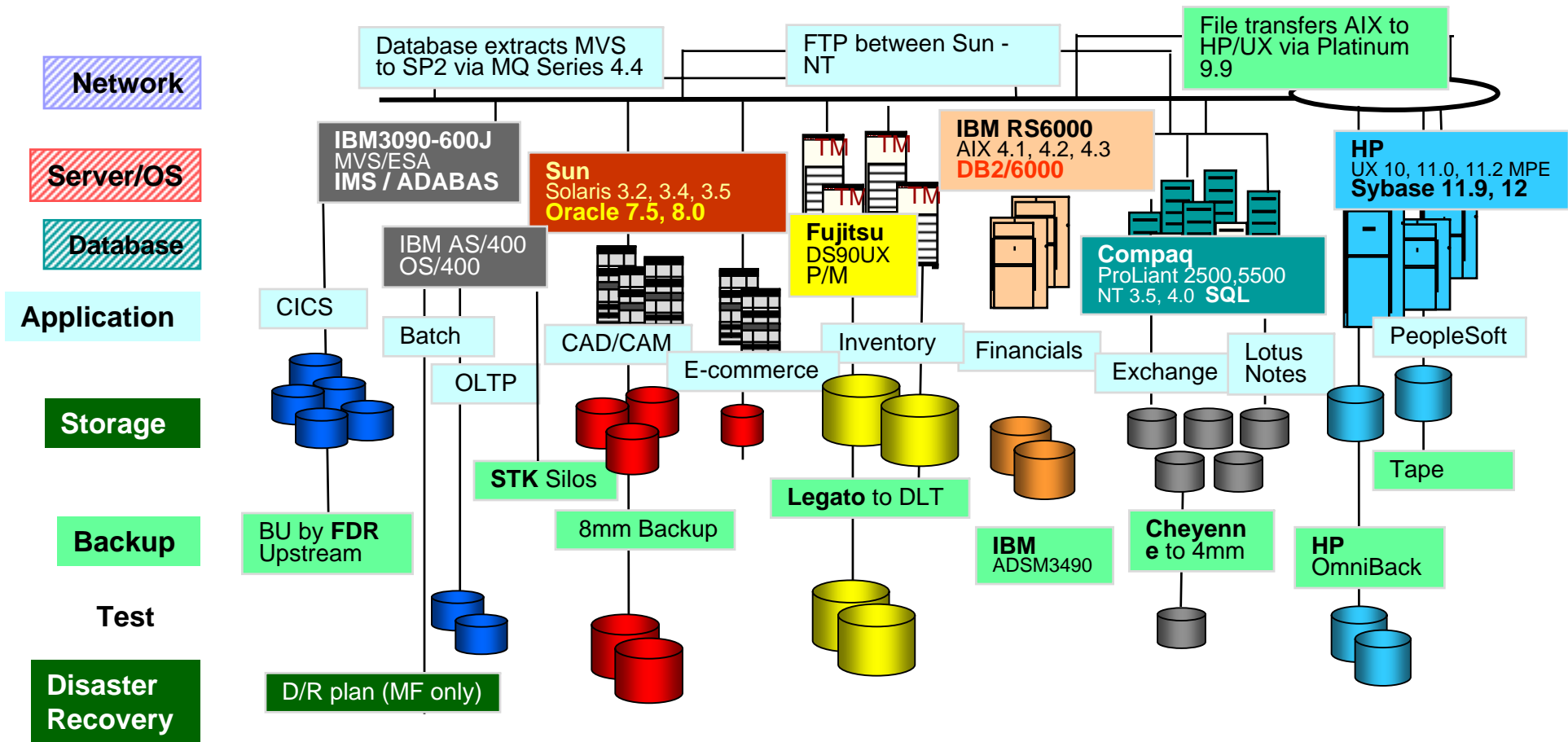
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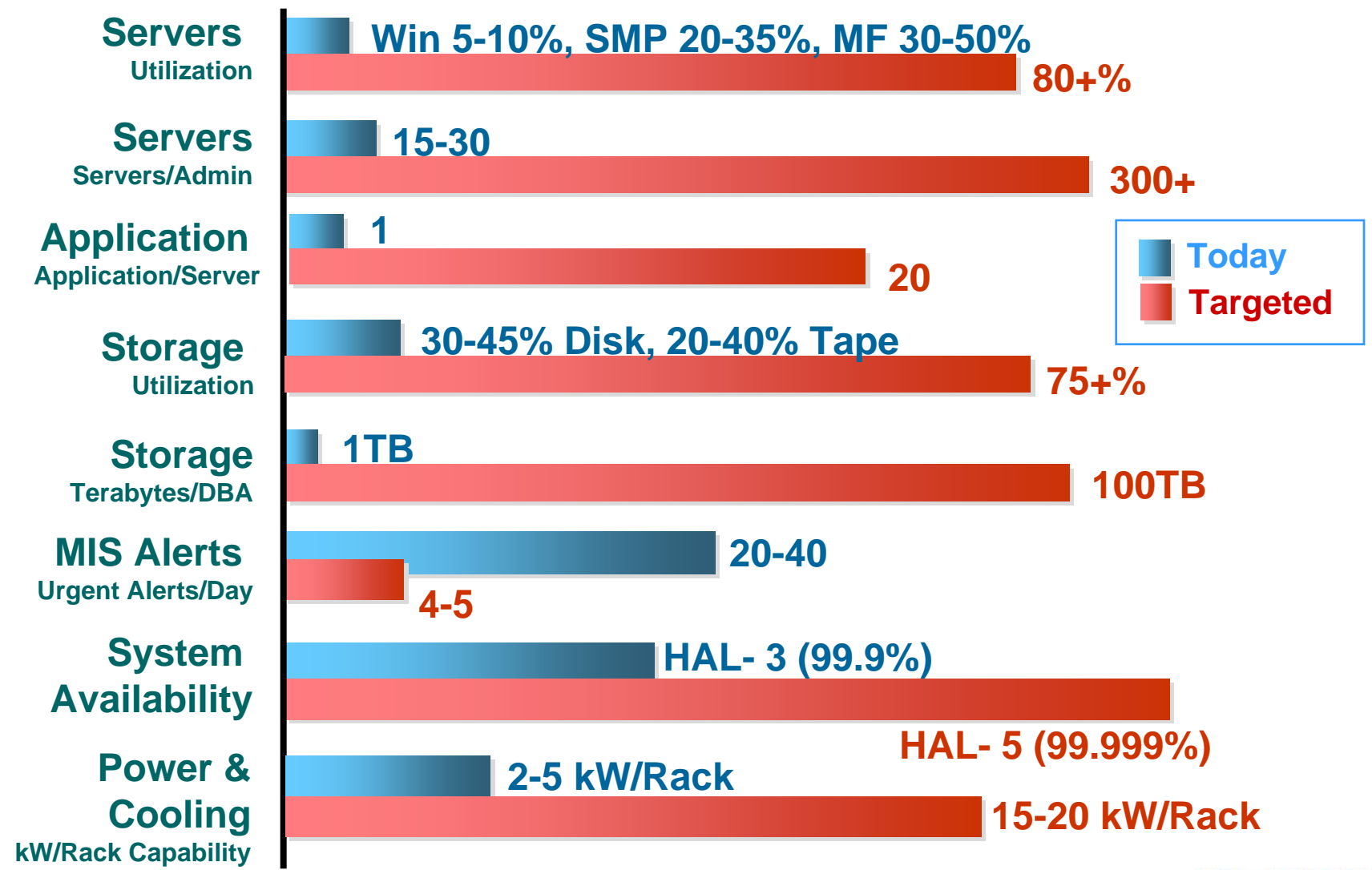
► Chaos in the Enterprise . . .

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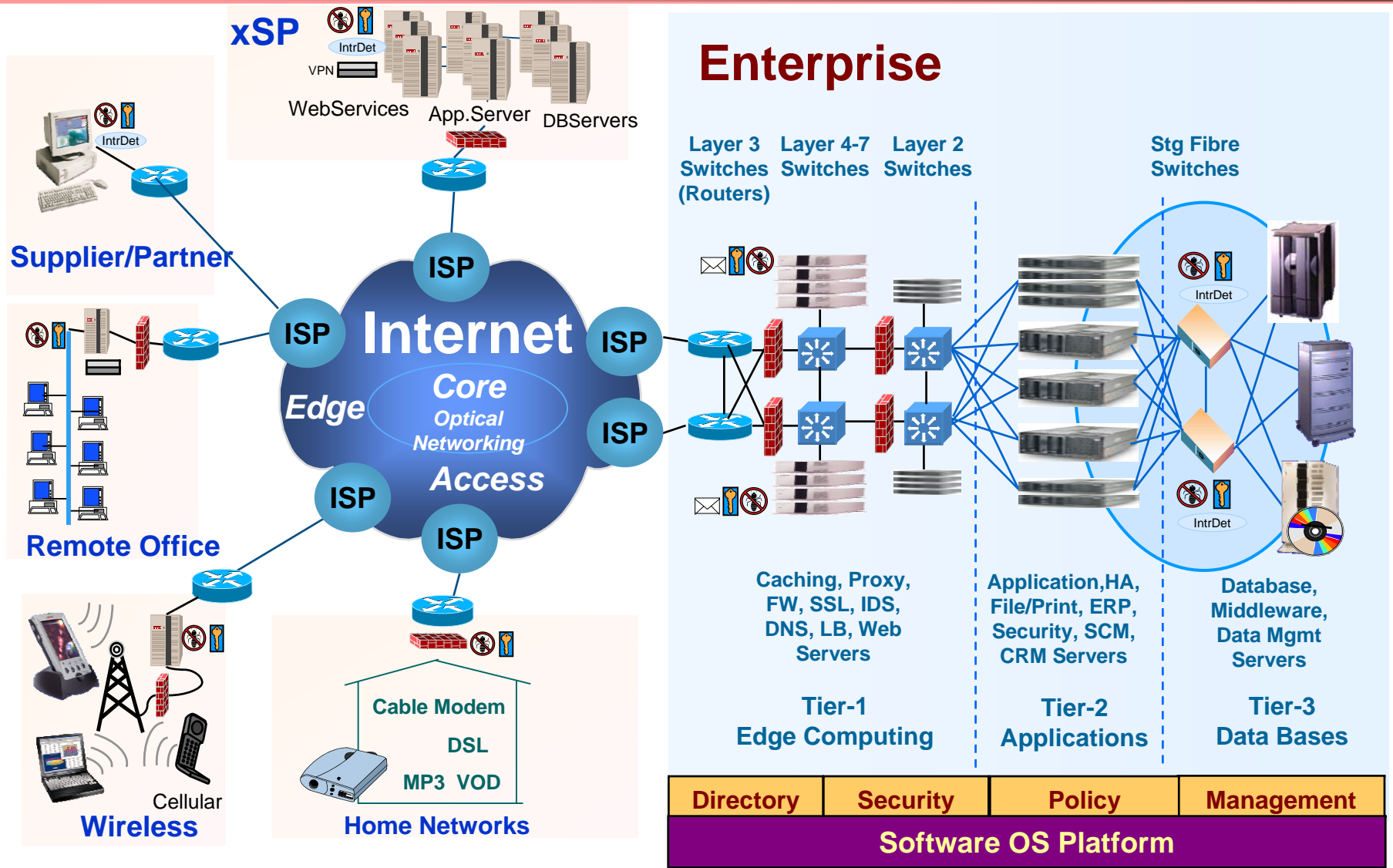


