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# The Marketplace

*IBM Mainframe vs the Wannabees*

*Positioning System z vs UNIX and Windows*

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*UK Technically Speaking - May 2007*

## Agenda

### Today's Mainframe and the new value proposition

#### Mainframe Momentum - what's new?

#### Platform Positioning - key components –

- Virtualisation
- Availability and Security
- Workload and Systems Management
- Controlling IT costs

### Closing Thoughts





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# MAINFRAME MOMENTUM

## Strategic Investment for System z

### System z9 and z/OS

- \$1.2 billion
- 5,000 tech professionals

### \$40M on Applications

- Joint Initiatives with SAP and Oracle

### \$100M for Platform Simplification



## 2006 Major Milestones

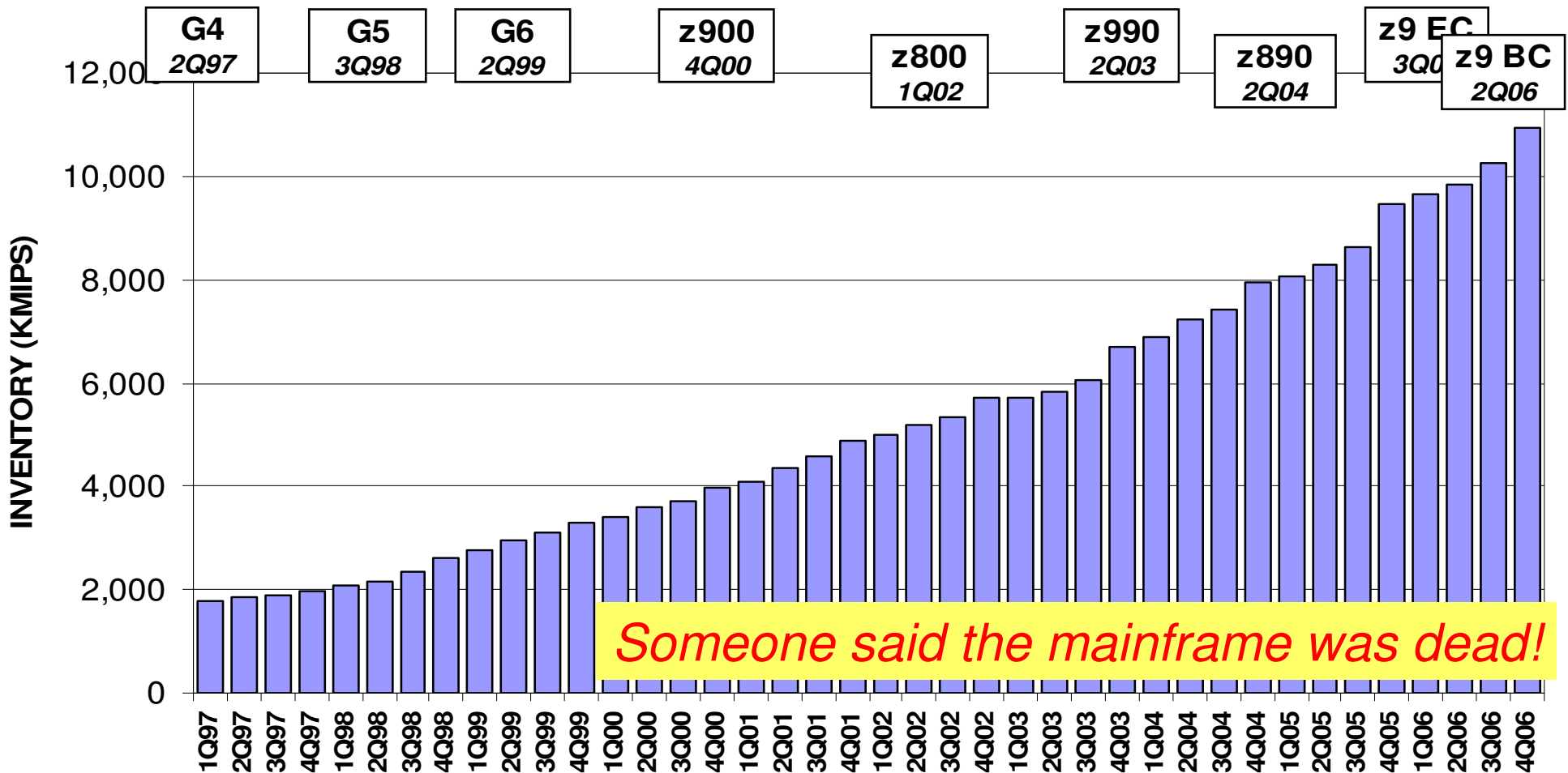
- ❑ **4Q06 largest hardware revenue quarter since 4Q98**
- ❑ **Passed 10 million MIPS installed in 3Q06**
- ❑ **Used by top 25 banks in the world and many other enterprises**
- ❑ **Record year for take-up of specialty engines - new Workloads moving to System z**
- ❑ **New customers to the platform**



