Next-Gen Data Center
Virtualization:
Studies in Implementation

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- **Markets Drivers / Industry Dynamics**
  - Mainframes to Blade Servers - Evolution in Tiered Computing
  - Segmenting Applications/IT Workloads – TC, HPC
  - Motivators, Inhibitors
  - Market Penetration
- **Virtualization Implementation**
  - Implementation At Various Levels – OS, Server, Network, Stg
  - Economics of Virtualization
- **Futures**
  - Next-Gen Data Center: Integration, Virtualization, Autonomics, Grids, Services

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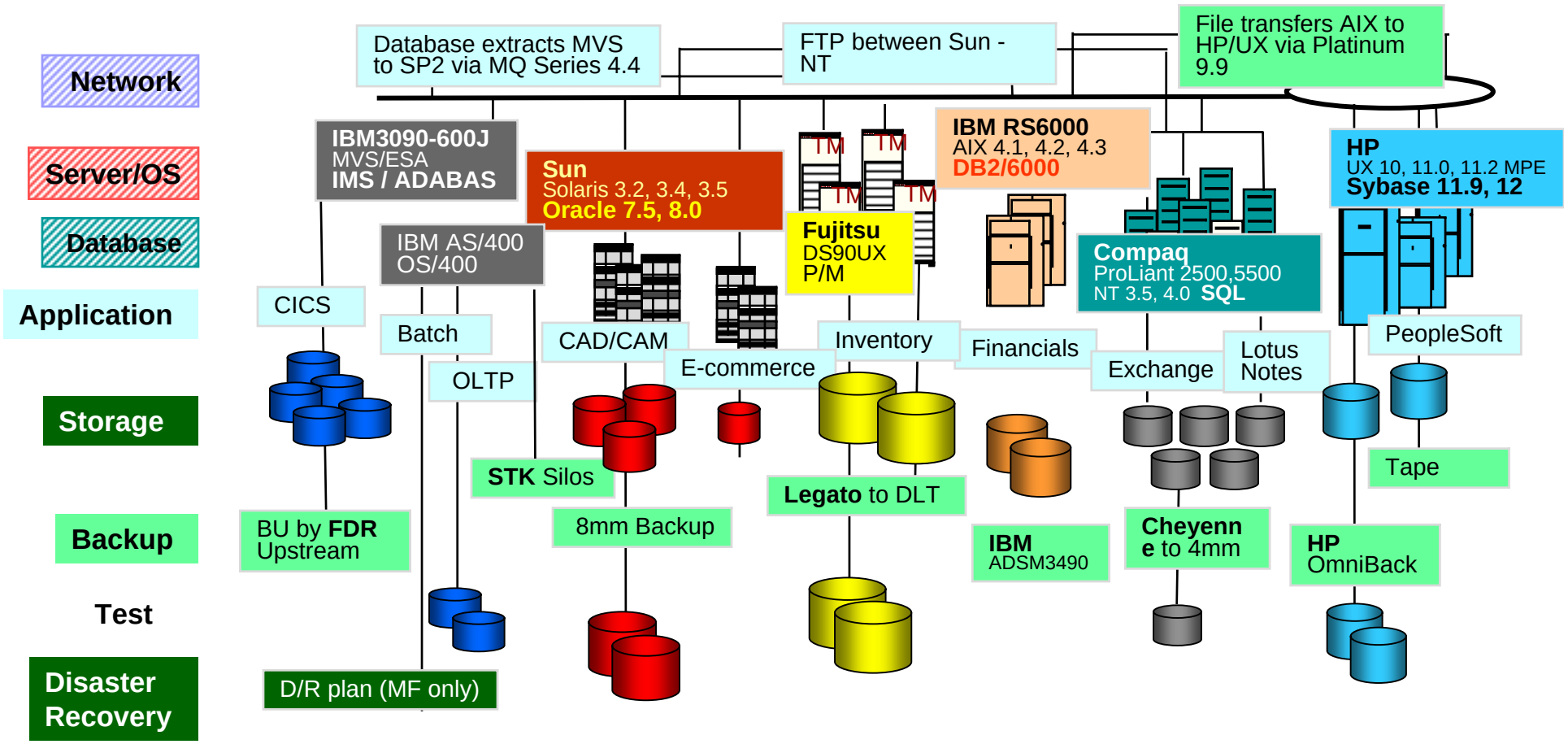
Chaos in the Enterprise . . .