(1) Scales poorly (2) Difficult to manage (3) Reliability is questionable (4) Management costs out of control

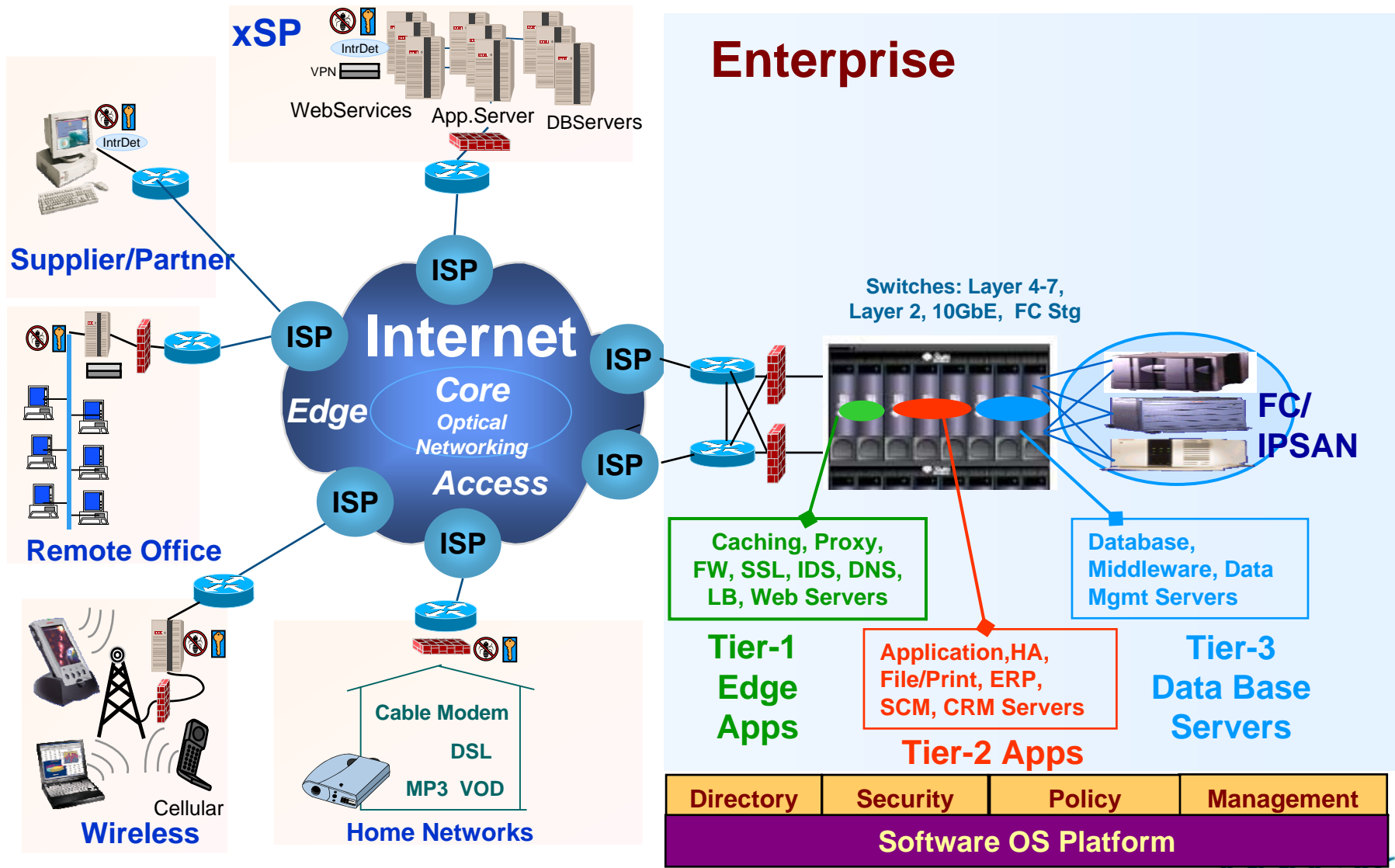
▶ DC Infrastructure Nightmares Driving CIOs



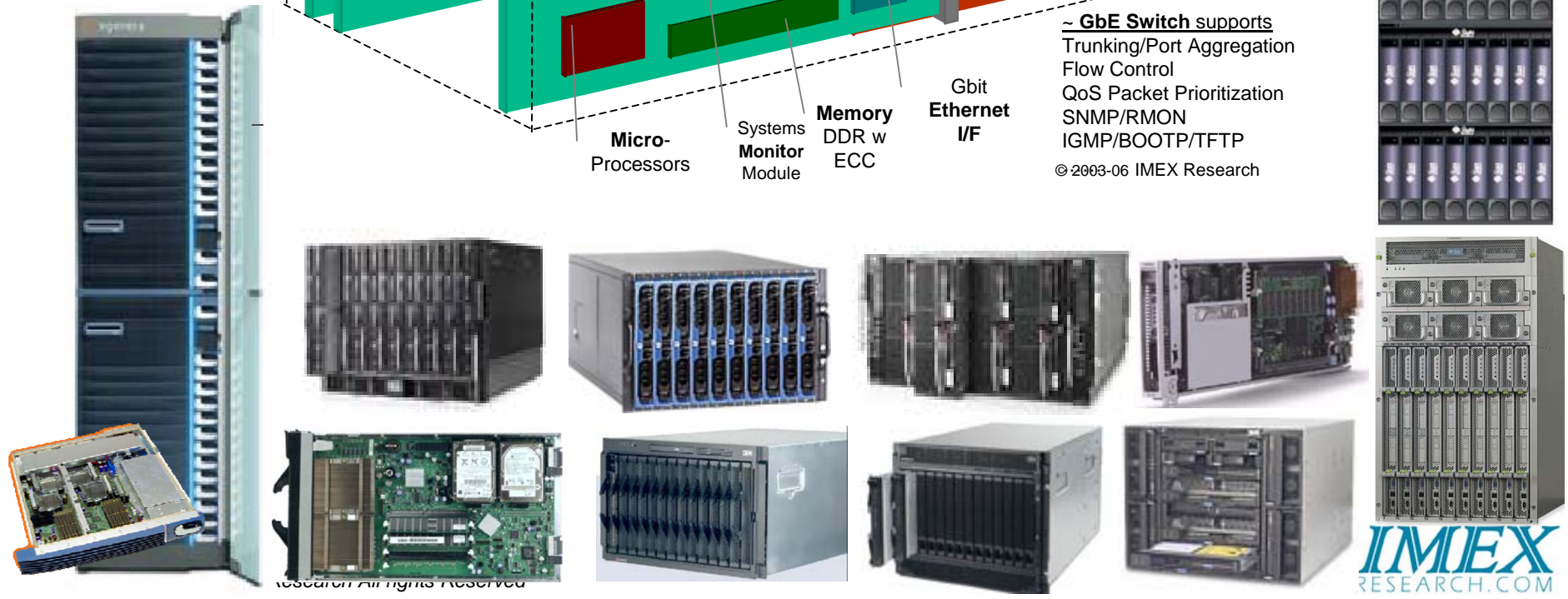
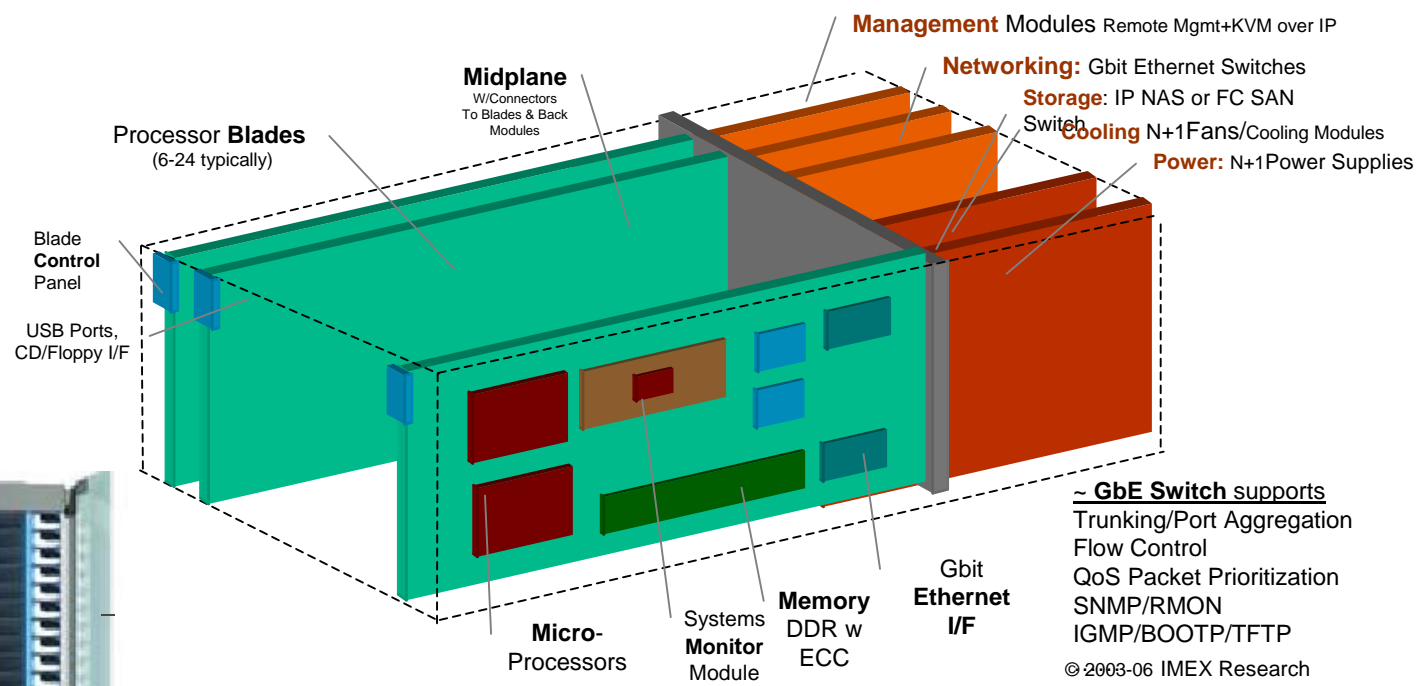
End to End IT Infrastructure with HA & Security