Source: IBM Finance, 1Q07 & CSI Finance '06



# IBM Mainframe Growth – last ten years



*Someone said the mainframe was dead!*

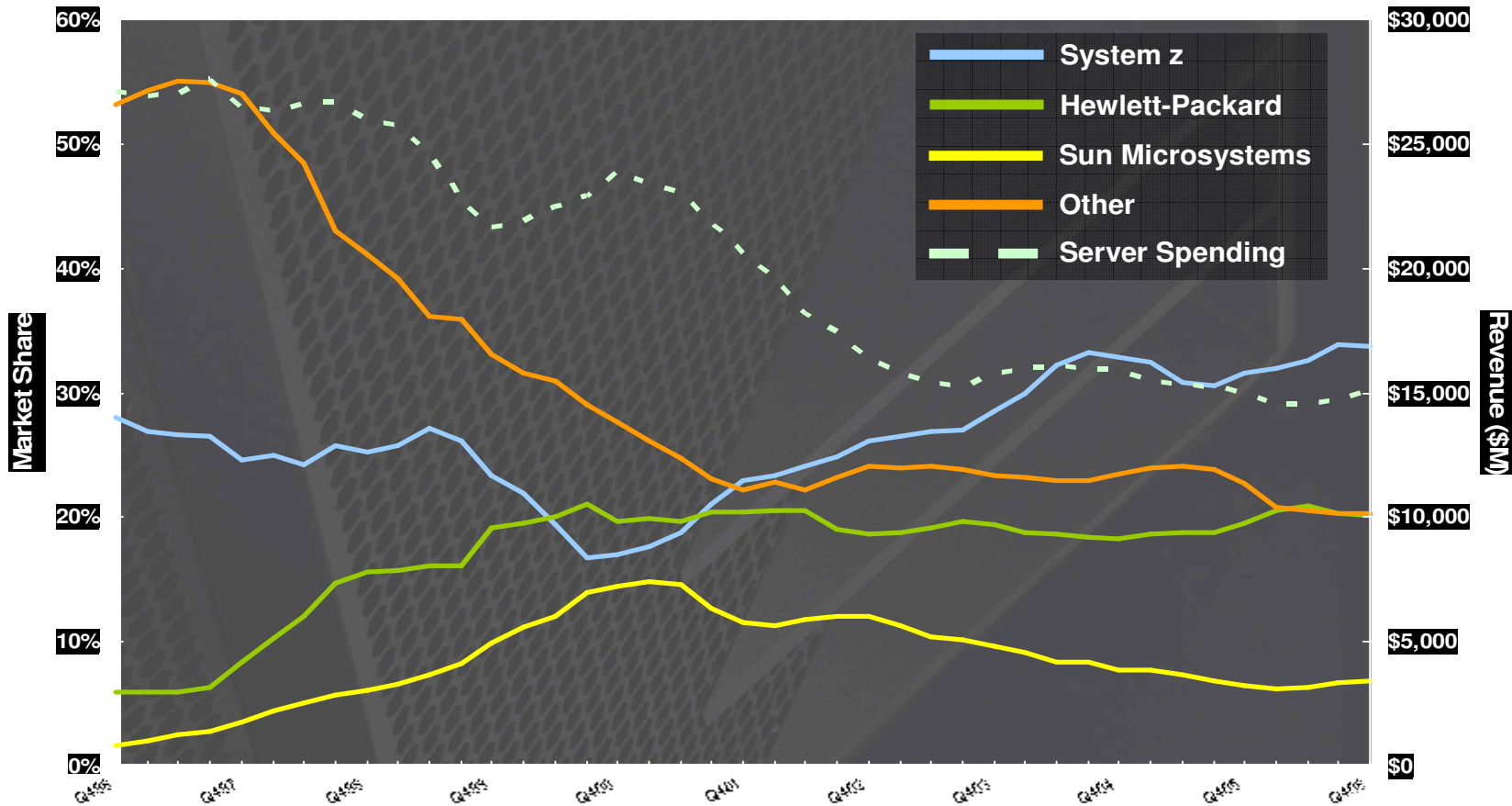
CAGR 1997-2006 = 21%

Source: IBM STG Finance



*“the mainframe gained 16% market share since 2001”*

# \$250K Server Segment by Key Vendor (1)



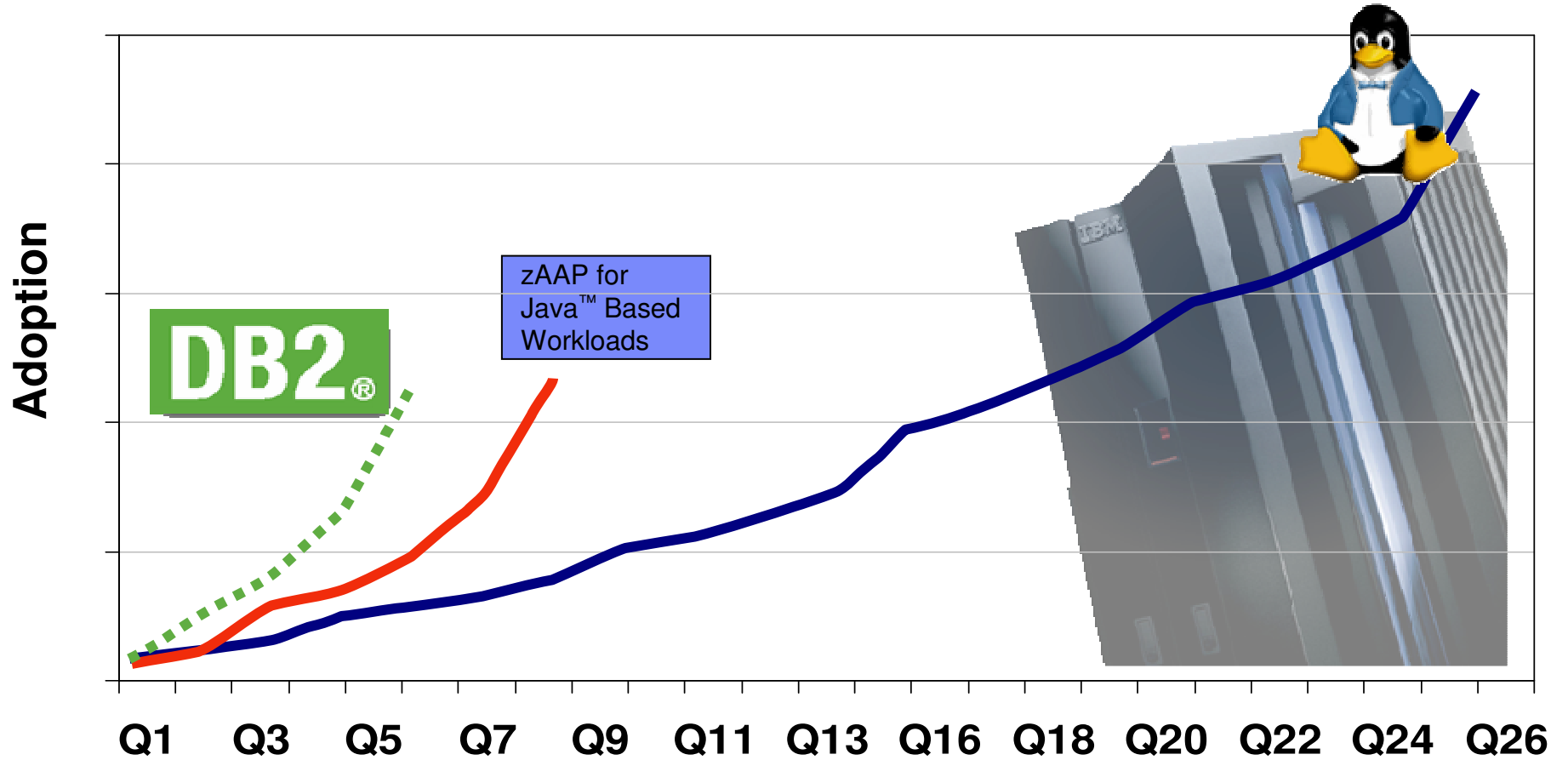
(1) Source: IDC 4Q06 Server Tracker

## New Customers, New Markets, New Wins





# System z - Dynamic Growth in New Workloads



Source: IBM internal data

## The Mainframe Charter – Providing a Strategic Framework

IBM is committed to delivering innovative solutions to meet our customers' on demand business requirements. **It is our intention to continue to:**

### Innovation



- Provide leadership in innovation to enhance the use of IBM eServer zSeries to support increasingly integrated and flexible business processes for the on demand business.
- Maintain zSeries' position as a benchmark for flexible, efficient, and responsive platforms for highly complex, integrated environments running a wide range of mission-critical workloads.
- Improve the autonomic and self-managing capabilities of the zSeries while working to simplify user processes and system administration tasks.

### Value



- Enhance the value proposition and lower the cost of computing of zSeries solutions in a way that is compelling, clear, and consistent.
- Extend the on demand characteristics of zSeries servers, highlighting its strengths as an environment for usage-based computing.
- Increase the ability to account for allocation and use of zSeries resources in an on-demand environment.

### Community



- Support programs designed to foster vitality in the zSeries community, helping to promote a strong application portfolio and world-class support services.
- Provide the skills and expertise to assist customers in designing, developing, and deploying on demand solutions built on a foundation whose cornerstone is zSeries.
- Leverage key open standards and common structures to enhance the use of zSeries in large, heterogeneous environments.

***These principles help guide IBM's investment priorities in System z systems today and far into the future, and demonstrate IBM's commitment to provide value to its System z customers.***

## Mainframe Ecosystem



### Partners

- 1,350 ISVs
- 1,500 mainframe partners



### IBM Academic Initiative for System z

- >300 colleges and universities
- >23,000 students educated already



### Customer councils

Mainframe blog: <http://mainframe.typepad.com>

## Butler Group Predicts IBM Mainframe Growth

IBM today announced that independent IT research and advisory organization, The Butler Group, believes mainframe adoption will continue to grow in existing markets as well as emerging markets including China, India and South America due to continued advancements in Service Oriented Architecture (SOA) and virtualization technologies on the platform.

**Butler Group's "The King is Dead - Long Live the Mainframe" article** specifically points to WebSphere Application Servers on System z as enhancing the ability to utilize SOA and Linux on the mainframe in providing virtualization tools for a single computing platform. Additionally, the report cites the mainframe's "green" capabilities, describing the power-saving features and small footprint (27-square feet) as, "desirable for large customers in the financial and government sectors."

Other key differentiators of the System z identified by the Butler Group include:

- One z9 mainframe can support many Virtual Machines (VMs), allowing for quick and simple implementation of new VMs;
- The mainframe requires fewer people to manage than equivalent systems. Labor costs can amount to 80% of the total cost of running a data center, so this is an area where mainframes can save money;
- The System z mainframes are certified to EAL5 security standards;
- The z9 mainframes can handle up to 6,000 Secure Sockets Layer (SSL) handshakes per second due to Crypto-Express2 PCI-X adapters. This helps enable secure on-line transactions.

Source: <http://www.huliq.com/8195/butler-group-predicts-ibm-mainframe-growth> 27<sup>th</sup> January 2007



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# PLATFORM POSITIONING

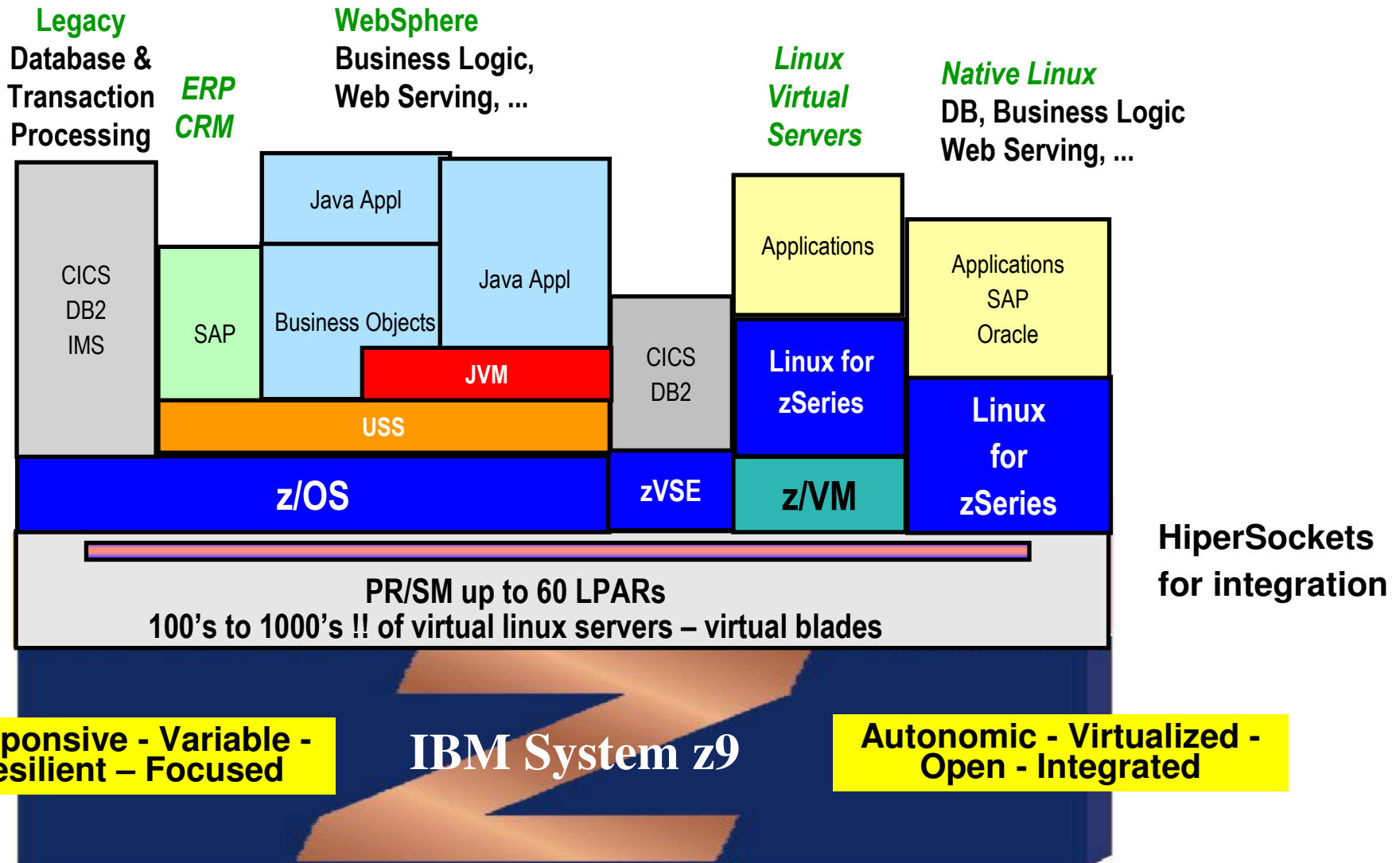
## If you were starting again . . .

*What do you require in an on-demand, 24x7, always-on world?*

- **Nearly unlimited scalability**
  - Physical / Virtual
- **Integration across heterogeneous servers with advanced middleware**
- **Economies of scale**
  - Low cost of ownership for current workloads and future growth
  - Ability to run multiple mixed workloads on fewer servers in a highly automated environment
- **High levels of automation**
- **Business continuity**
  - Comprehensive security
  - Continuous availability



# IBM System z9 Virtualization – enables integration and consolidation beyond a single footprint, when using clustering – one single resource space







# Gartner's platform positioning - 1Q07

UNWEIGHTED																	Gartner		
RELEASE 3																			
	FORM FACTOR	Operating System used in final score	PLATFORM & RELATED TOOLS	PLATFORM SERVICES	OS & TOOLS	OS & TOOLS	OS & TOOLS	OS & TOOLS		OS SERVICES	OS SERVICES	OS SERVICES	OS SERVICES	OS SERVICES BEST RESULT	CORPORATE SALES & MARKETING	LOCAL GO-TO-MARKET	AVERAGE SCORE	RANK	
Top Ten UNWEIGHTED by average score																			
1	IBM SYSTEM z9	F	ZOS	7	10	0	5	0	9	9	0	6	0	7	7	8	7	8.1	1
2	HP INTEGRITY	F	HP-UX	7	8	5	5	8	6	8	6	6	7	6	7	8	7	7.6	2
3	IBM SYSTEM p5	R	AIX	7	7	0	4	8	0	8	0	6	7	0	7	8	7	7.5	3
4	IBM SYSTEM i5	F	i5OS	7	8	0	4	0	8	8	0	6	0	7	7	8	7	7.5	4
5	HP INTEGRITY NonStop	R	NSK	7	8	0	0	0	7	7	0	0	0	6	6	8	7	7.3	5
6	NCR TERADATA	F	MP/RAS	8	7	6	6	7	0	7	6	7	7	0	7	8	7	7.2	6
7	SUN FIRE ULTRASPARC	F	SOLARIS	6	7	0	0	8	0	8	0	0	7	0	7	8	7	7.1	7
8	HP BLADESYSTEM	B	WINDOWS	8	6	6	6	6	0	6	7	7	6	0	7	8	7	7.1	8
9	HP PROLIANT	R	WINDOWS	8	5	6	6	0	0	6	7	7	0	0	7	8	7	7.1	9
10	UNISYS CLEARPATH	F	OS2200 & MCP	5	8	0	0	0	8	8	0	0	0	7	7	7	6	7.0	10

Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07



# Gartner's platform positioning 1q07

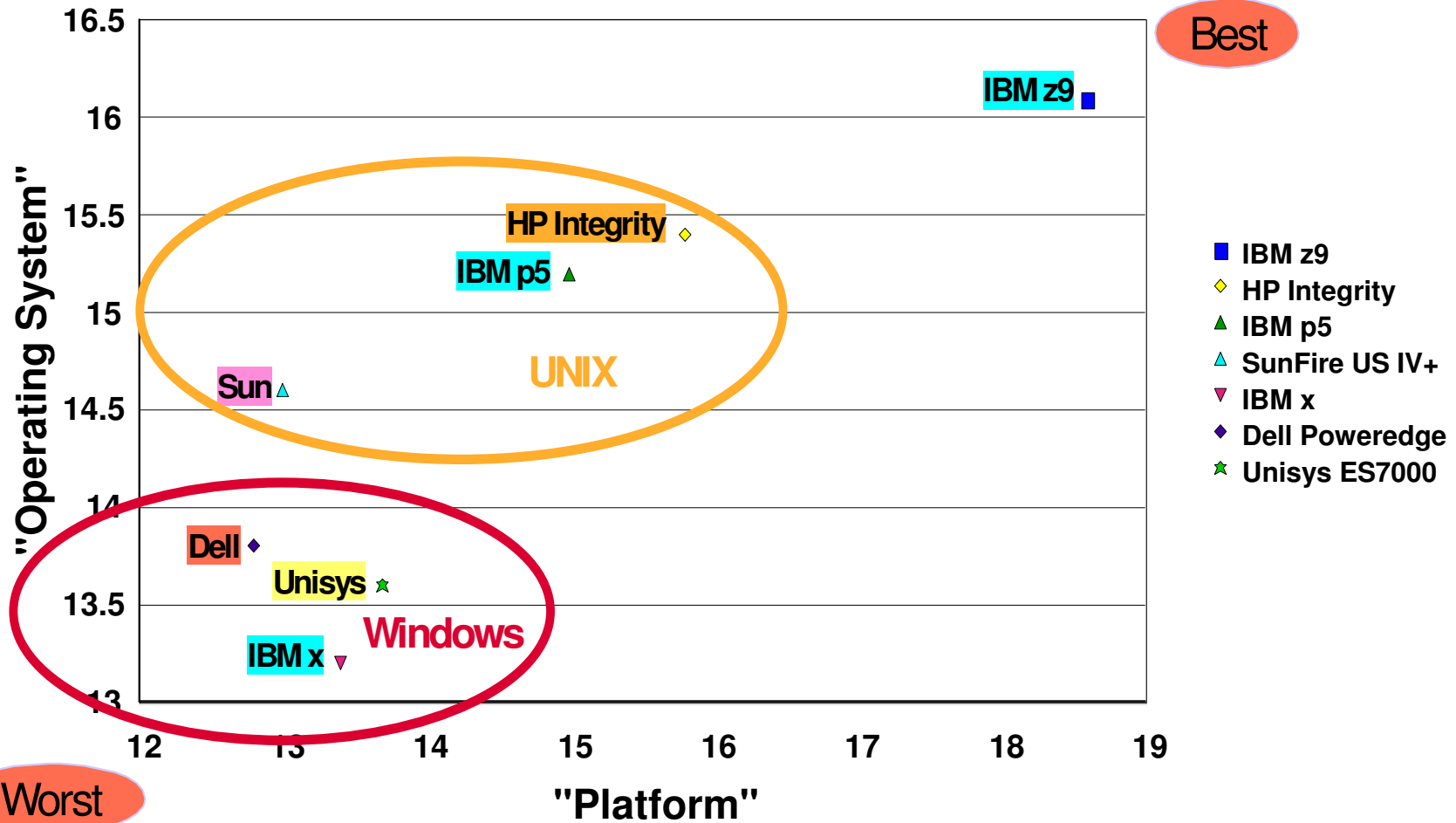
	CPU ARCHITECTURE	SYSTEM TYPE	OPERATING SYSTEM	FORM FACTOR	PLATFORM TOTAL	OS TOTAL
IBM SYSTEM z9	IBM CMOS	Mainframe	z/OS	F	18.6	16.1
HP INTEGRITY NonStop	ITANIUM	Mainframe	NSK	R	16.2	13.0
HP INTEGRITY	ITANIUM	UNIX	HP-UX	F	15.8	15.4
UNISYS CLEARPATH	UNISYS CMOS	Mainframe	OS2200	F	15.1	15.4
IBM SYSTEM p5	POWER5+	UNIX	AIX	F	15.0	15.2
IBM SYSTEM i5	POWER5+	Mainframe	i5/OS	F	14.3	15.2
UNISYS ES7000	XEON	Windows	Windows	R	13.7	13.6
SUN FIRE T2000	SPARC T1	UNIX	Solaris	R	13.5	13.0
IBM SYSTEM x	XEON	Windows	Windows	R	13.4	13.2
HP PROLIANT	XEON	Windows	Windows	R	13.4	13.5
SUN FIRE ULTRASPARC	SPARC IV+	UNIX	Solaris	F	13.0	14.6
SUN FIRE x86	OPTERON	UNIX	Solaris	R	12.9	12.9
DELL POWEREDGE	XEON	Windows	Windows	R	12.8	12.8
FUJITSU BS2000	FSC CMOS	Mainframe	BS2000	F	12.8	12.4
FUJITSU PRIMEPOWER	SPARC64	UNIX	Solaris	F	12.1	14.2
BULL GCOS	ITANIUM	Mainframe	GCOS	F	12.0	13.4
HP 9000	PA-RISC	UNIX	HP-UX	F	9.3	13.3

PLATFORM & TOOLS	PLATFORM ENERGY EFFICIENCY	SMP/MPP SCALABILITY	SINGLE SYSTEM AVAILABILITY	OVERALL ARCHITECTURAL VIABILITY	VIABILITY OF CURRENT GENERATION				
PLATFORM SERVICES	PLANNED DOWNTIME	DISASTER TOLERANCE & RECOVERY	HARDWARE PROTECTION AND SECURITY	HARDWARE/ELECTRICAL ISOLATION	VIRTUAL MACHINES (HYPERVISORS/)	MIXED WORKLOAD/ OS HOSTING	MIXED WORKLOAD/OS MANAGEMENT	SERVER MANAGEMENT TOOLS	
OS & TOOLS	FAILOVER CLUSTERING	WORKLOAD MANAGEMENT	CAPACITY ON DEMAND	OS MANAGEABILITY	OS VERTICAL SCALING	SOFTWARE PORTFOLIO	THIRD PARTY TOOLS SUPPORT		
OS SERVICES	INSTALLATION SERVICES	HELPDESK & ESCALATION	REMOTE MANAGEMENT	OS DISTRIBUTION	OS/HW COMBINED TRACK RECORD	EDUCATION SERVICES	ENGINEERING (LEVEL 3) SERVICES	OS MIGRATION SERVICES	HIGH AVAILABILITY SERVICES

Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07

# Gartner's platform positioning 1Q07

## Platform positioning - Selected Platforms



Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07

## Today's mainframe

*Designed for data serving and SOA*

- **Built upon a strong foundation:**
  - Security-rich, resilient, and virtualized capabilities
  - 40 years of data serving heritage
  
- **Broad set of open and industry standards**
  
- **Designed to deliver:**
  - Great value from mainframe assets
  - Low marginal cost of growth
  - New capabilities fast
  - Great flexibility to meet new business opportunities



**A hub for data and SOA -  
massive scalability  
centralized management**



***If data is the life blood of the business . . .***

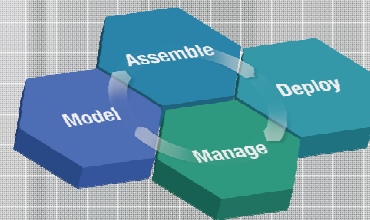
***. . . then your data server is the heart of your SOA***

## SOA, WAS z/OS, & the Mainframe

Recent data indicates that 41% of mainframe customers are building or deploying new applications on System z - up from 31% a year ago.

WebSphere is the key to unlocking & reusing many core assets and extending their value, and the mainframe is at the heart of many SOA customers.

### WebSphere Application Server for z/OS



**CICS, IMS, & DB2**

- Commitment to open standards
  - J2EE
  - JMS support
  - XML support
  - Advanced Web services
- Commitment to SOA
  - SCA & futures
- WebSphere security
- WebSphere high availability
- Engine for WebSphere expansion products on z/OS

- Platform integration
  - z/OS WLM
  - Automatic Restart Mgr
  - Parallel Sysplex
  - Security (RACF)
- Asset integration
  - Local DB2 connections
  - IMS & CICS integration



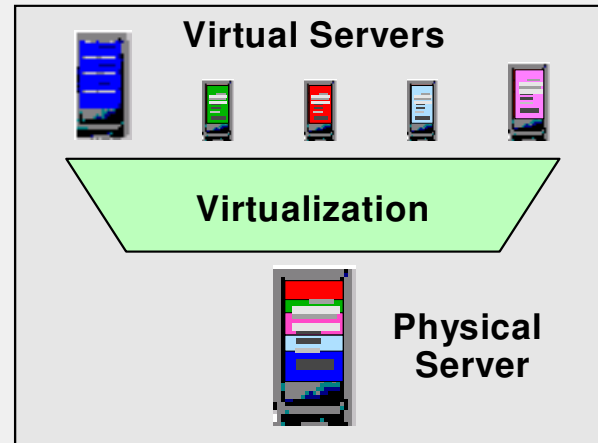
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# VIRTUALISATION

## Server Virtualization Business Value

### 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:**

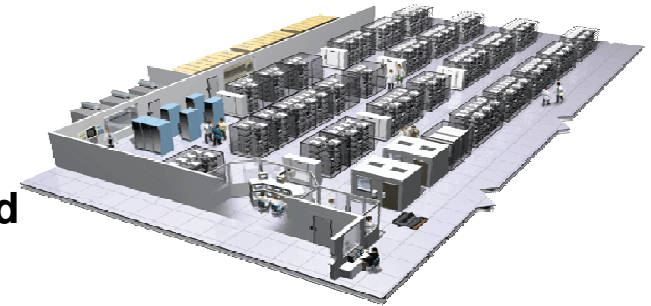
- **Reduced hardware and software costs**
  - Higher physical resource utilization
  - Less capacity needed for same or better QoS
- **Reduced systems management costs**
  - Fewer physical servers to manage
  - Many common management tasks become easier
- **Improved flexibility and responsiveness**
  - Virtual resources can be adjusted dynamically to meet new or changing needs and to optimize service level achievement
  - Virtualization is a key enabler of on demand operating environments