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

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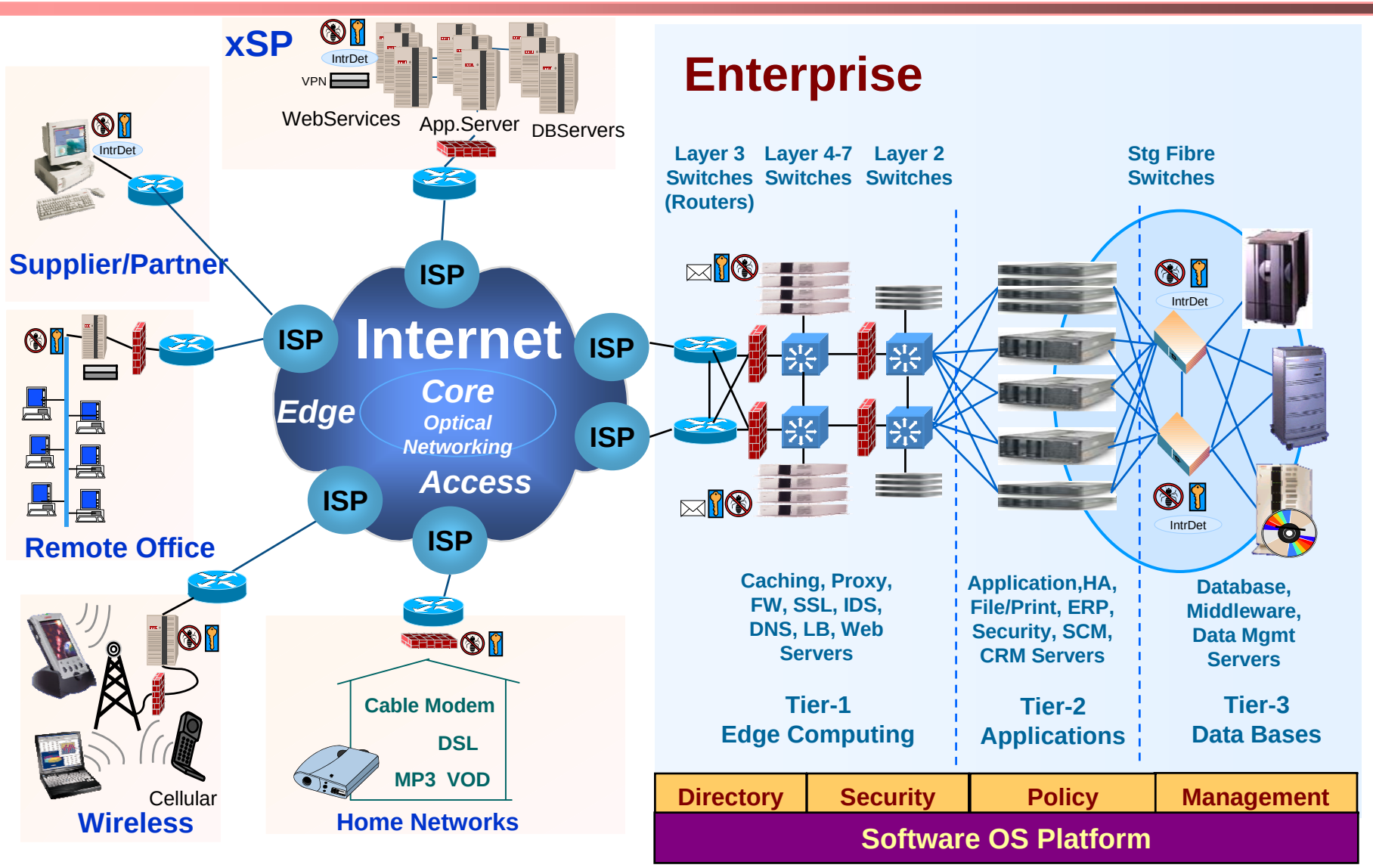
End to End IT Infrastructure *with HA & Security*



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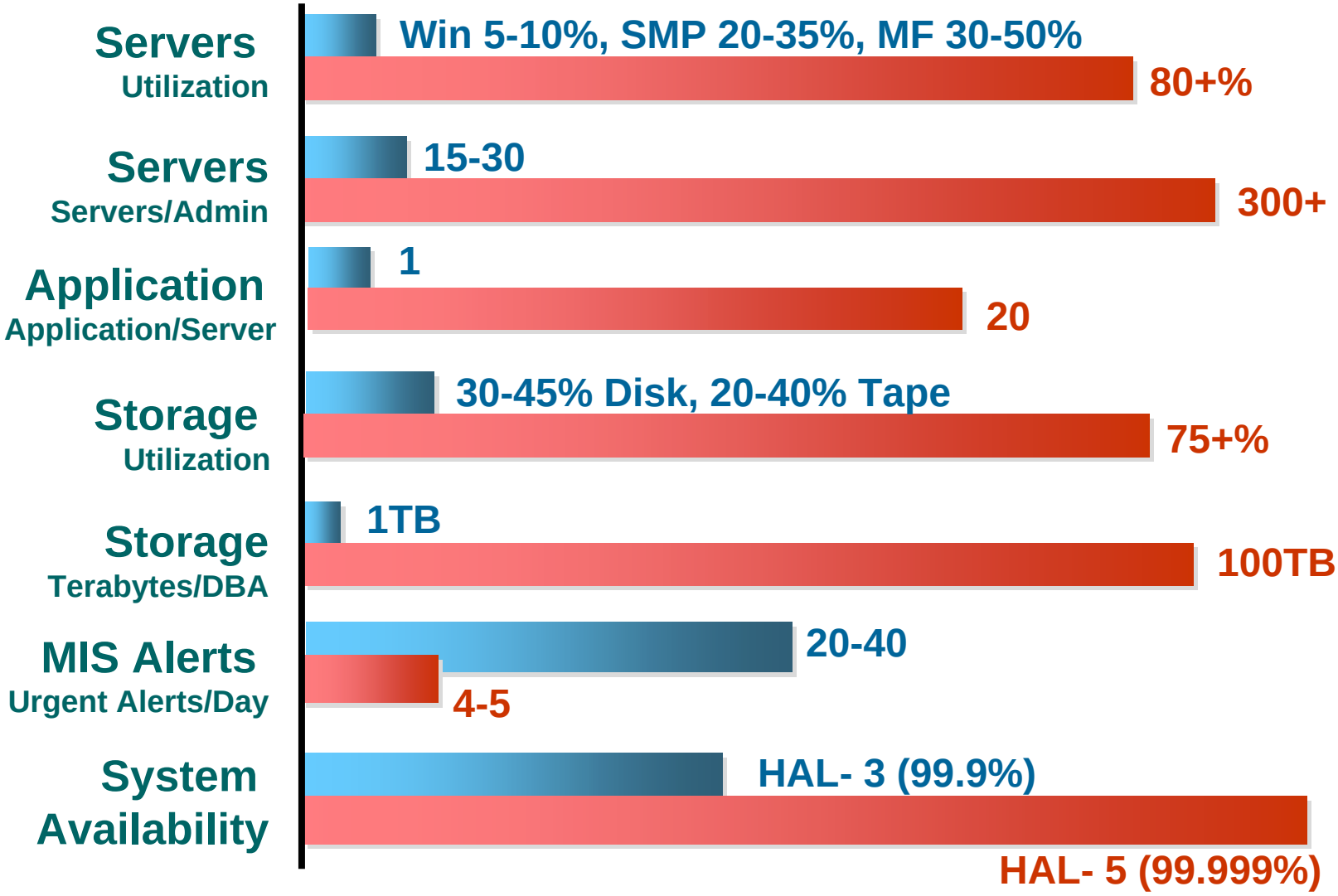
DC Mgmt Nightmares Driving Virtualization