Consolidated Data Center

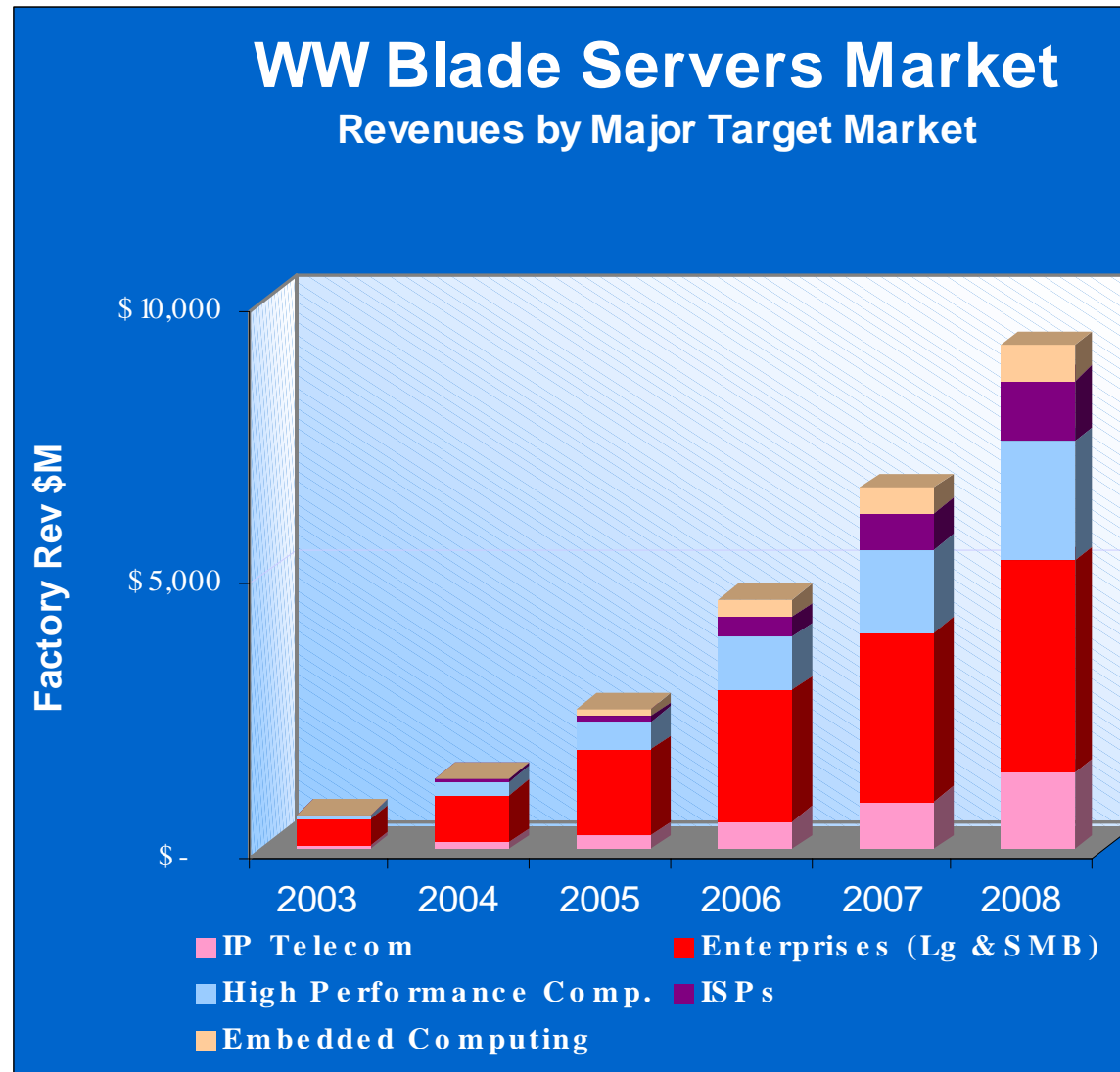


Blade Infrastructure: Local Area Grid (LAG) ©

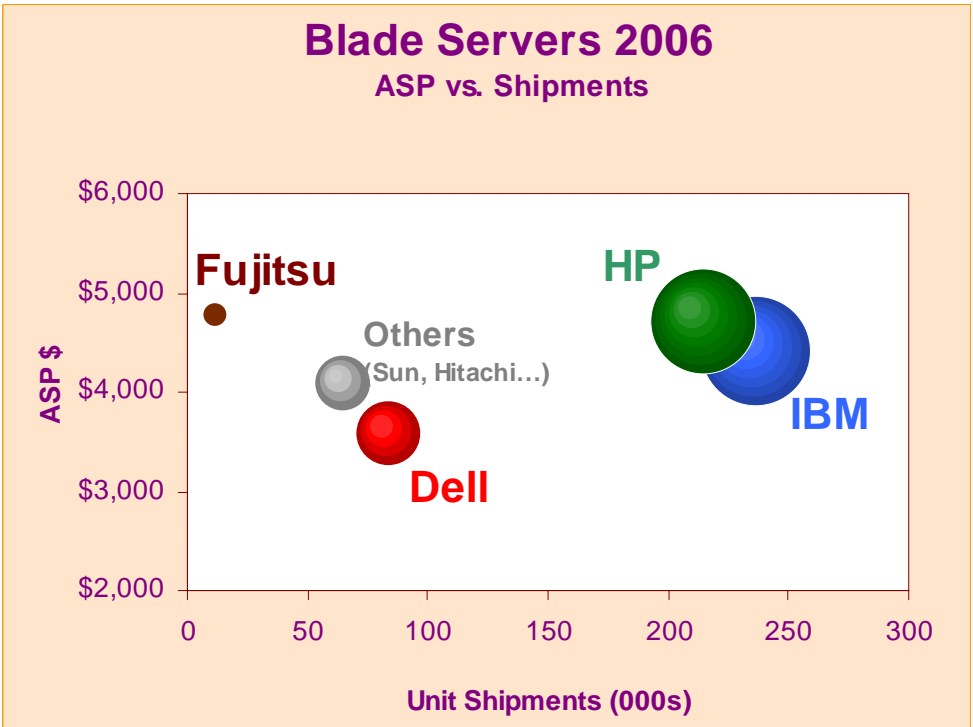
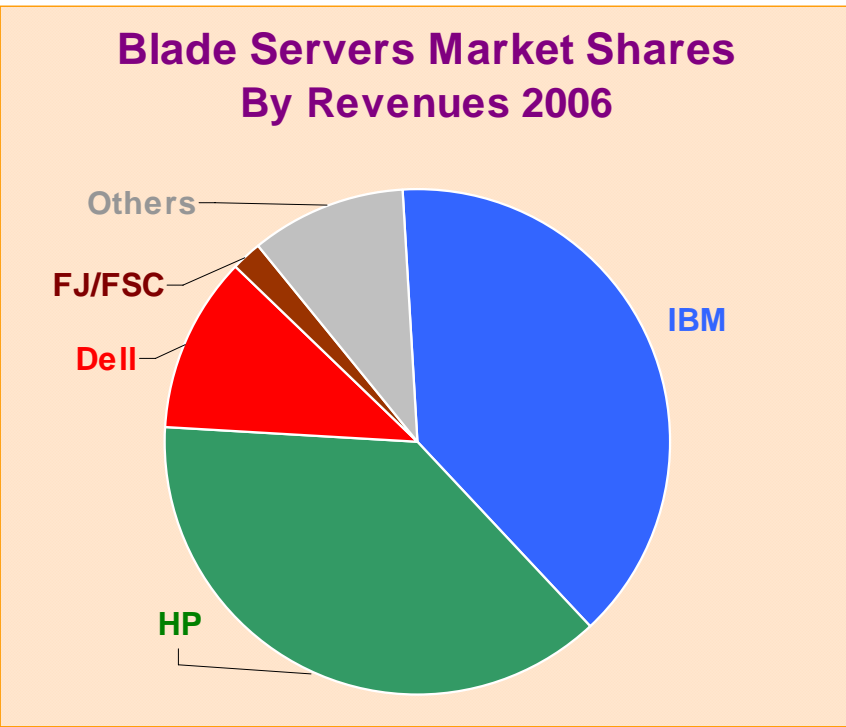


Blade Servers by Market Segments

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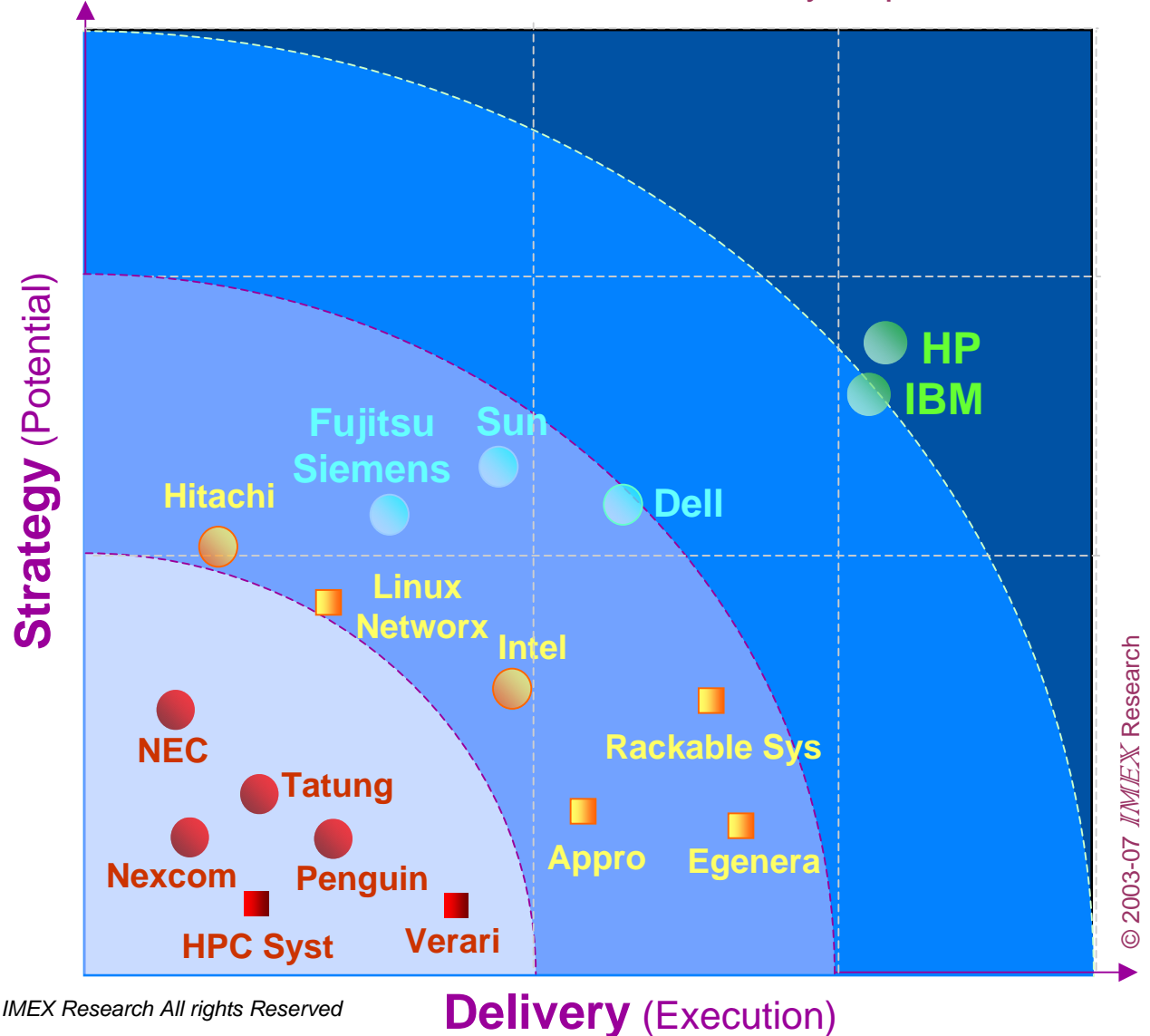