# The Advantages of System z Virtualization

## Replace many physical servers with virtual ones

- Resources are shared for better utilization
- Server resources are allocated dynamically, based on demand
- Additional capacity is available to handle unpredictable fluctuations as well as planned increases

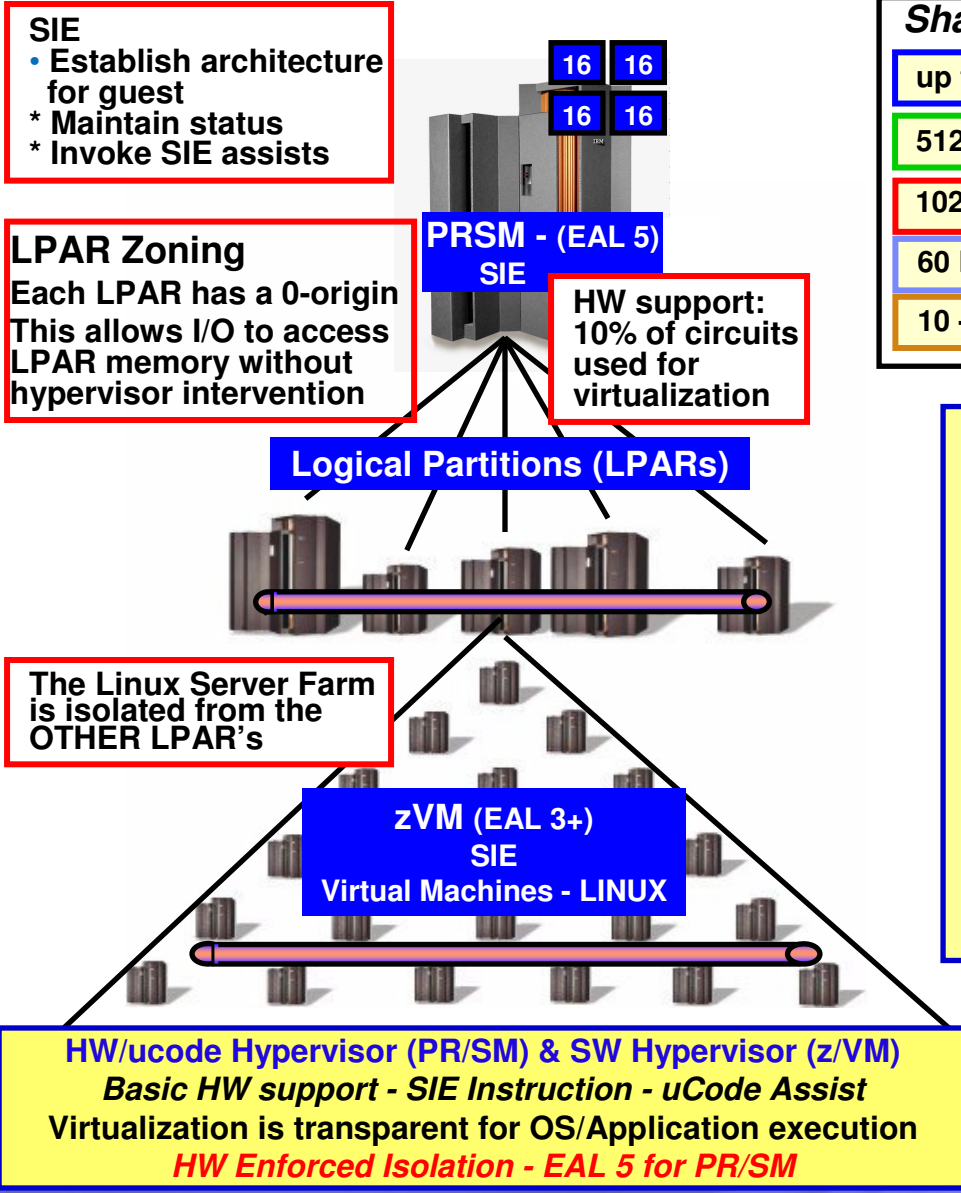


## Benefit from the capabilities enabled by virtualization...

- *Cost savings* – reduced capital outlay and management expenses
- *Consolidation* – fewer servers doing more work
- *Greater utilization* – ability to handle increased workloads and multiple applications on a single machine
- *Standardization* – ability to apply standard management tools across a diverse work environment
- *Automation* – replacement of manual business processes and controls for infrastructure management
- *Integration* – increased collaboration across the enterprise for greater operating efficiencies and economies of scale



# System z virtualization - multiple dimensions - *not an "add-on", but a "built-in"*



**SIE**

- Establish architecture for guest
- \* Maintain status
- \* Invoke SIE assists

**LPAR Zoning**

Each LPAR has a 0-origin  
This allows I/O to access LPAR memory without hypervisor intervention

**HW support:**  
10% of circuits used for virtualization

**Logical Partitions (LPARs)**

The Linux Server Farm is isolated from the OTHER LPAR's

**zVM (EAL 3+)**  
SIE  
Virtual Machines - LINUX

**HW/ucode Hypervisor (PR/SM) & SW Hypervisor (z/VM)**  
Basic HW support - SIE Instruction - uCode Assist  
Virtualization is transparent for OS/Application execution  
**HW Enforced Isolation - EAL 5 for PR/SM**

**Shared Resource Space per footprint**

up to 54 (64) CPU's	Shared %	up to 32 z/OS images with "up to" 1700+ CPU's...  in a CLUSTER  for SCALABILITY and Continuous Availability
512 GB	MB	
1024 I/O	Shared	
60 LPARs - "any mix possible"		
10 - 100 - 1000 Virtual Machines under z/VM		

**"Most sophisticated & complete Hypervisors"**

z/OS, z/VM, Linux support  
**SHARED ALL architecture**

Any Virtual CPU can run on any Physical CPU  
Sharing is down to the "1"% level

Any Virtual CPU can access any Virtual I/O Path within the attached logical channel subsystem

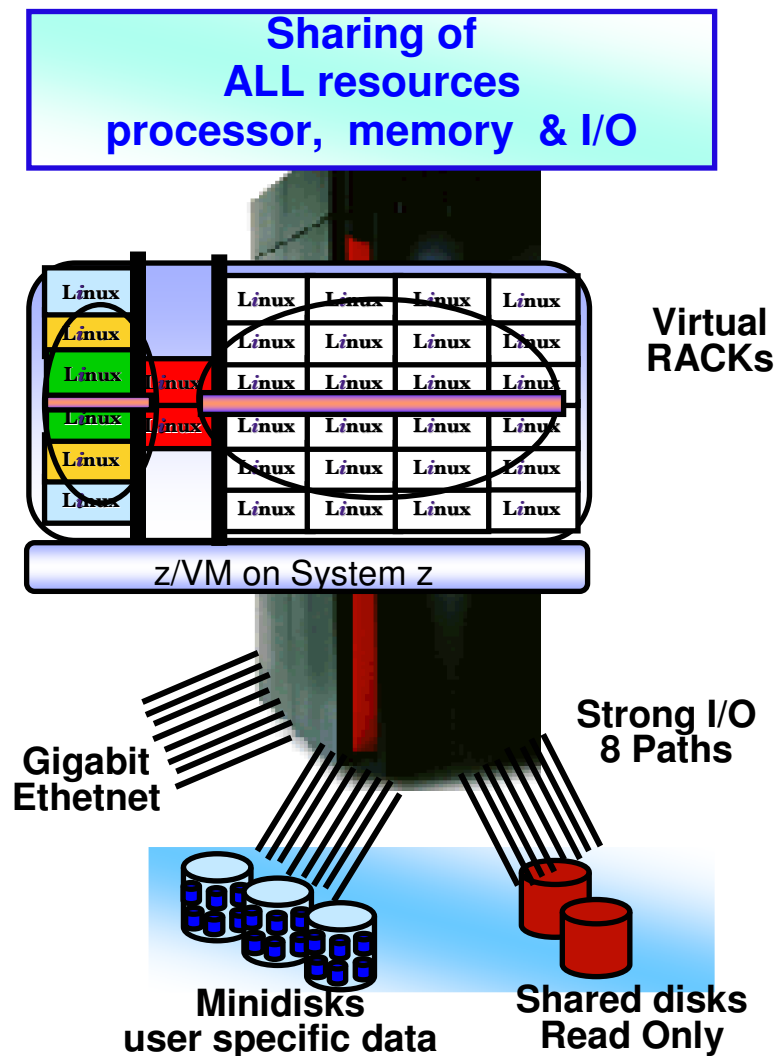
zVM may emulate multiple device not physically present  
Application Integration via HIPERSOCKETs and VLANs  
Intelligent & Autonomic WLM based on policies

First Virtual Machine implementation in the late 1960ties  
SIE delivered around 1980  
PR/SM – LPAR's delivered in 1987



## System z - utilizing the virtual capabilities of zVM

flexible and cost effective - for consolidation, integration and on demand



- Virtual Machine - Software Hypervisor "integrated" with the HW Architecture (SIE/SIE assists)
- 10's, 100's, up to 1000's of "virtual servers"
- New Servers installed in "minutes" - CLONING
- Sharing of CPU, Memory & I/O resources
- Virtual Network – Virtual Switches/Routers
- Virtual I/O (mini-disks, temporary disks, virtual cache...)
- Virtual Appliances (SNA/NCP etc..)
- Virtual capabilities - Coupling Links, Coupling Facilities
- 64bit support - REAL & VIRTUAL
- Self-Optimizing Workload Mgmt - PRIORITIES, capping, monitoring, reporting, charge back...
- Excellent Automation & System Mgmt facilities
- Low "cpu-cost" via HW & ucode support
- Very FLEXIBLE "NO COST" solution for Test, Development & Proof-of-Concept
- Mature technology – z/VM first time introduced in 1967