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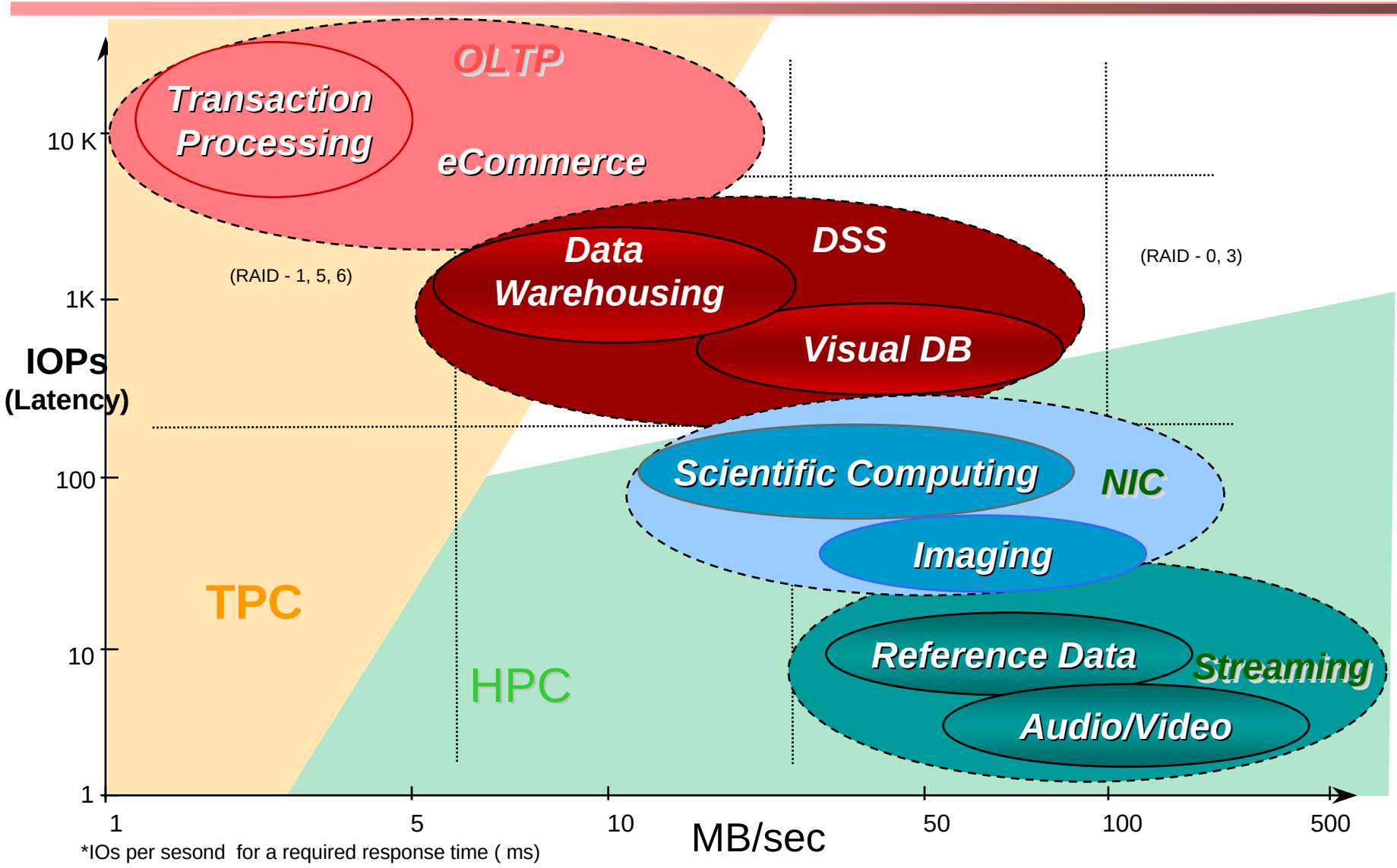
Market Segments by Applic./Workloads