► State-of-the-BladeSystems Vendors 2006



▶ Blade Servers: Vendor Positioning Index

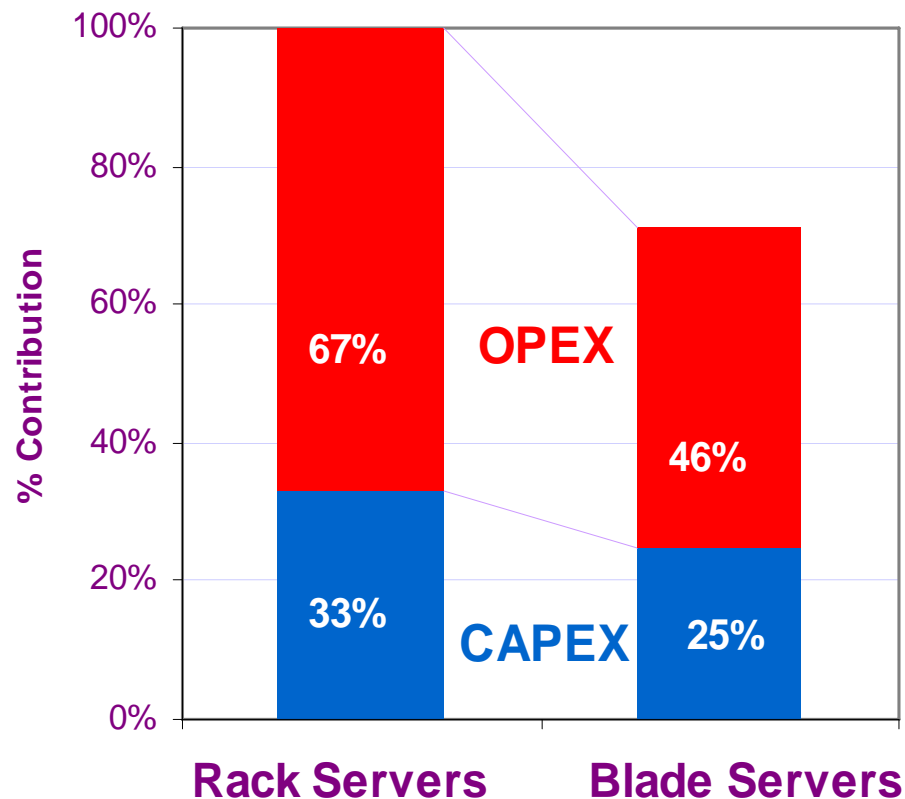
(As of Oct 2006 - See IMEX Blade Servers Industry Report 2007 for latest data)



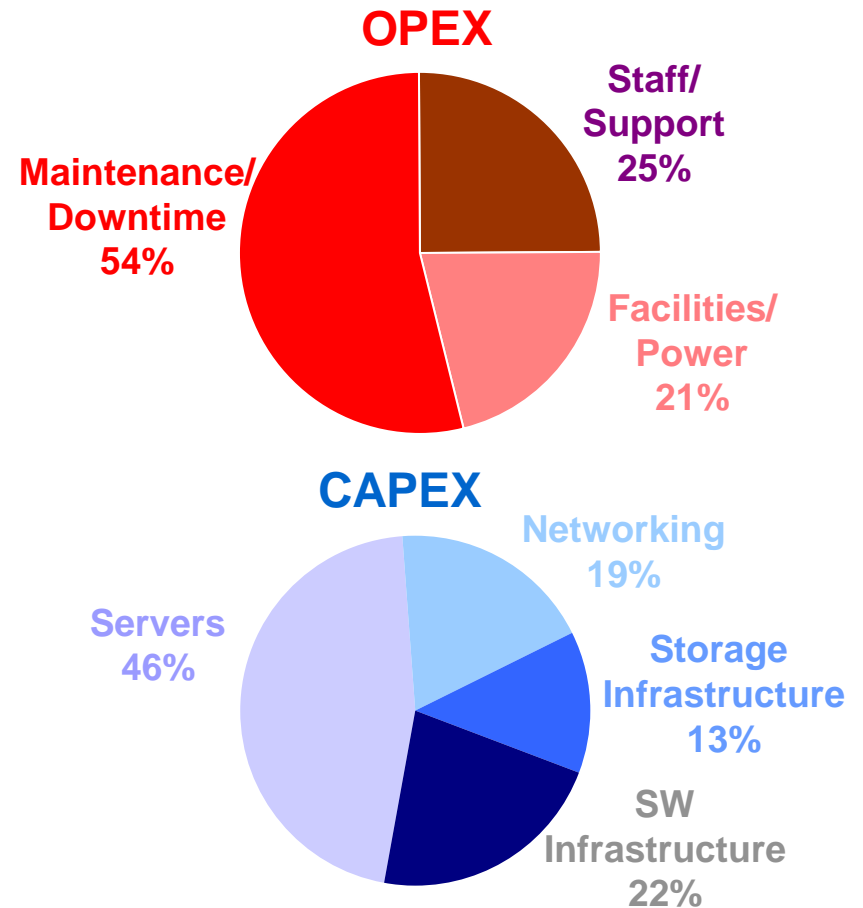
Blades - TCO Savings & ROI

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3 Year TCO Savings Rack vs. Blade Servers

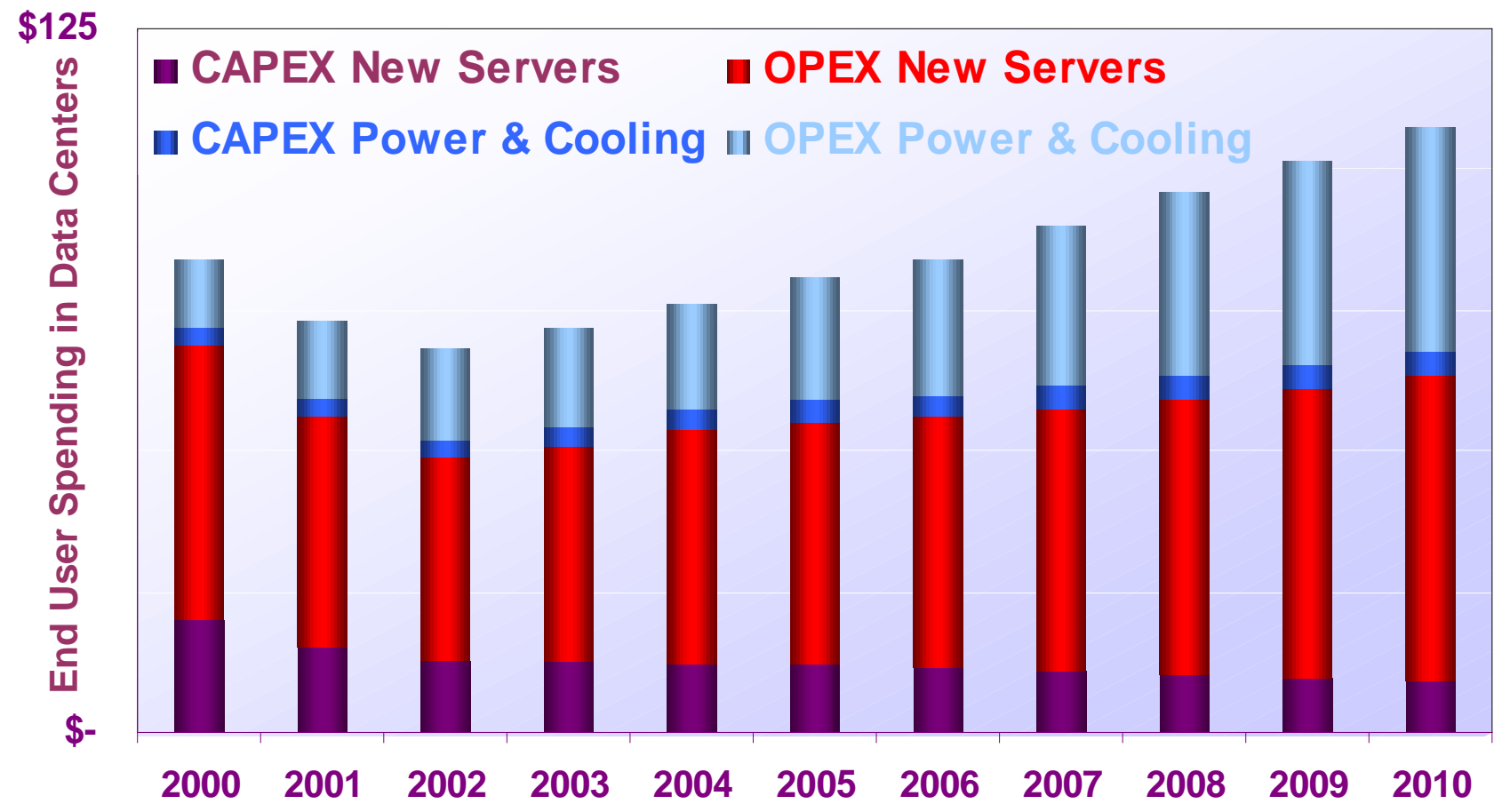


TCO Savings in..