## Canadian government entity improves citizens' services while saving money and improving operation



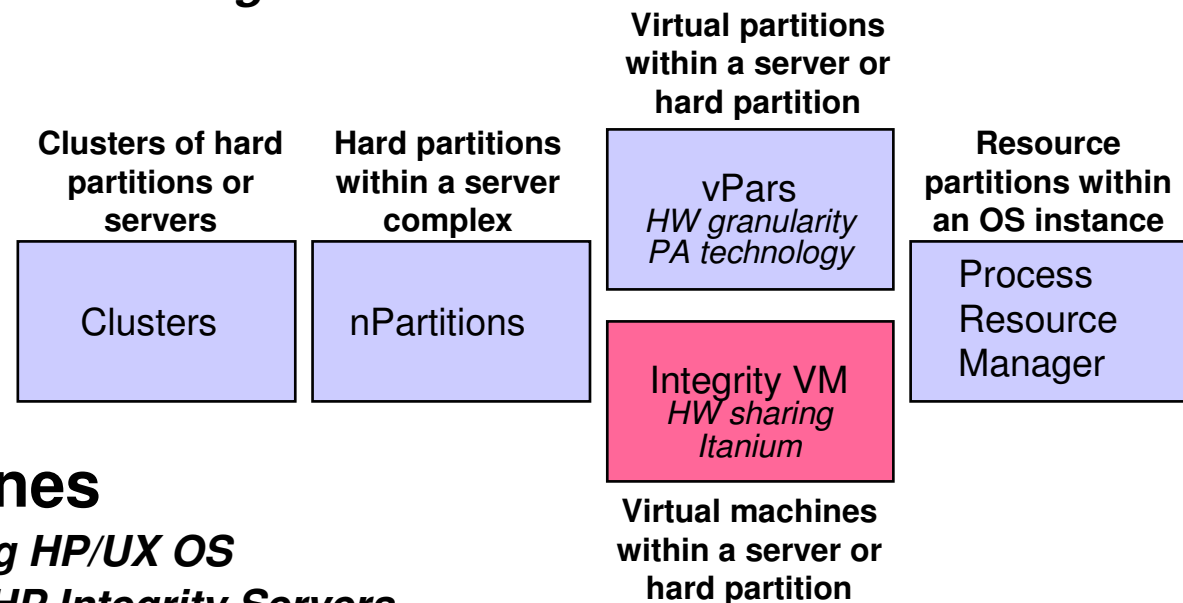
- **Government of Quebec, Canada**
  - Relies heavily on large Web-based application environment to serve the needs of its citizens
  - DGTIC (Direction générale des technologies de l'information et des communications) supports applications & underlying infrastructure
- **Situation:**
  - Fast growth of applications & infrastructure (150+) distributed servers, staffing pressures
- **Problem:**
  - Slow deployment of new applications, Limited general manageability (including backup/recovery), Rising software licensing costs, especially for the Oracle environment
- **Solution:**
  - z9 EC was ideal choice: robust virtualization capabilities, proven high availability and ease of management
  - Consolidated approximately 60 hard-to-manage distributed server environment (Sun UNIX servers) to single z9 EC server running SUSE Linux Enterprise Server (SLES) operating system under z/VM V5.2
    - Linux-only System z9 server with 5 IFLs and 48GB of memory
  - 80+ Oracle 9i database instances consolidated to the z9
    - consolidation from 60 servers down to 1 server resulted in significant reduction in Oracle licenses
    - plan to move numerous Oracle 10g instances as well

**Result:** New application deployment time fell from several weeks to days  
Saved CA\$1.2M (software licensing) & reduction in management costs  
Drastic improvement in backup and recovery operations

## HP Virtual Server Environment (VSE)

### ■ HP VSE consists of several product components

- *HP Integrity Essentials Capacity Advisor*
- *HP Integrity Essentials Virtualization Manager*
- *HP-UX Workload Manager*
- *HP Integrity Essentials Global Workload Manager*
- *HP Systems Insight Manager*
- *HP Integrity Virtual Machines*

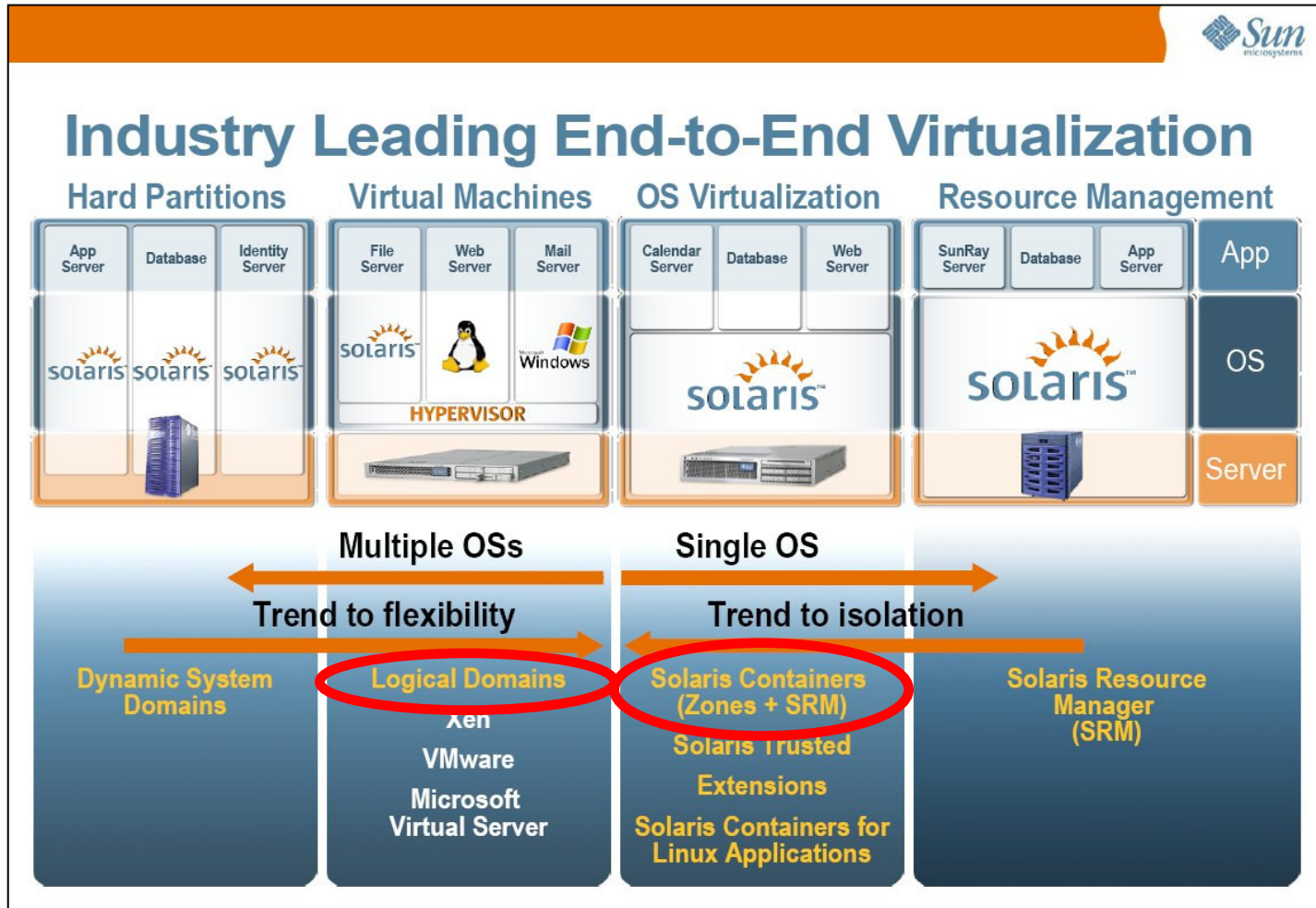


### ■ HP Integrity Virtual Machines

- *Hypervisor runs on top of underlying HP/UX OS*
- *Supports low- to high-end range of HP Integrity Servers, Integrity Superdome, and future Integrity servers*
- *Support limited to HP-UX with initial product release*
- *Supports Uni and SMP guest images with CPU sharing (ONLY 1-WAY is recommended)*
- *Strong linkage between a virtual CPU and a Physical CPU (rather inflexible)*

Source: HP, February 2007

# Sun Microsystems



Source: Sun Microsystems, February 2007

**DOMAINS**  
Physical Partitions

**LDoms**  
Thread Domains  
Up to 32  
1way only  
Sub-Engine  
Para-Virtualization

**Containers**  
Closer to WLM  
than Virtualization  
*OS Mgmt replaced by Container Mgmt*

**Solaris**  
Workload Mgmt

**NOT delivered YET**  
Only Niagara technology

**NO sharing among test. Dev, prod**  
Some functions **MUST** be executed in Global Zone

# IBM evaluation of System z virtualization vs HP, Sun and VMware

	IBM	HP		Sun	VMware	
<i>Solution</i>	PR/SM – SIE LPAR - zVM	vPars <b>HP 9000/Integrity</b>	IVM <b>HP Integrity only</b>	Containers <b>Sun SPARC/x86</b>	LDoms <b>Sun US-T1</b>	ESX
<i>OS supported</i>	<b>z/OS, zVM, Linux</b>	<b>HP-UX</b>	<b>HP-UX 11i, Windows Server 2003</b>	<b>Solaris 10</b>	<b>Solaris 10</b> (T1 based systems only)	<b>Windows, Linux, Netware, Solaris 10</b>
<i>Security / Fault isolation</i>	<b>Hypervisor</b> (hardware/firmware)	<b>Not hardware enforced</b>	<b>Not hardware enforced</b>	<b>Single OS kernel exposed</b>	<b>Hypervisor</b> (hardware/firmware)	<b>Hypervisor</b>
<i>Granularity</i> (Min CPUs per partition)	<b>small %</b>	<b>1</b>	<b>1/20</b>	<b>8192</b> (per Solaris instance)	<b>1/32</b> (1/4 per core)	<b>8 VM</b> (per physical CPU)
<i>Scalability</i> (Max CPUs per partition)	<b>54</b>	<b>64 - 128</b>	<b>4</b>	<b>72 (144 cores)</b>	<b>1</b>	<b>4</b> (requires Virtual SMP)
<i>CPU capacity sharing</i>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<i>I/O Sharing</i>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<i>Dedicated I/O</i>	<b>Yes</b>	<b>Yes</b>	<b>No</b> (All I/O must be virtualized)	<b>No</b>	<b>No</b>	<b>No</b> (All I/O must be virtualized)
<i>CoD integration</i>	<b>Reserve CoD</b>	<b>Yes</b> (integrated utility pricing)	<b>Yes</b> (gWLM adds temporary instant capacity)	<b>No</b>	<b>No</b>	<b>No</b>
<i>List Price</i>	<b>PR/SM included with z9</b>	<b>USD 1.500 - 1.700</b> (per active CPU)	<b>USD 1.700</b> (per active CPU)	<b>Included with Solaris</b>	<b>Expected to be included with Solaris 10 on T1</b>	<b>USD 1.875</b> (per CPU)

Leadership	Advantaged	Marginal	Non-Competitive
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Source: Company websites, February 2007