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Genesis of VZ & Grid Computing

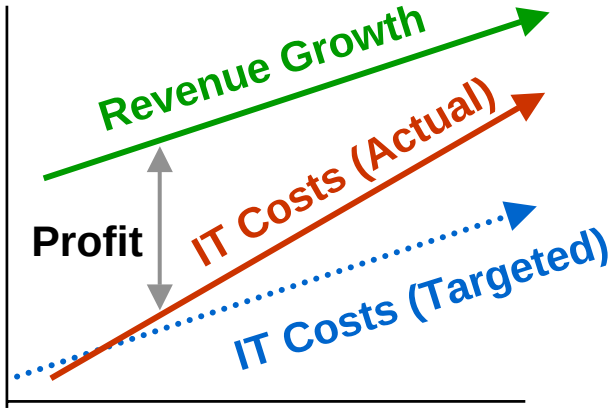
CFO vs. CIO - Shocking Observations

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

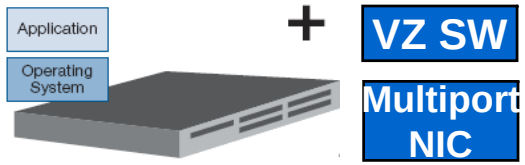
Reason – IT Spiral

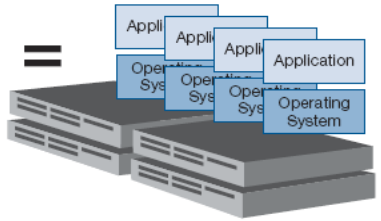
- Web Growth > New Apps Mushroom > Lo Cost Win Servers Sprawl (Tier-1)
- Business Growth > Need More Computing Power > App/DB Servers (Tier-2,3)
- More Servers > ↑Storage > ↑ DC Facilities > ↑IT Support > ↑ IT Staff
- More Low Cost Servers > 5% Utilization >Scale Out Infrast. (Racks & Blades)
- IT Costs ≠ Business Growth

Problem



Solution





1 Physical Server

4 Virtual Servers

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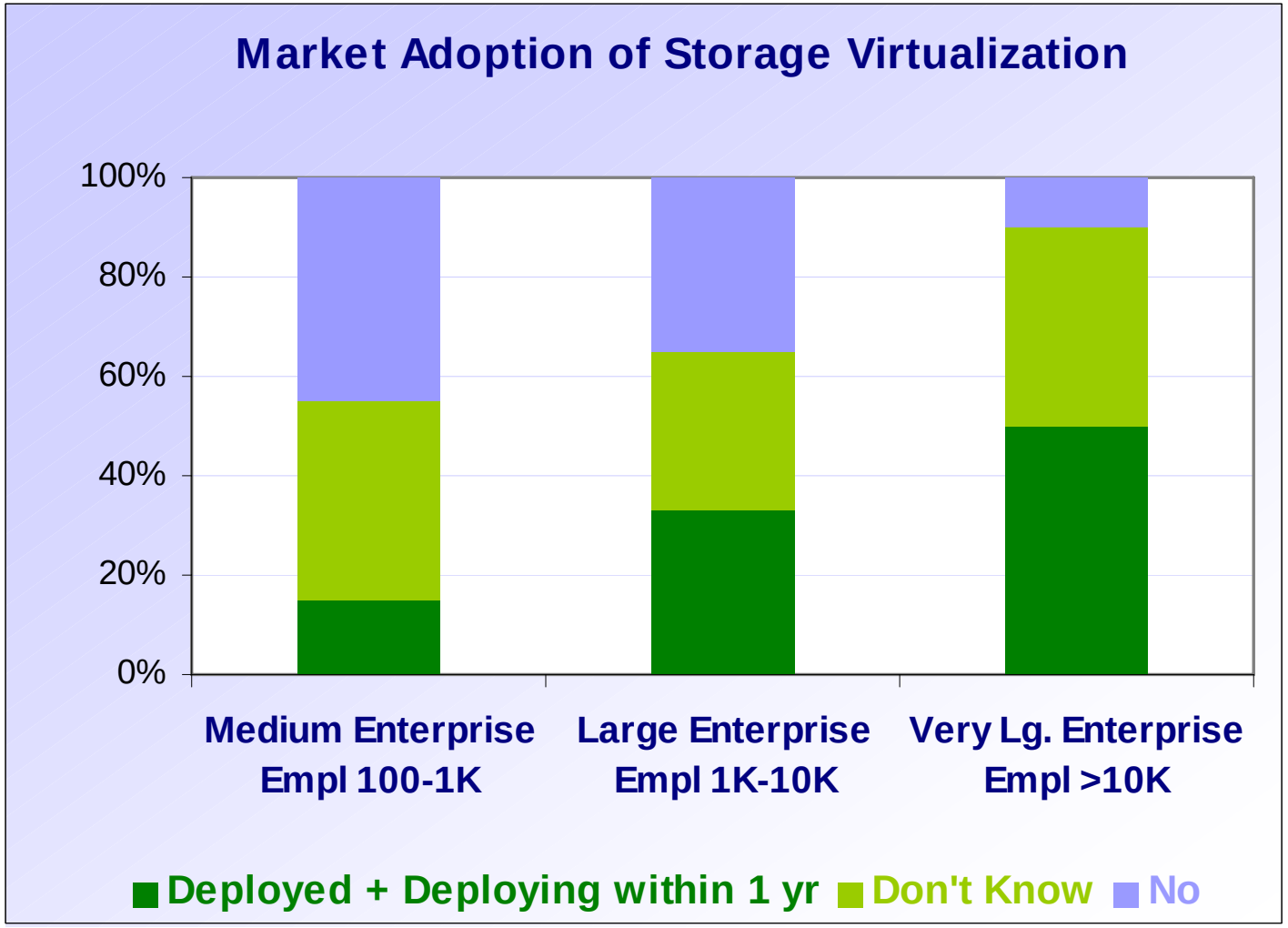
Market Adoption of Storage Virtualization