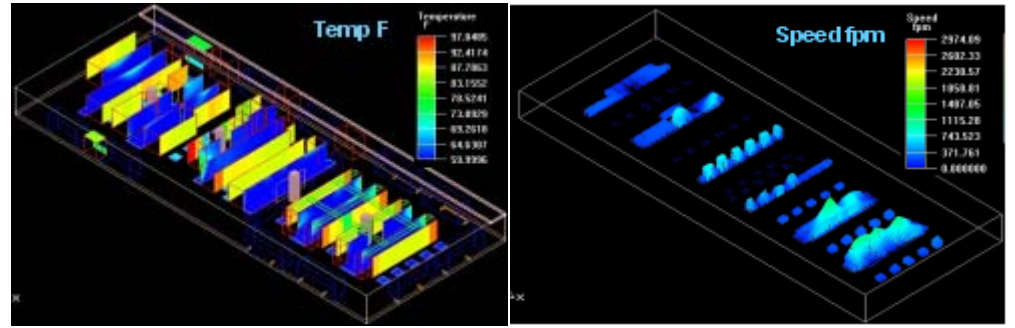
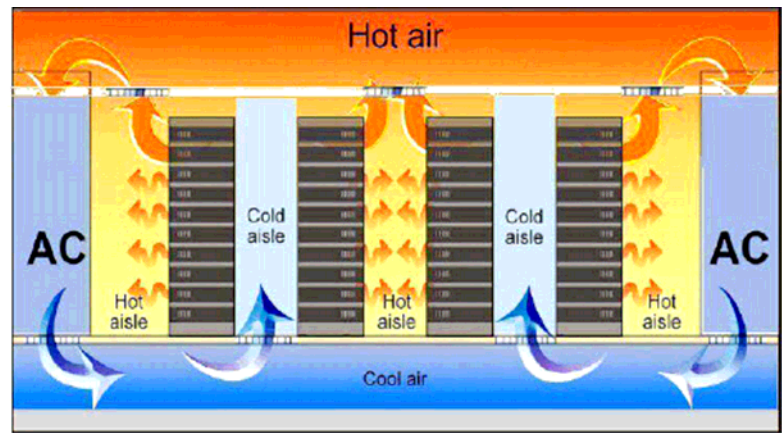
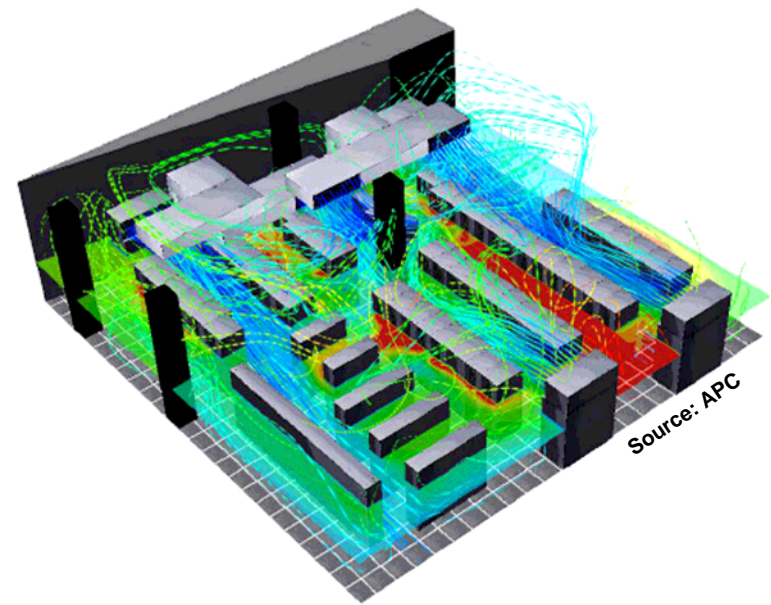
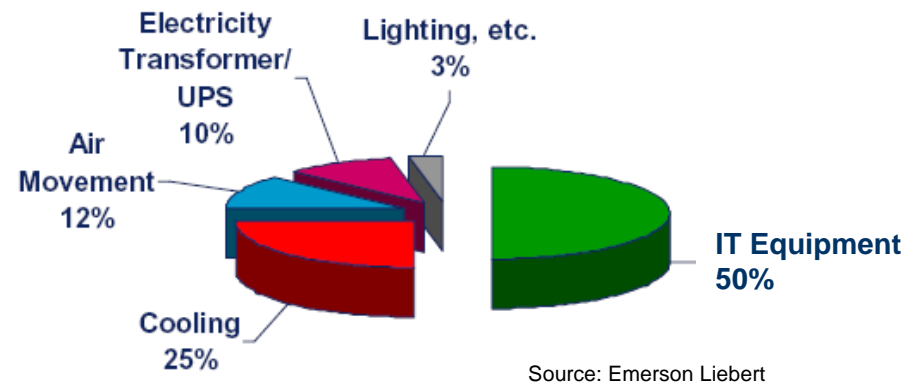
▶ Power/Cooling Spending to rise dramatically to 40%

Power & Cooling Spending to rise to 40% of Total DC Spending by 2010



► Data Center Cooling

Where does the power go in Data Centers ?

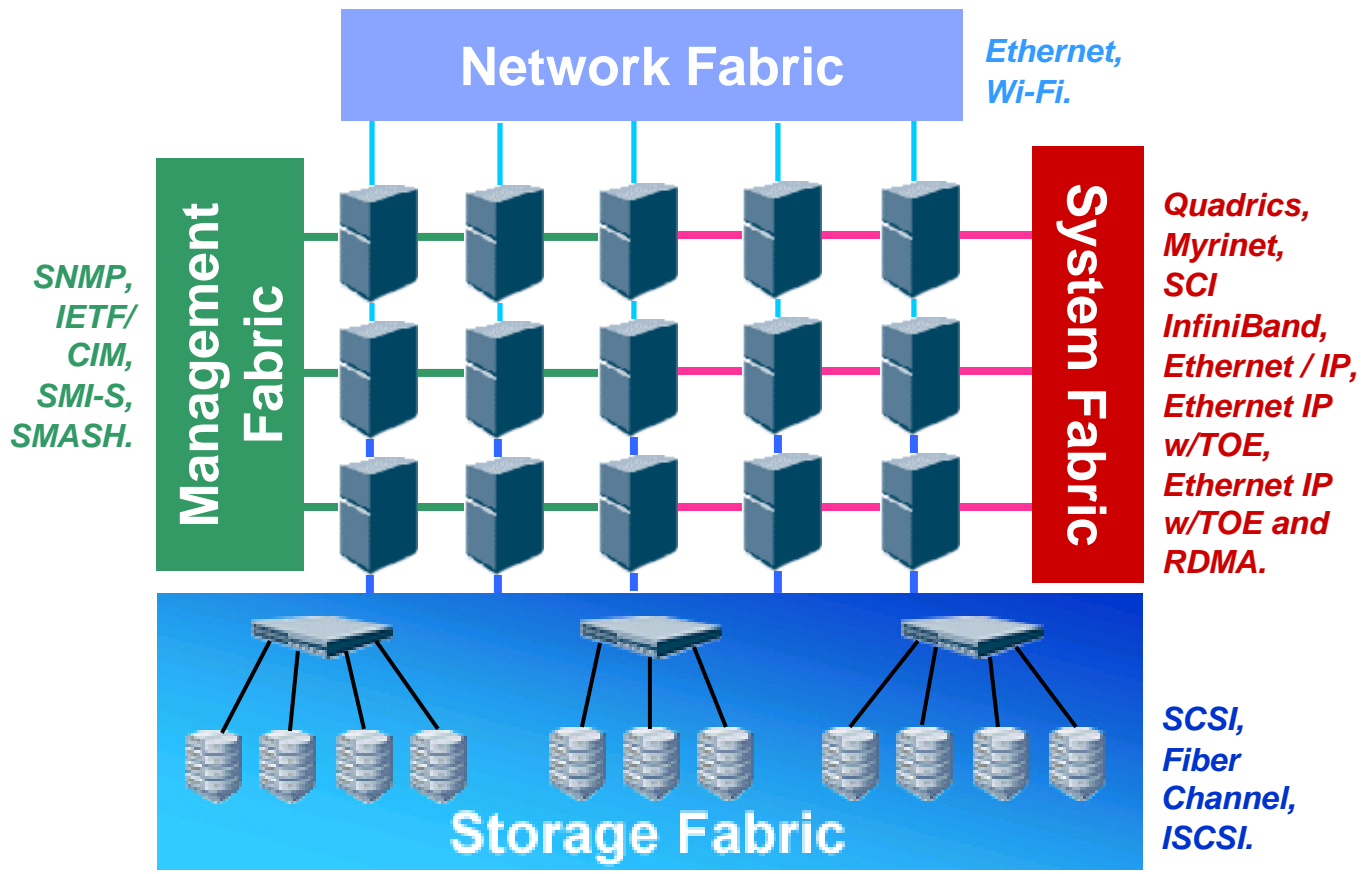


Many techniques, methodologies and equipments from air cooling to liquid assisted cooling available form a variety of vendors and Consultants
 (Email imex@imexresearch.com for more info and Assessment of competitive vendor products, consultants | data center power & cooling integrators)

Computer Simulation using widely available software (e.g. Fluent Airpack Ansys CFD ...) to verify Cooling Designed is the most cost effective before committing to final implementation.