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# AVAILABILITY & SECURITY

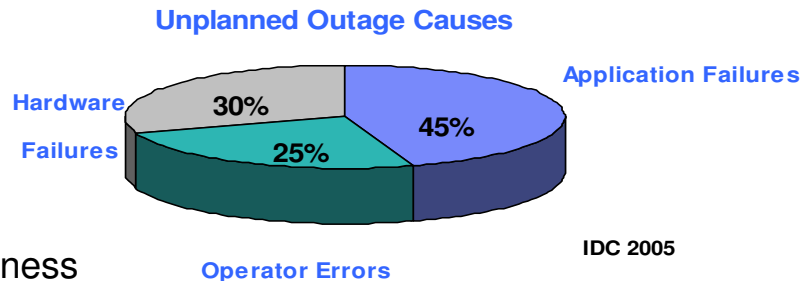
# Business Issue of Availability

**Financial Impact of Downtime Per Hour**  
(by various industries)

Brokerage Retail	\$6.5 Million
Credit Card Sales Authorization	\$2.6 Million
Airline Reservation Centers	\$90,000
Package Shipping Services	\$28,250
Manufacturing Industry	\$26,761
Banking Industry	\$17,093
Transportation Industry	\$9,435

Source: ©Eagle Rock Alliance, LTD. All Rights Reserved 2003

- **On demand challenges**
  - Downtime unaffordable
  - Heterogeneous by nature
  - Complex to manage
- **Customer pressures**
  - Application availability
  - Operations complexity and costs
  - Automation implementation and maintenance costs
  - Rapid change of I/T infrastructure
  - Adding new workloads



- **Loss** of business
- **Loss** of customers – the competition is just a mouse click away
- **Loss** of credibility, brand image and stock value





## 'Never goes down' – System z stack availability features

### *True 99.999% Application Availability Requires:*

- **Component reliability**
  - Higher test and burn-in standards
  - Ceramic packaging reliability
  - Software stack tested together
- **Virtualization and redundancy built-in**
  - Subsystems exploit virtualization
  - Built in spare processors seamlessly enabled
  - Alternate I/O paths
- **Detect and anticipate failure**
  - Instruction mirroring/parity/error correcting codes
  - Monitor component environmentals to predict failures
- **Eliminate planned outages**
  - Vary on/off processors, channels, memory, paths, disks without reboot
  - Hot pluggable replacement parts
  - Apply most patches without reboot
- **Fast Diagnosis and repair**
  - Capture state of chips via scan registers
  - First failure data capture/phone home
  - Extensive use of integrated trace log





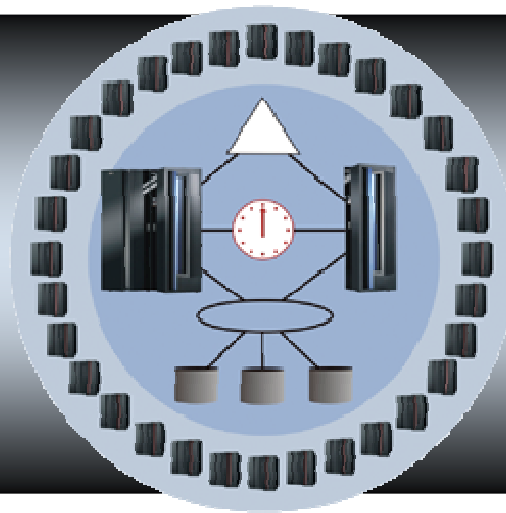
## Business Continuity options on the System z9

### Single System



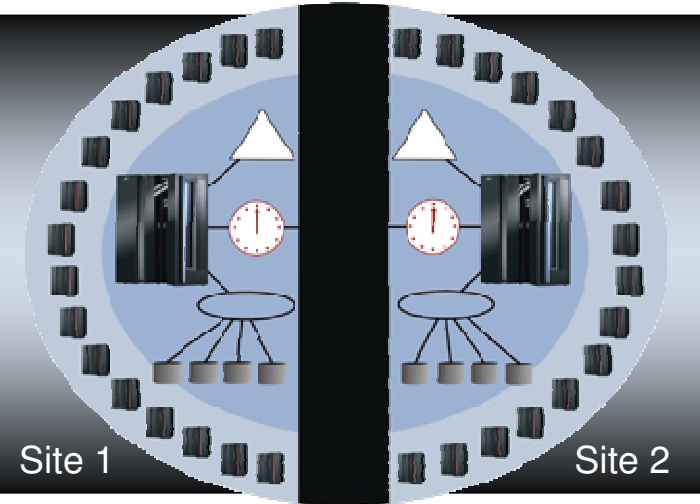
- Built In Redundancy
- Capacity Upgrade on Demand
- Capacity Backup
- Hot Pluggable I/O

### Parallel Sysplex



- Addresses Planned and Unplanned HW/SW Outages
- Flexible, Nondisruptive Growth
- Capacity beyond largest CEC
- Scales better than SMPs
- Dynamic Workload / Resource Management

### GDPS



- Addresses Site Failure / Maintenance
- Sync/Async Data Mirroring
  - Sync (PPRC) – 100km
  - Async (XRC) – any distance
- Eliminates Tape/Disk SPOF
- No/Some Data Loss
- Application Independent

# Gartner's platform positioning 1Q07

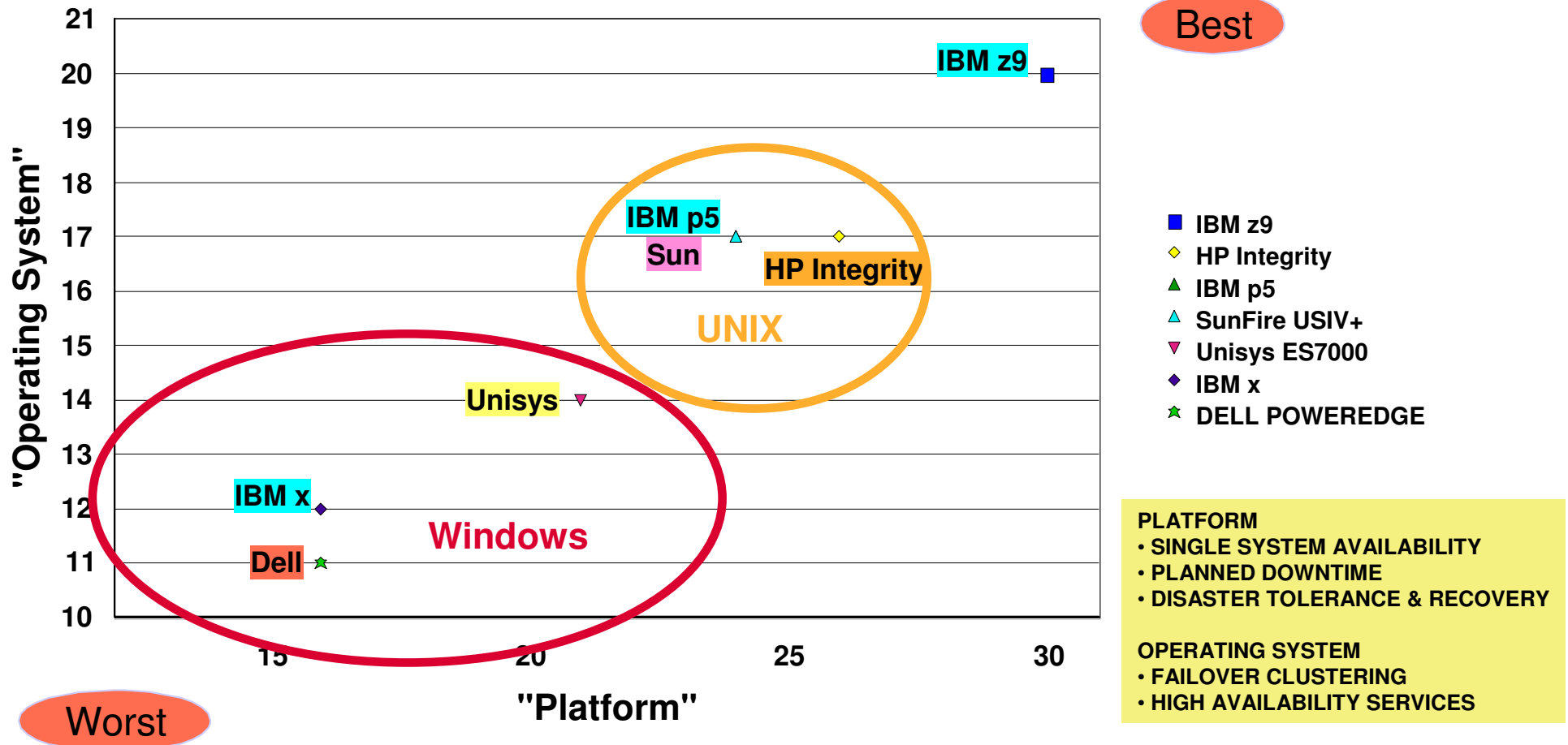
	CPU ARCHITECTURE	SYSTEM TYPE	OPERATING SYSTEM	FORM FACTOR	PLATFORM AVAILABILITY	OS AVAILABILITY
IBM SYSTEM z9	IBM CMOS	Mainframe	z/OS	F	30	20
HP INTEGRITY NonStop	ITANIUM	Mainframe	NSK	R	30	20
UNISYS CLEARPATH	UNISYS CMOS	Mainframe	OS2200	F	28	19
BULL GCOS	ITANIUM	Mainframe	GCOS	F	27	17
FUJITSU BS2000	FSC CMOS	Mainframe	BS2000	F	27	17
IBM SYSTEM i5	POWER5+	Mainframe	i5/OS	F	26	18
HP INTEGRITY	ITANIUM	UNIX	HP-UX	F	26	17
FUJITSU PRIMEPOWER	SPARC64	UNIX	Solaris	F	25	15
IBM SYSTEM p5	POWER5+	UNIX	AIX	F	24	17
SUN FIRE ULTRASPARC	SPARC IV+	UNIX	Solaris	F	24	17
HP 9000	PA-RISC	UNIX	HP-UX	F	24	15
UNISYS ES7000	XEON	Windows	Windows	R	21	14
SUN FIRE T2000	SPARC T1	UNIX	Solaris	R	21	14
SUN FIRE x86	OPTERON	UNIX	Solaris	R	16	16
HP PROLIANT	XEON	Windows	Windows	R	16	12
IBM SYSTEM x	XEON	Windows	Windows	R	16	12
DELL POWEREDGE	XEON	Windows	Windows	R	16	11

- PLATFORM**
- SINGLE SYSTEM AVAILABILITY
  - PLANNED DOWNTIME
  - DISASTER TOLERANCE & RECOVERY
- OPERATING SYSTEM**
- FAILOVER CLUSTERING
  - HIGH AVAILABILITY SERVICES

Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07

# Gartner's platform positioning 1Q07

## Availability Rankings - selected platforms



Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07

# Business Issue of Security

***Is Anything More Important to the Success and Survival of Your Business?***

## Security Statistics

- Computer viruses increased by 25% in 2004
- Estimates of over 6% of e-mail contain viruses
- More Than 90% Of Companies Expose Sensitive Data<sup>1</sup>
- Businesses Reluctant To Report Cyber Attacks<sup>2</sup>
- One In Four Identity-Theft Victims Never Fully Recover<sup>3</sup>
- Card Associations Unite Setting Standards to Fight Fraud<sup>4</sup>