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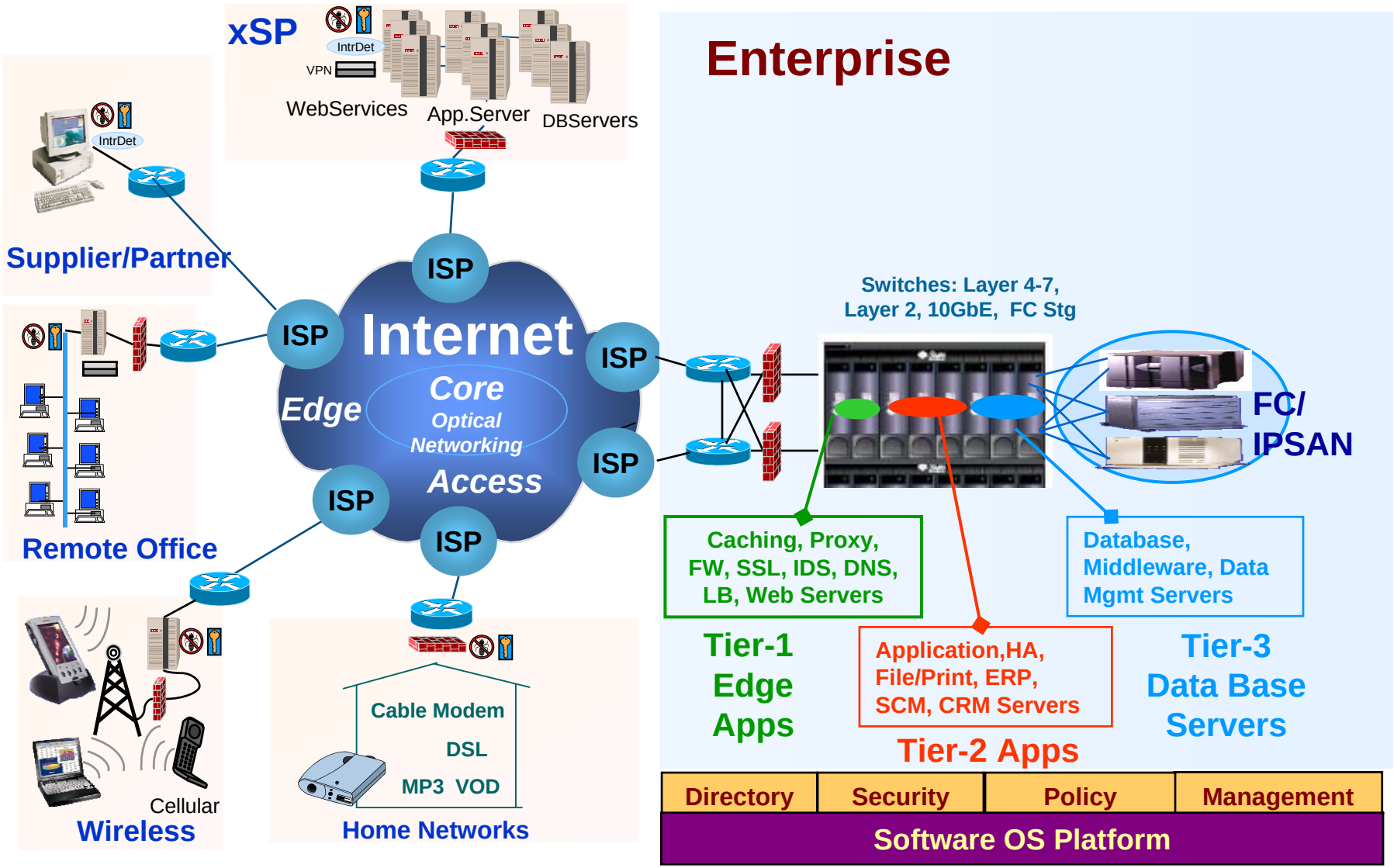
Consolidated Data Center