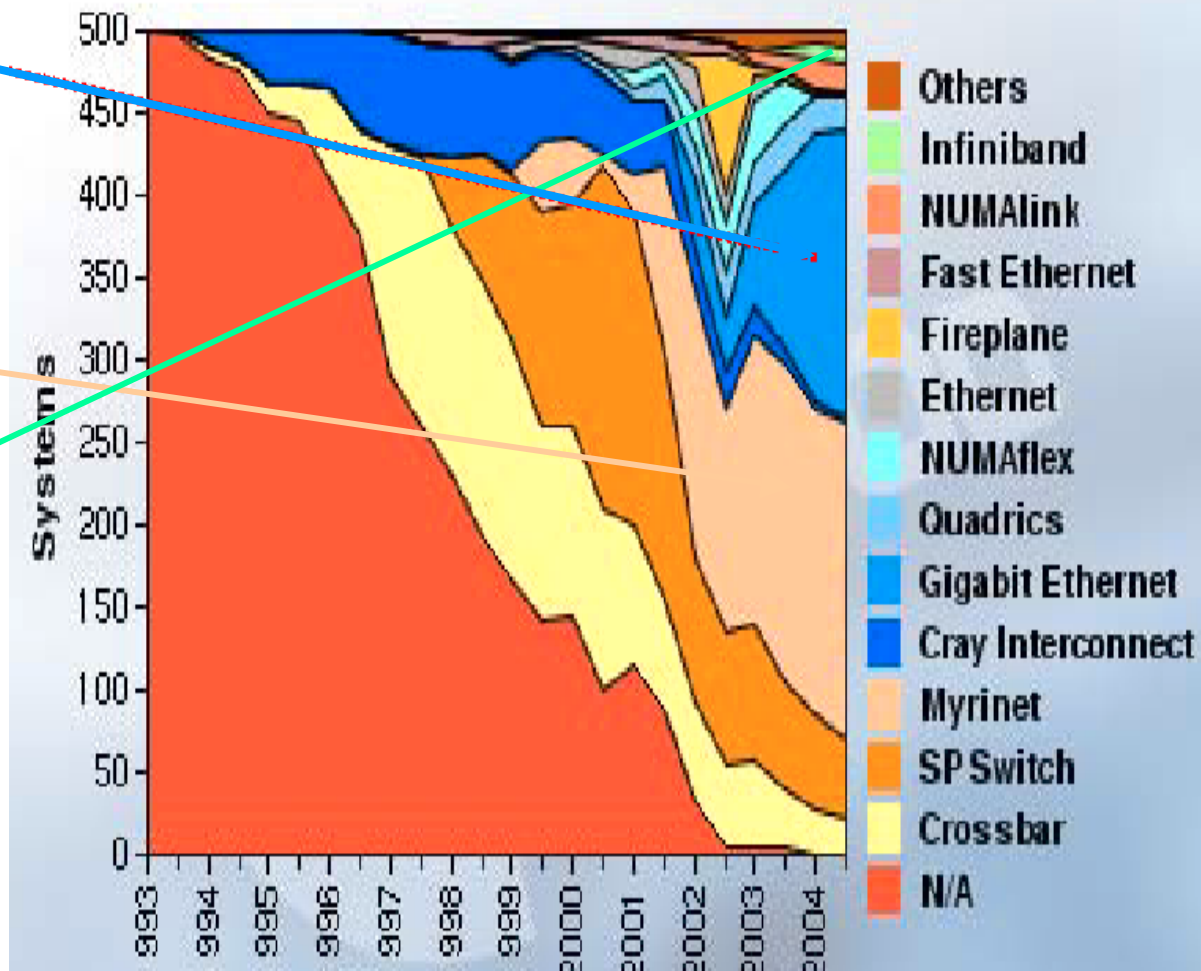
Source: IBM 2005

▶ Key to Integration: Interconnect Fabrics

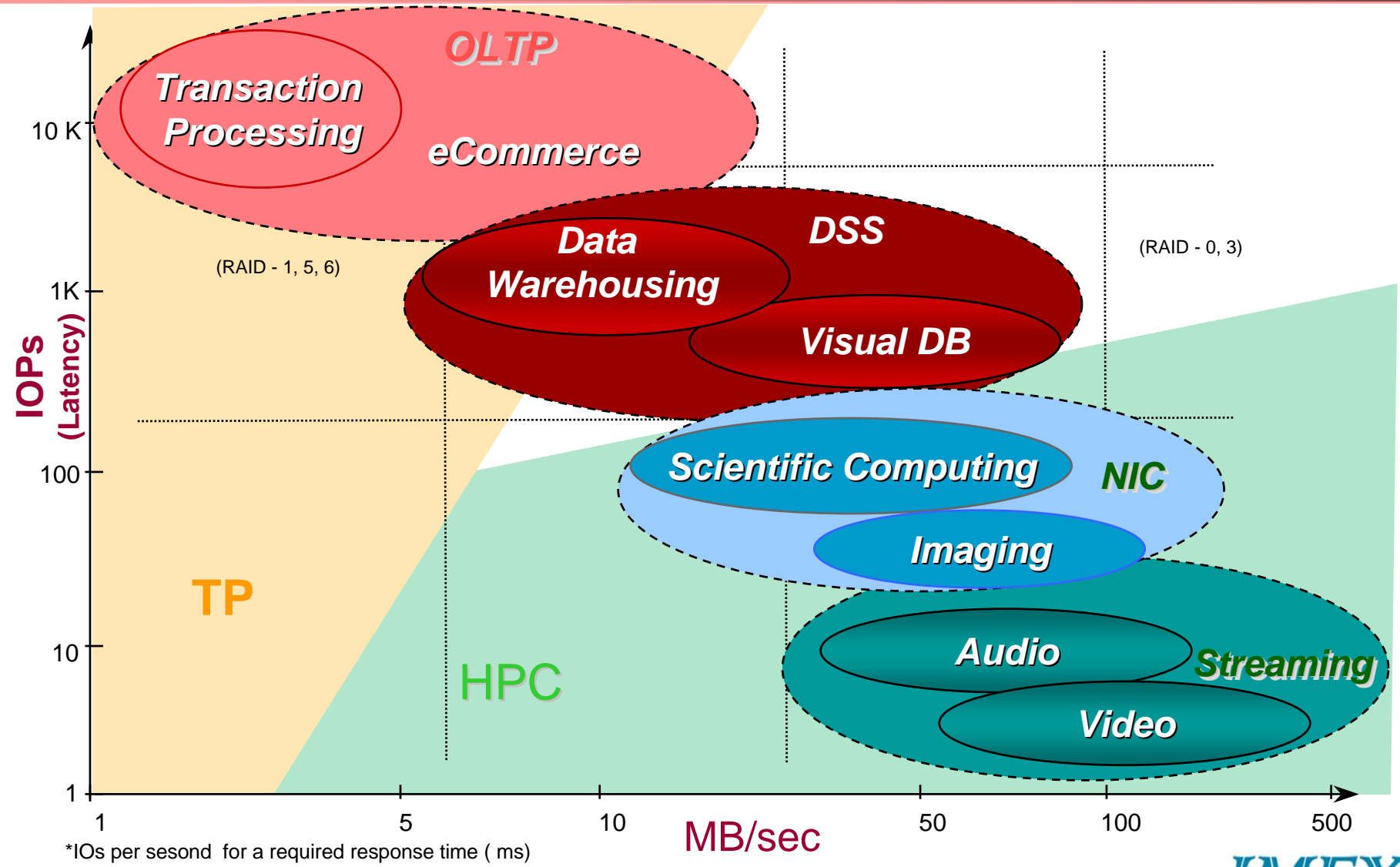


► HPC Interconnect – Leaders

GbE for majority of applications dominate the Interconnect for HPC. **Myrinet** for the highly latency sensitive applications while **Infiniband** is rearing up at the Midrange latency applications



Market Segments by Applications

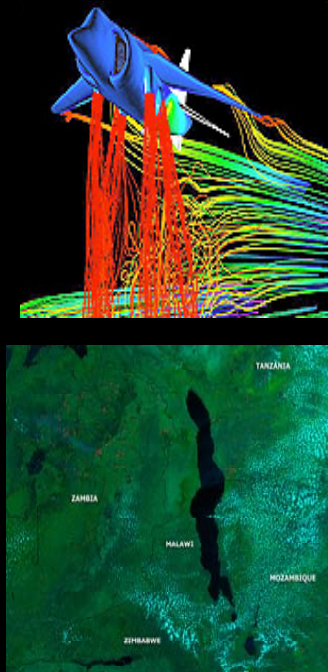


*I/Os per second for a required response time (ms)

HPC – From Academia to Wall St to Hollywood

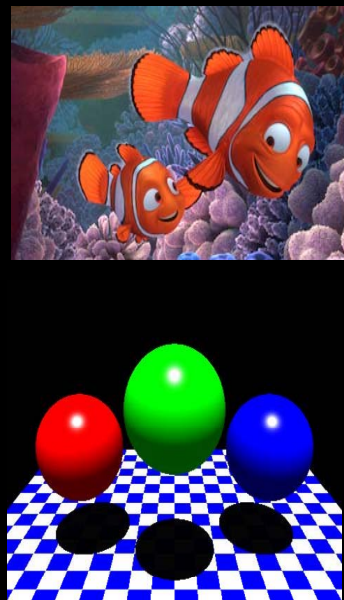
Data: IMEX Research & Panasas

High Performance Computing



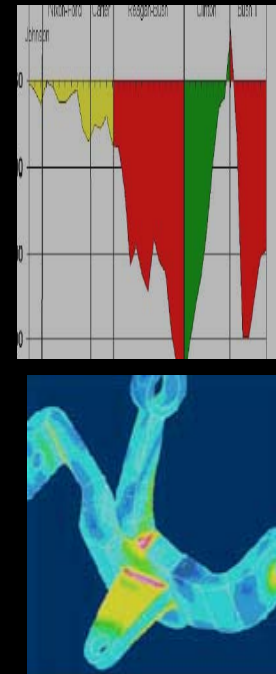
- ▶ 100+ Teraflops
- ▶ Throughput = 100 GB/s

Commercial Visualization



- ▶ Rendering (Texture & Polygons)
- ▶ Throughput = 1.2 GB/s

Bioinformatics Decision-Support Systems



- ▶ Data rate & capacity
- ▶ Throughput : DSL/Cable

Entertainment Audio/Video OnDemand



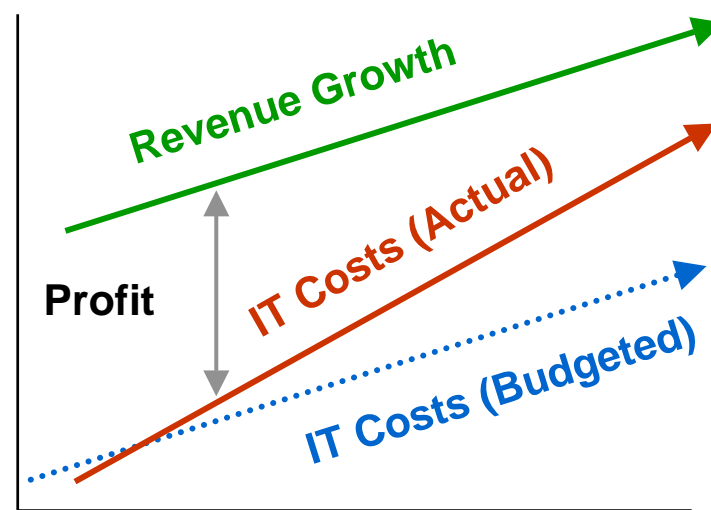
► *Genesis of Virtualization & Grid Computing*

CFO vs. CIO - Shocking Observations

- IT Infrastructure Investments yet to achieve TCO/ROI Financial Objectives
- Expected Boost in Corporate Productivity not Visible
- Post 2000 Dictum: Do More with Less

Reason – IT Spiral

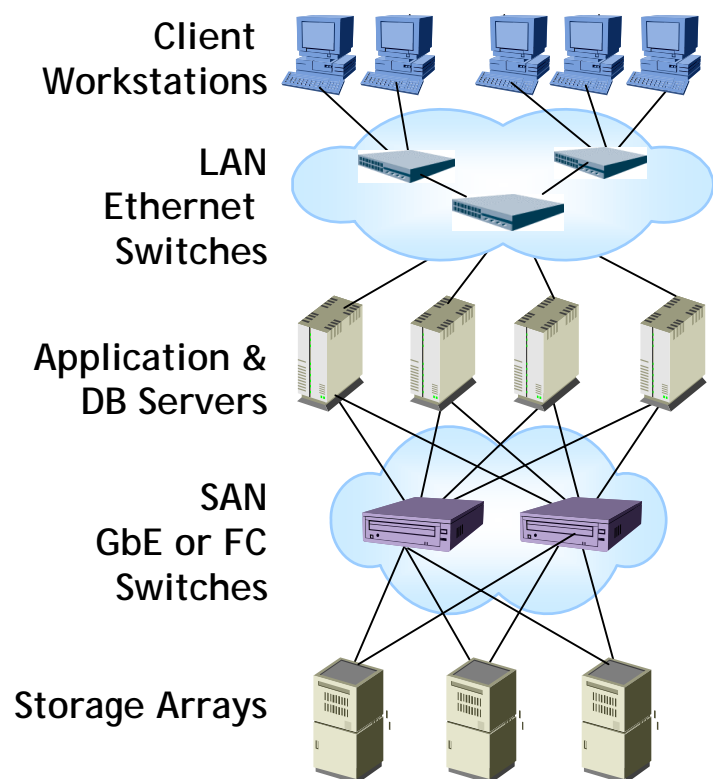
- **Web Growth** > **New Apps Mushroom**
> **Lo Cost Windows Servers Sprawl** (Tier-1)
- **Business Growth** > **More Computing Power**
> **Applications/DB Servers Sprawl** (Tier-2,3)
- **More Servers** > **↑ Storage** > **↑ DC Facilities** > **↑ IT Support** > **↑ IT Staff**
- **More Low Cost Servers** > **5% Utilization** > **Scale Out Infrastructure**
- **IT Costs** \neq **Business Growth**