## Associated Costs & Risks

- *Cost of research and recovery*
- *Cost to notify customers*
- *Problem solution or remediation*
- *Claims from trusted vendors and business partners*
- *Loss of business, customers, brand image ..*

<sup>1</sup> Reconnex Insider Threat Index August 2005

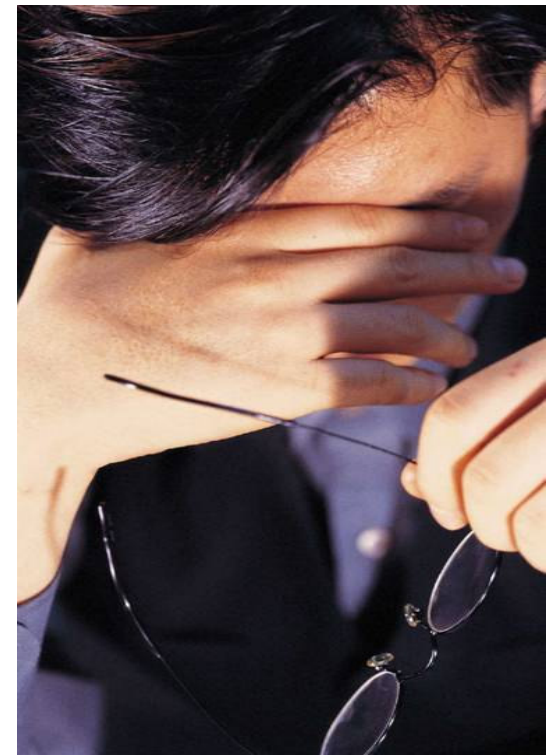
<sup>3</sup> Nationwide Mutual Insurance Co. Survey July 2005

<sup>2</sup> 2005 CSI/FBI Computer Crime and Security Survey

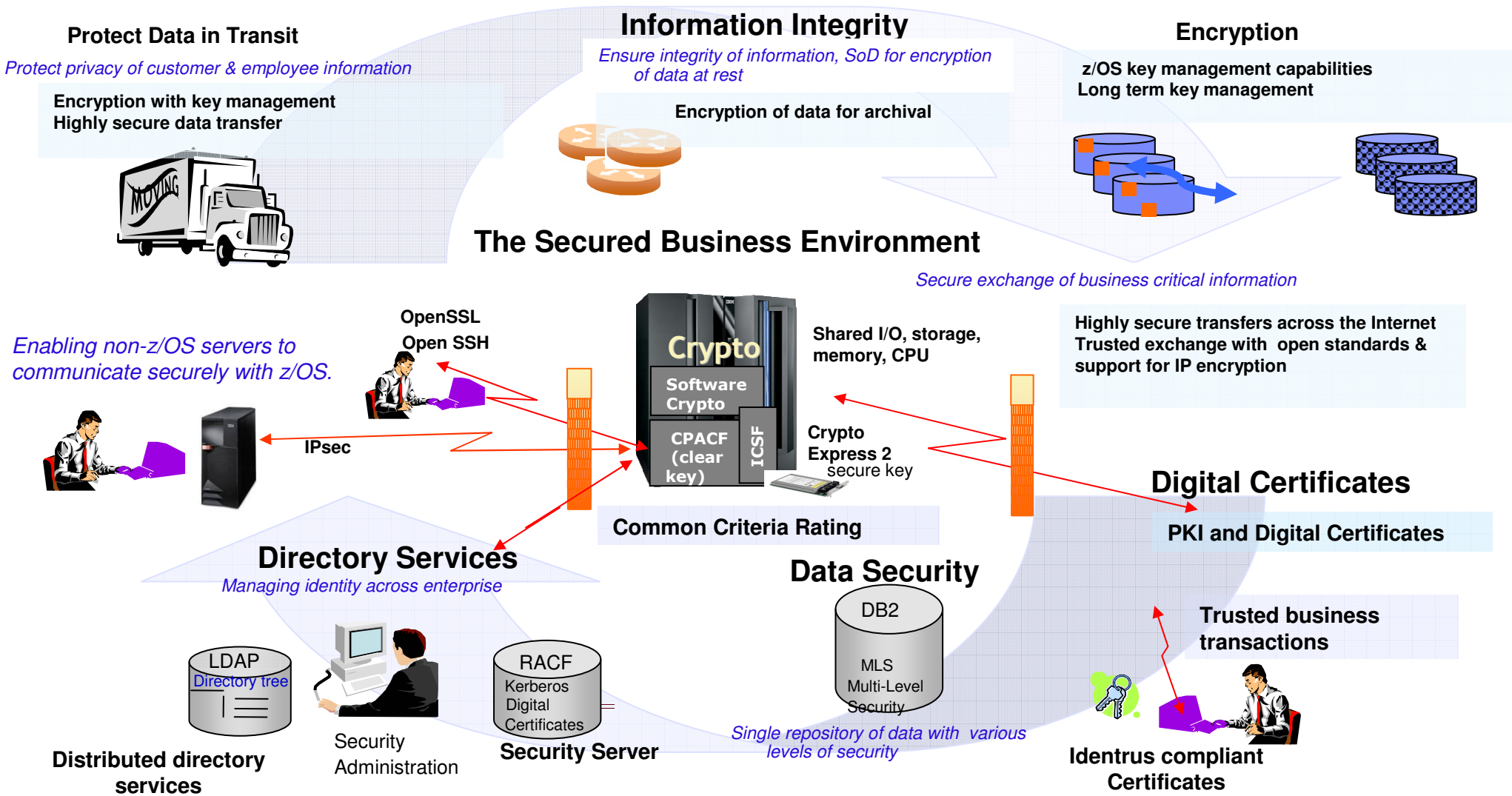
<sup>4</sup> Green Sheet Inc. August 2005 Issue 2

## Regulatory & Compliance

GLBA  
SOX  
EUPA  
ISO 17799



# System z9 security provides system and data integrity



## Secure “Smart Card” Solution – Fights Fraud and Reduces Costs



- **One of the largest banks in Latin America**
  - Approximately 3,000 branches, 20,400 automated teller machines and 42,200 employees
  - 15M checking accounts, 9M savings accounts, 6M credit cards
- **Situation:**
  - To meet efficiency objectives and ensure the security of its 12 million issued debit cards, the Bank replaced its regular cards with security chip-enabled smart cards.
  - Need improved security to fight fraud
- **Problem:**
  - Performance bottleneck with Thales e-Transactions security servers (which process “smart cards”)
- **Solution:**
  - Leverage superior mainframe security, eliminate separate security server and migrate smart card solution to the mainframe
    - ▶ All core business systems run on mainframes
    - ▶ System z reliability and technical support also key factors in this decision
    - ▶ Better price performance
  - Install mainframe PCI Cryptographic Coprocessor cards (PCICC)
    - ▶ Encryption keys are generated and stored on PCICC cards and used for smart card authentication, blocking and password change
    - ▶ Use IBM z/OS V1.6 security APIs
- **Result:** Reduced fraud from stronger smart card security, reduced costs, PLUS increased stability, efficiency, and faster processing



# Gartner's platform positioning 1Q07

	CPU ARCHITECTURE	SYSTEM TYPE	OPERATING SYSTEM	FORM FACTOR	SECURITY
IBM SYSTEM z9	IBM CMOS	Mainframe	z/OS	F	18
HP INTEGRITY NonStop	ITANIUM	Mainframe	NSK	R	16
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FUJITSU PRIMEPOWER	SPARC64	UNIX	Solaris	F	12
IBM SYSTEM i5	POWER5+	Mainframe	i5/OS	F	10
IBM SYSTEM p5	POWER5+	UNIX	AIX	F	9
IBM SYSTEM x	XEON	Windows	Windows	R	8
HP 9000	PA-RISC	UNIX	HP-UX	F	8
SUN FIRE T2000	SPARC T1	UNIX	Solaris	R	7
SUN FIRE x86	OPTERON	UNIX	Solaris	R	7
HP PROLIANT	XEON	Windows	Windows	R	5
DELL POWEREDGE	XEON	Windows	Windows	R	5

**HARDWARE PROTECTION AND SECURITY  
HARDWARE ELECTRICAL ISOLATION**

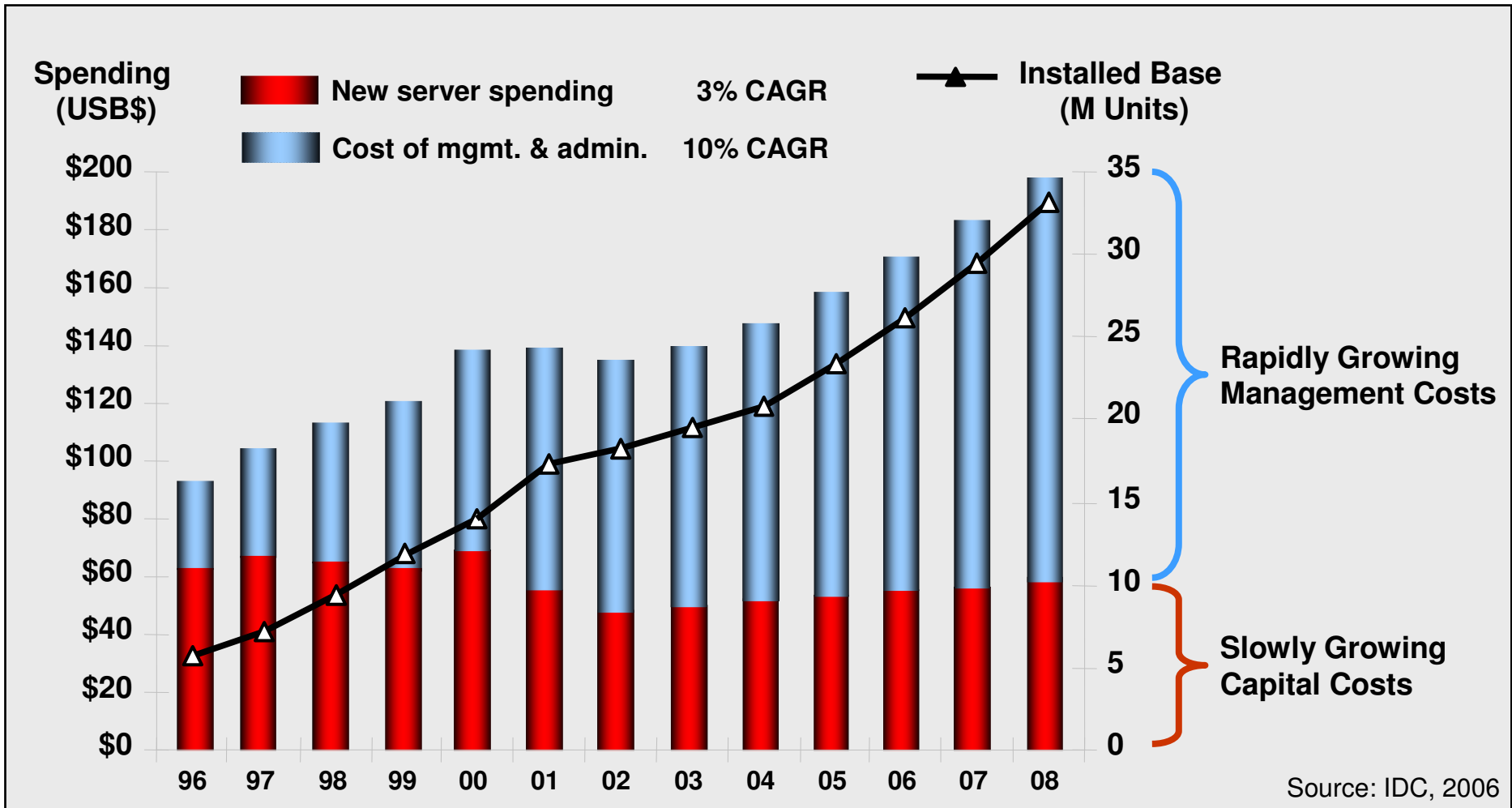
Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07