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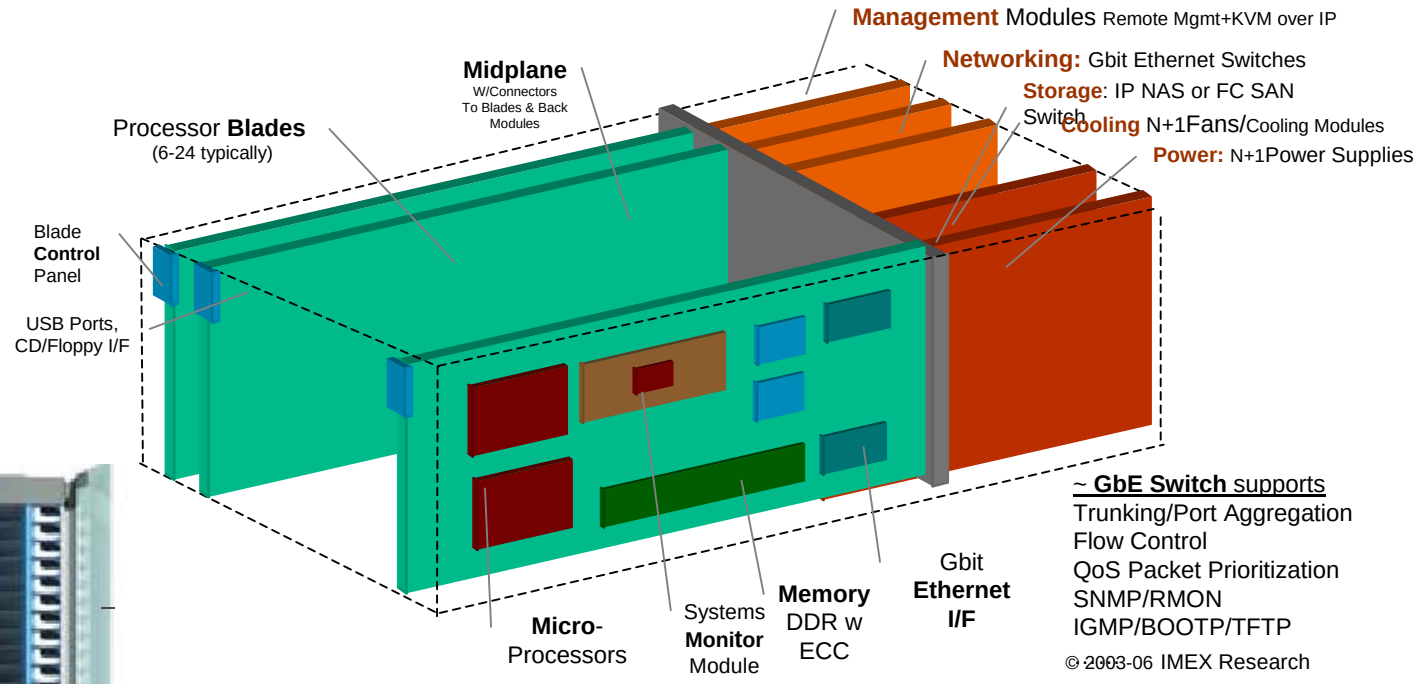
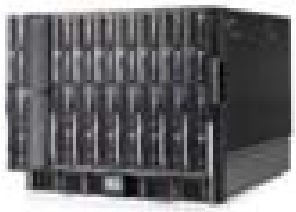
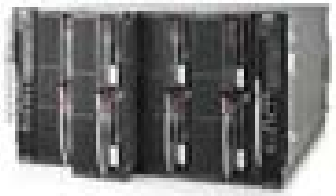
Blade Infrastructure:Local Area Grid (LAG©)



~ **GbE Switch** supports
Trunking/Port Aggregation
Flow Control
QoS Packet Prioritization
SNMP/RMON
IGMP/BOOTP/TFTP





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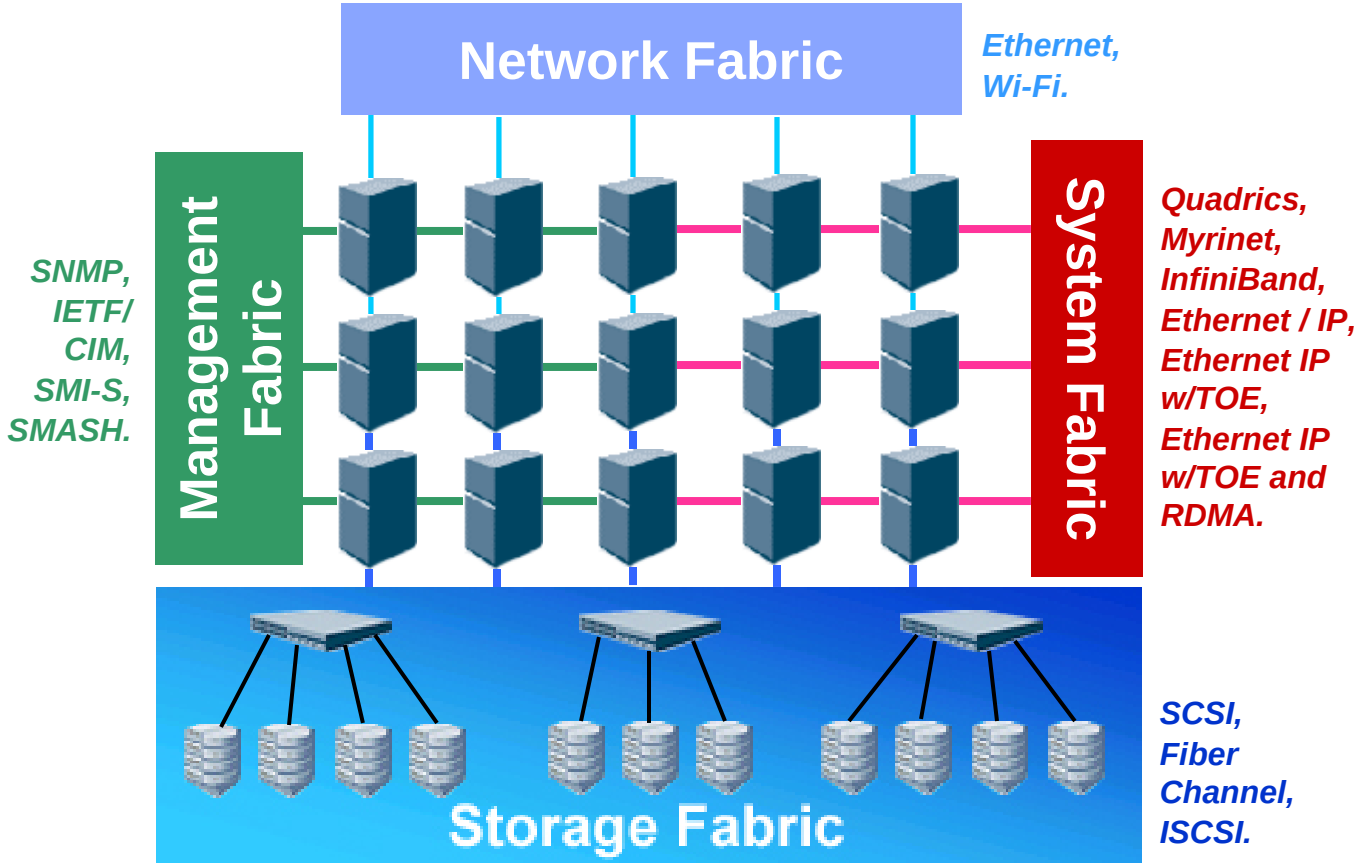
Fabric based Integrated Architecture