▶ **Next-Gen Data Center - Observations**

- **WW, there are 5.1 million data centers (you are not alone)**
- **Now costs \$100-175M to build a large data center**
 - ~\$1005/Sqft, \$40,000/Rack, \$2,500/Server, 2.5U
 - 82% of installed equipment (Srvr,Stg,Ntwk) has only 10% utilzn.
 - For every \$1 invested in new IT infrastructure, \$7 spent to maintain
 - For every \$1 in new Server spending, 50c spent on Power & Cooling /2006
 - Virtual Servers growth will outstrip growth of Physical servers by 50% with an associated rise in managing virtual servers
 - Blades increasing Power/Rack by 10x Need Power/Cooling, Weight, Solutions to pursue

► Implementing Virtualization



At Various Levels

Microprocessor

- *Intel VT, AMD-Pacifica*

OS

- *zOS, pOS, UNIX, Windows, Linux*

- *IBM, HP, Sun, VMWare, Xen, SWSOft*

File System

- *DFS*

Networking

- *Multiport*

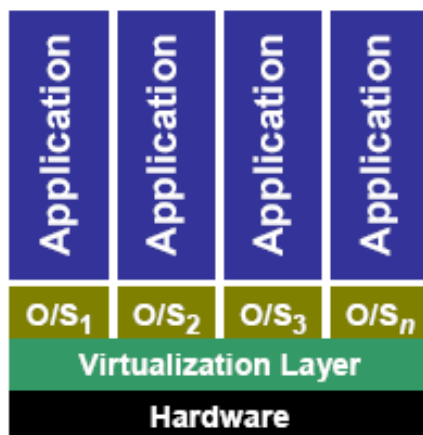
Storage

- *Host, SAN, Controller*

- *In-Band, Out-of-Band Management*

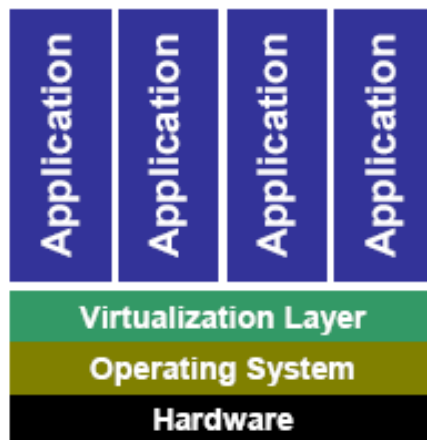
Virtualization Models

Hypervisor model



- Each application is contained by its own Operating System instance
- The Virtualization layer is tasked with spoofing each OS into believing its is the only OS on the system
- Users can mix and match guest OS's with various versions of Windows or Linux.
- Major Players: VMWare, Microsoft, Xen

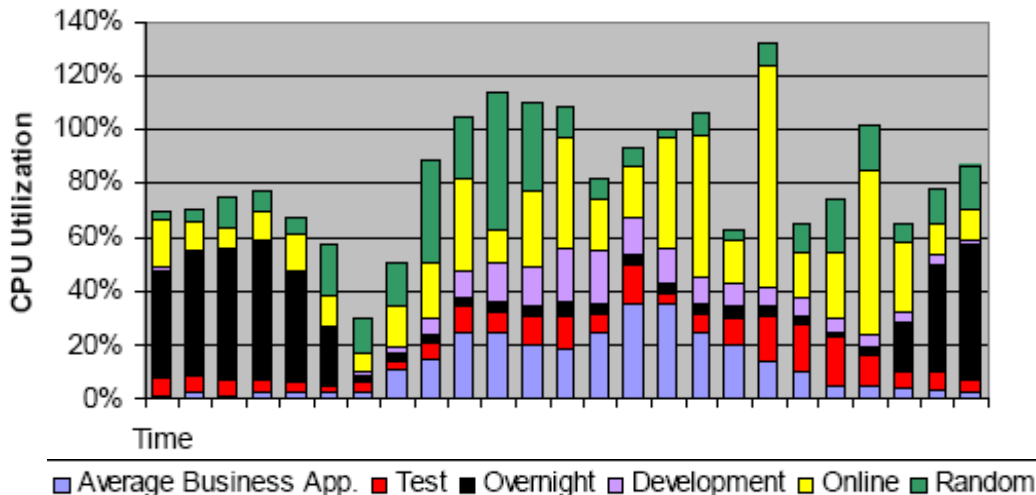
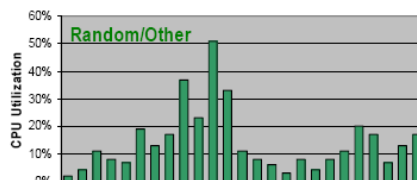
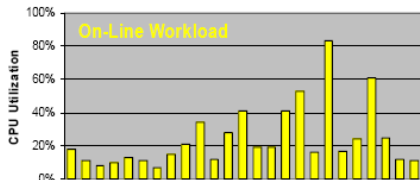
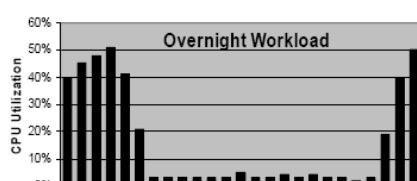
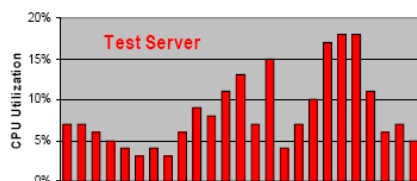
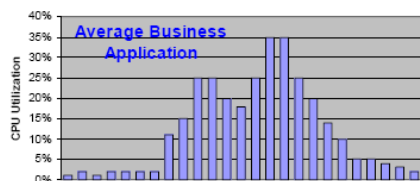
O/S Virtualization



- A single OS hosts multiple applications.
- The Virtualization layer handles resource allocation between applications
- The VZ layer also provides protection to the host OS so that a misbehaving application does not cause problems for the system as a whole
- Major Players: SWSOft, Sun/Containers



Workloads Consolidation using VZ



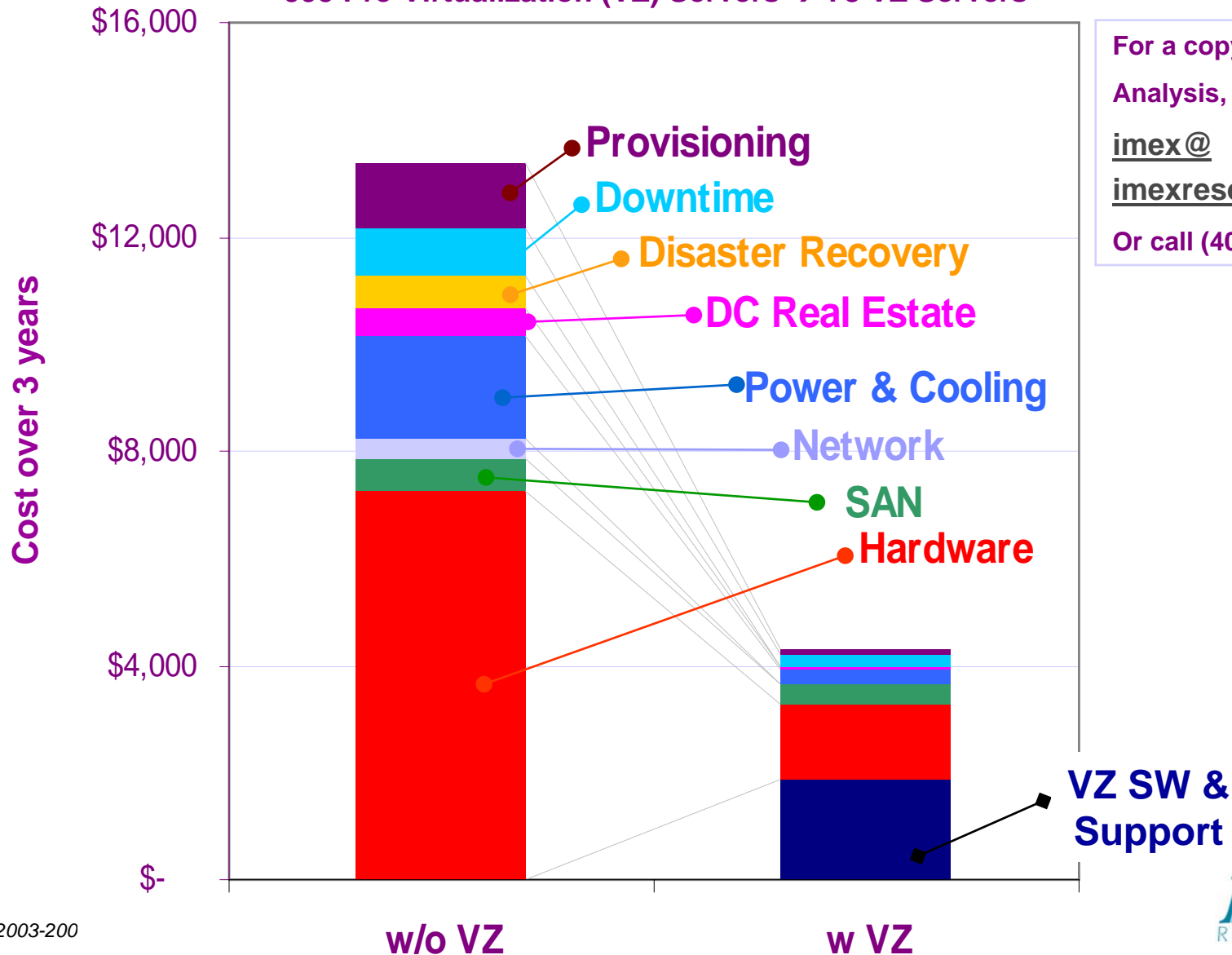
- A single server 1.5x larger than standard 2-way server will handle consolidated load of 6 servers.
- VZ manages the workloads + important apps get the compute resources they need automatically w/o operator intervention.
- Physical consolidation of 15-20:1 is easily possible
- Reasonable goal for VZ x86 servers – 40-50% utilization on large systems (>4way), rising as dual/quad core processors becomes available
- Savings result in Real Estate, Power & Cooling, High Availability, Hardware, Management



TCO Savings with Virtualization

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995 Pre-Virtualization (VZ) Servers → 78 VZ Servers



For a copy of TCO Analysis, Email: imex@imexresearch.com
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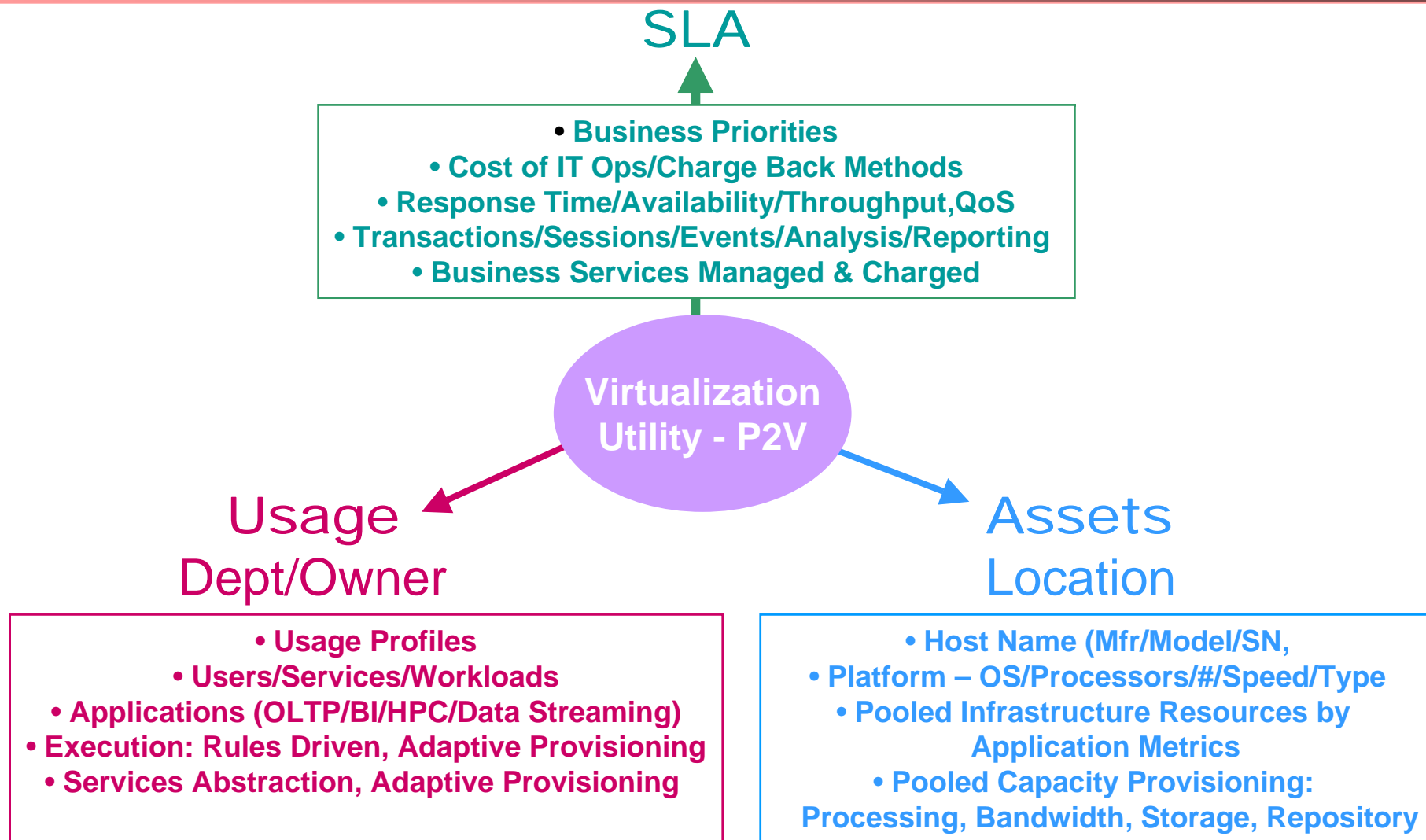
► Virtualization Players by Category

App VZ	OS	Processor	PC	Servers	Storage	Tools	
Appistry	Fedora	AMD	Altiris	Akimbi System	Cloverleaf	Acronis	Sun
Data Synapse	Novell	Intel	AppStream	AppStream	Compellent*	Altiris	Surgient
	OpenVZ		Ardence	Ardence	Datacore	BladeLogic	VizionCore
	Red Hat		Checkpoint	Egenera	EMC*	BMC SW	VMware
	Sun		Citrix	HP	FalconStor	CA	vThere
			Fujitsu	IBM	Fujitsu*	Cassatt	
			Fujitsu-Siemens	Microsoft	HDS*	Cirba	
			Hitachi	Parallels	HP*	Dunes	
			HP	Sun	IBM Tivoli	Ecora	
			IBM	SWsoft	IBM*	IBM	
			LeoStream	Virtual Iron	NetApp*	Microsoft	
			NEC	VMware	Netreon	Opsware	
			Parallels	Xen	SANRAD	Parallels	
			Platform		StorageAge	PHD	
			Microsoft		Sun/STK*	PlateSpin	
			Sun		Symantec	Platform	
			Wyse		Vicom	Scalent	

► **Summary - Virtualization**

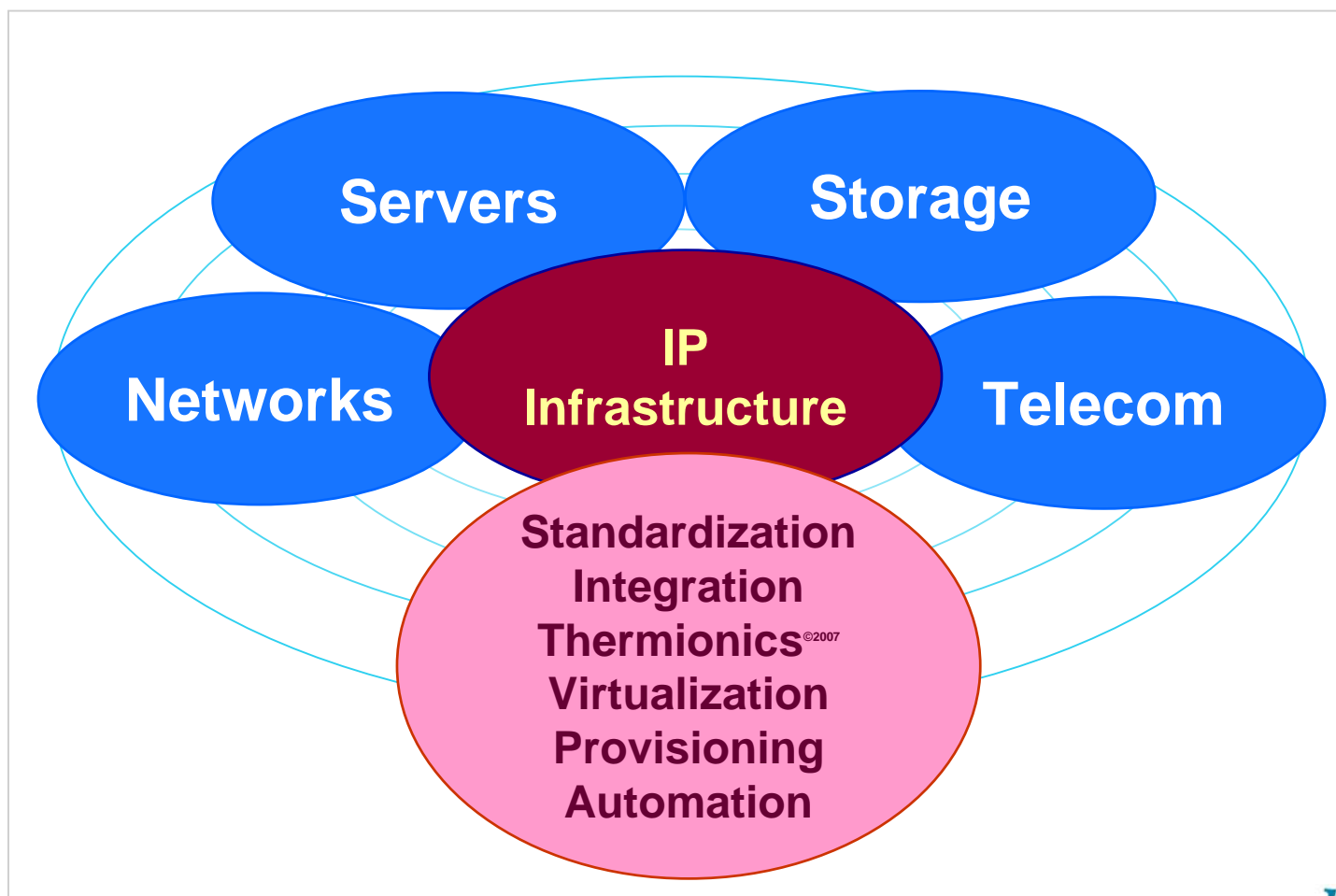
- **Server Virtualization (VZ) now a mainstream technology**
- **VZ is turning Data Center strategies & core infrastructure upside down**
- **DC Professionals very happy with its future use**
- **VZ means “Doing More for Less” (finally making CFOs get off your back)**
- **Issues to be Resolved**
 - VMs exploding – Managing them a nightmare: needs more tools
 - Database Performance (one reason HP bought Polyserve)
- **Follow SIVA® in executing your DC strategy**
 - **Standardize** (Windows/Linux, GbE, IP Storage/iSCSI,SATA..)
 - **Integrate** (Blades, Management Tools..)
 - **Virtualize** (Infrastructure-uP,Servers, Storage, Networks,Clients w P2V tools)
 - **Automate** (Provide important Apps required resources automatically w/o intervention to ↓OPEX costs)
- **Create VZ Justification: TCO Reduction of 60-70% over 3 years, ROI >58%**
- **Follow VZ in 3 phases**
 - ① Consolidation & Resource Sharing ② HA/BC/DR, WkLd Balancing ③ Automation
 - Consolidate through VZ and Workload Management,
 - Reduce # systems Footprints & OS instances (↓OS Lic Costs, ↓ Mgmt Admin Costs)
 - Create Workload Mgmt based on Business Policies (Mission Critical, & DB Wklds)

▶ Virtualizing your IT Infrastructure



► **Future: IP Everywhere Based Infrastructure**

Follow SIVA^{©2007} – Standardization, Integration, Virtualization & Autonomics
In your Next Generation Data Center



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