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The Next Gen Data Center

Automation

Automatically Maintains Application Service Level Objectives

Provisioning

Provisions the Resources Required to Deliver a Business Service

Virtualization

Pools Resources. Allocates, Monitors, and Meters the Usage of Pooled Resources

Integration

Integrates physical infrastructure using standardized devices for CAPSIMS:
Cost, Availability, Performance, Scalability, Inter-operability, manageability & Security

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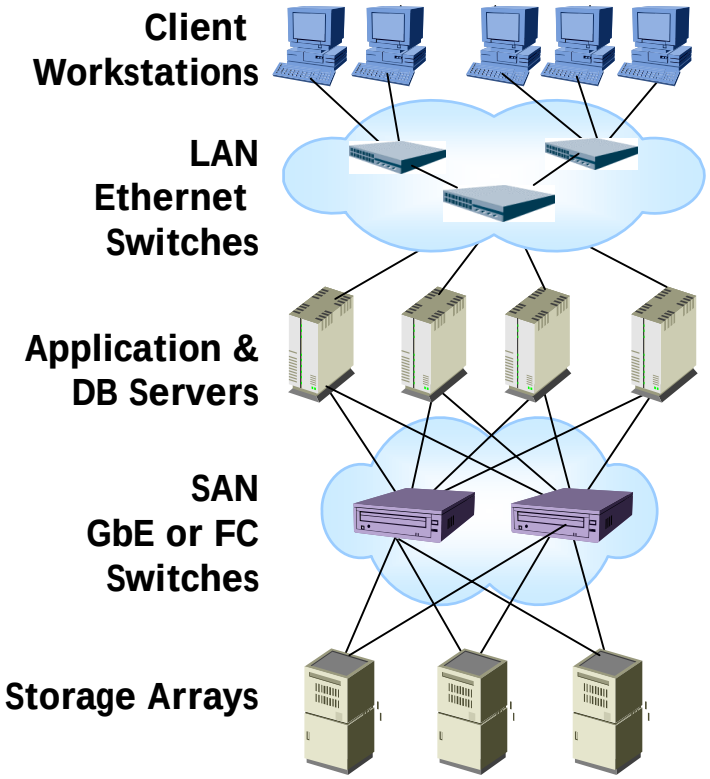
Implementing Virtualization



At Various Levels

Application

OS

File System

Microprocessor

- w VZ Extensions

Networking

- Multiport NICs

Storage

- Host, SAN, Controller

- In-Band, Out-of-Band Management

Tools

- Monitoring

- Management

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Virtualization Vendors

Virtualization Vendors by Category

App VZ	OS	Processor	PC	Servers	Storage	Tools
Appistry	Fedora	AMD	Altiris	Akimbi Syste	Cloverleaf	Acronis
Data Synapse	Novell	Intel	AppStream	AppStream	Compellent*	Altiris
	OpenVZ		Ardence	Ardence	Datacore	BladeLogic
	Red Hat		Checkpoint	Egenera	EMC*	BMC SW
	Sun		Citrix	HP	FalconStor	CA
			Fujitsu	IBM	Fujitsu*	Cassatt
			Fujitsu-Sieme	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
						Sun
						Surgient
						VizionCore
						VMware
						vThere

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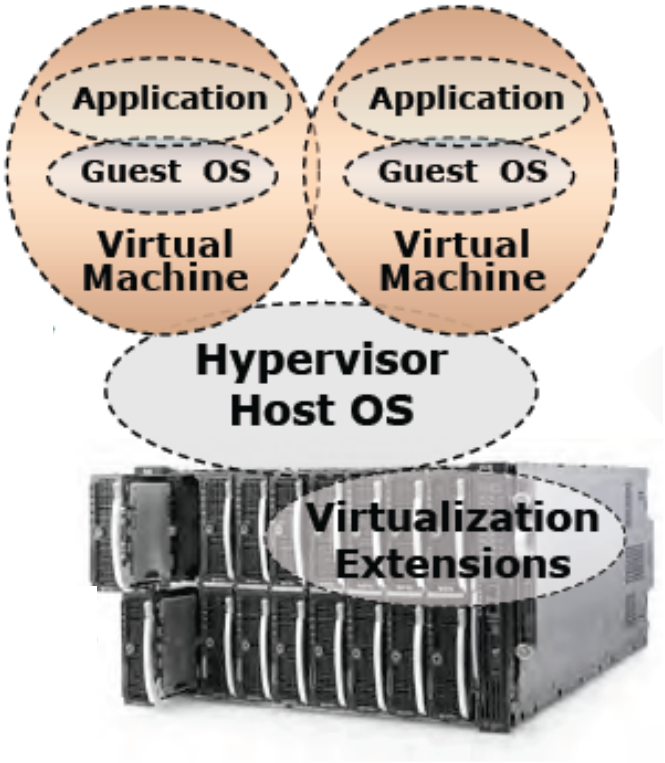
Implementing Virtualization



VZ Extensions at Processor

- Guest OS's run unmodified for a larger base of virtualization software
- Increased isolation to improve security of virtual machines
- Offers architectural enhancements to improve efficiency of switching between hypervisor and the guest OS's
- Implemented primarily in I/O bridges and other system core logic
- Enables virtualization software to map devices directly to virtual machines

Source: AMD

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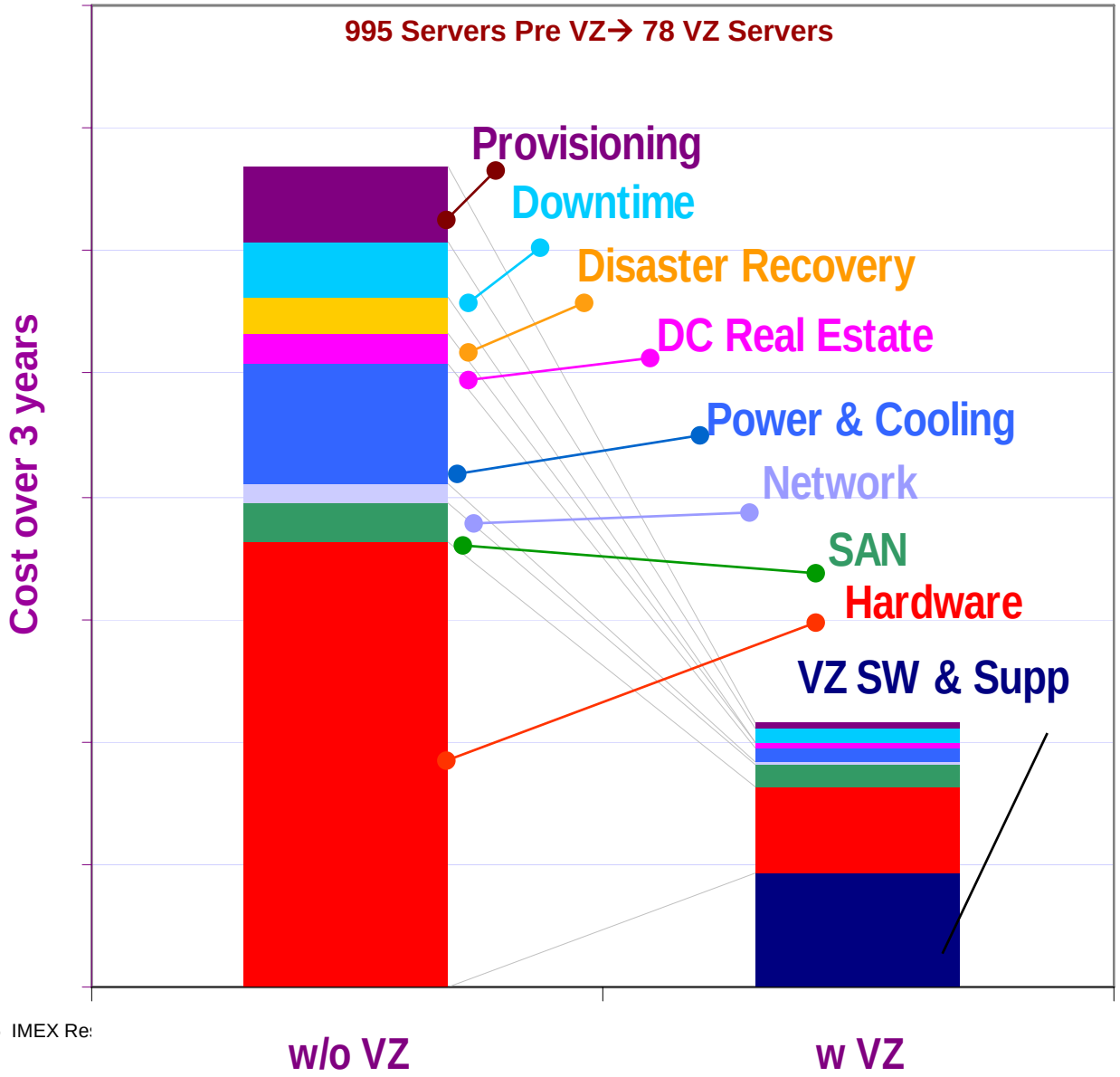
TCO Savings with Virtualization



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