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# WORKLOAD & SYSTEMS MANAGEMENT

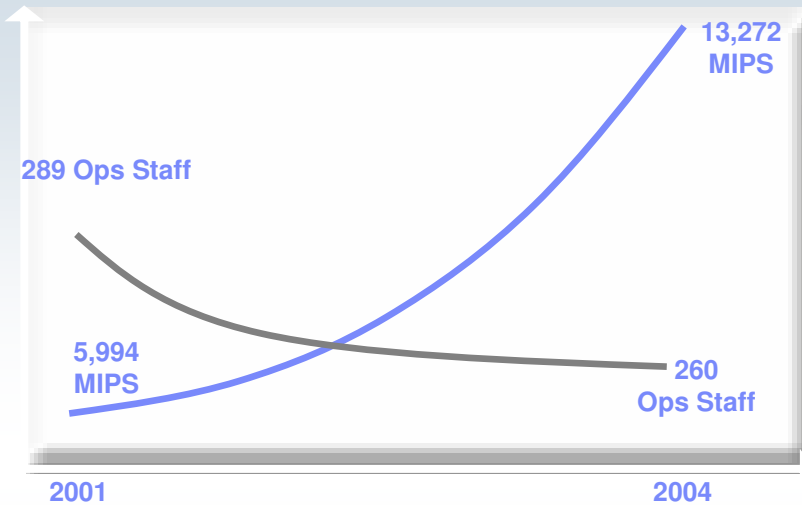




- **Total cost of ownership (TCO) for servers continues to rise significantly, even as total server spending remains nearly flat**  
Management costs are the reason, driven by the increasing numbers systems

# System z9 – Managing growth and complexity

***Only one platform bucks this trend !***



***Mainframe data center staffing levels have not significantly changed despite large increases in workload volumes.***

## Gartner

“Since we published our last high-level perspective of the ratio between MIPS and head count in 2001, the largest z/OS installations have more than doubled their ‘MIPS to head count’ ratio.”

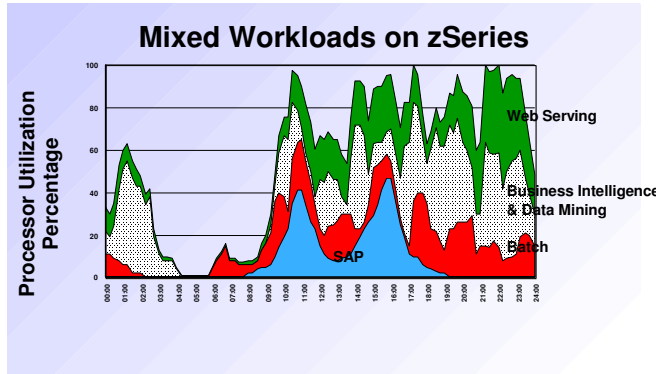
*L. Mieritz, M. Willis-Fleming – Gartner, 2004*

“I looked at our infrastructure in 2002 and saw we were growing servers at a rate of 30 percent per year. For every application I had, I needed another one to five servers behind that, for things like development and application and Web serving. And every 20 servers translates to another body to administer them.”

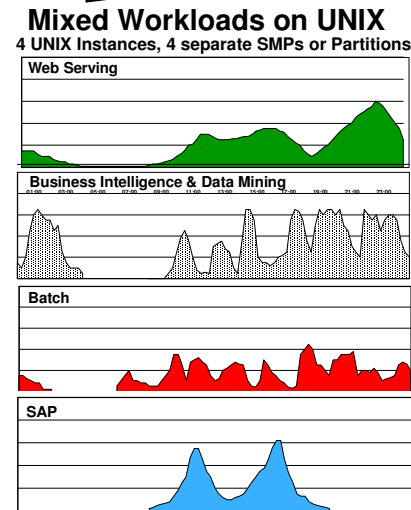
*Ken Kucera, senior vice president and division head  
FNBO Enterprise Technology Services*

# Optimizing Workloads on a Mainframe is more effective

Same workload



- z/OS WLM balances resources for you
- ▶ Based on business goals
  - ▶ No other platform comes close



## IBM Mainframes:

### Up to 100% Utilization

- Highly virtualized and shared resources
- “hands off”, business priority driven intelligent workload management
- Fewer servers, less power, cooling & admin
- Optimized use of SW assets

## UNIX processors:

### typically under 25% utilization

- More of them and more SW license
- Static scripted workload management
- Higher admin and environmental cost
- Intel worse, typically <10% utilization

## Gartner's platform positioning 1Q07

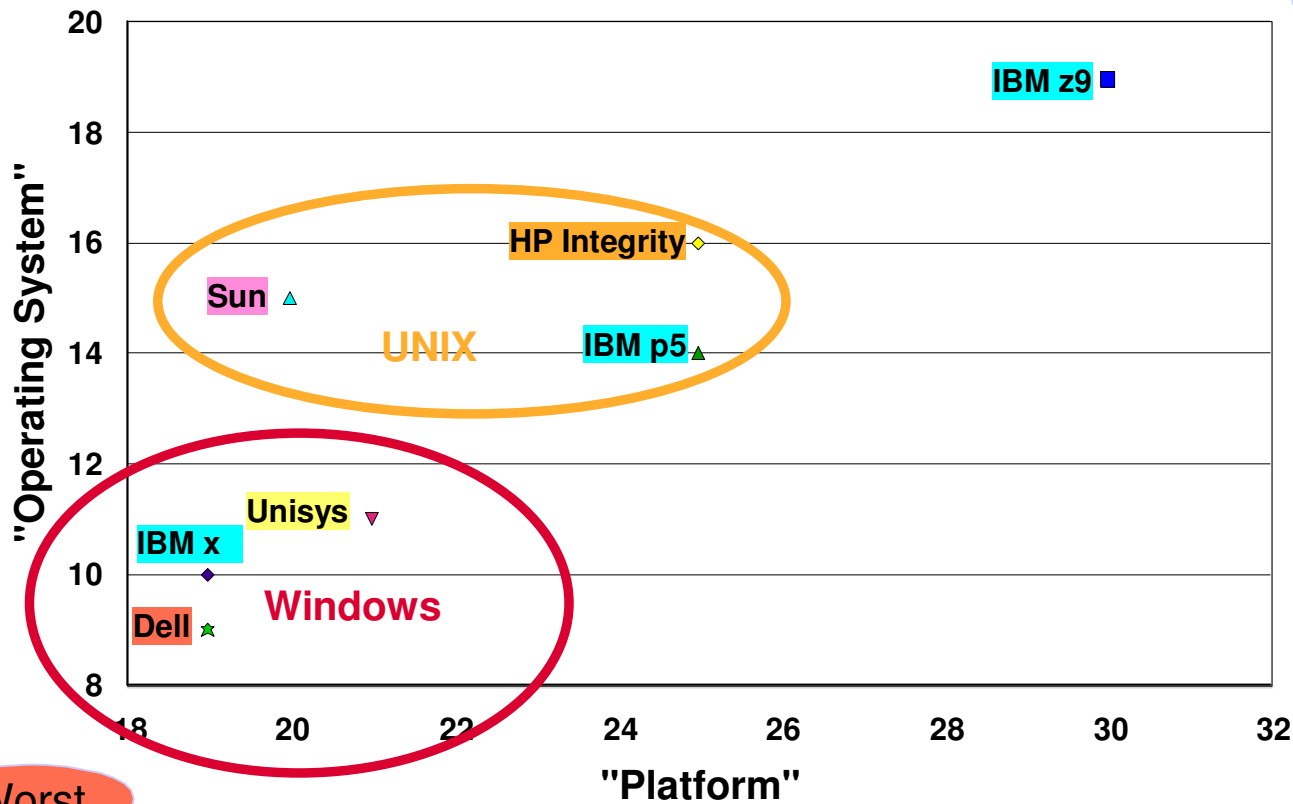
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- PLATFORM**
- Virtual Machines & LPARS
  - Mixed Workload Hosting
  - Mixed Workload Management
- OPERATING SYSTEM**
- OS Workload Management
  - OS Manageability

Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07

# Gartner's platform positioning 1Q07

## Workload Management Rankings - selected platforms



Best

- IBM z9
- ◇ HP Integrity
- ▲ IBM p5
- ▲ SunFire USIV+
- ▼ Unisys ES7000
- ◆ IBM x
- ★ Dell Poweredge

- PLATFORM**
- Virtual Machines & LPARS
  - Mixed Workload Hosting
  - Mixed Workload Management
- OPERATING SYSTEM**
- OS Workload Management
  - OS Manageability

Worst

Source: Gartner, Server Scorecard Evaluation Model version 3, 1Q07



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# CONTROLLING IT COSTS

## Cost of Ownership is Key

### Addressing the 'Hidden' Operational Costs of Computing

#### ■ Downtime

- Cost of downtime can vary by industry and can range from hundreds of thousands to millions of dollars per hour  
©Robert Francis Group. All Rights Reserved 2005

#### ■ Security breaches

- **More Than 90% Of Companies Expose Sensitive Data**  
Reconnex Insider Threat Index August 2005
- **Businesses Reluctant To Report Cyber Attacks**  
2005 CSI/FBI Computer Crime and Security Survey
- **One In Four Identity-Theft Victims Never Fully Recover**  
Nationwide Mutual Insurance Co. Survey July 2005
- **Card Associations Unite Setting Standards to Fight Fraud**  
Green Sheet Inc. August 2005 Issue 2

#### ■ Management and administration

- *'However, the costs of supporting and managing these complex environments and infrastructures have soared, and now far outweigh the customer's expenditure on new systems themselves'*  
© Software Strategies 2005 11



**IBM Mainframe solutions are highly available, highly secure and highly managed to help lower TCO**

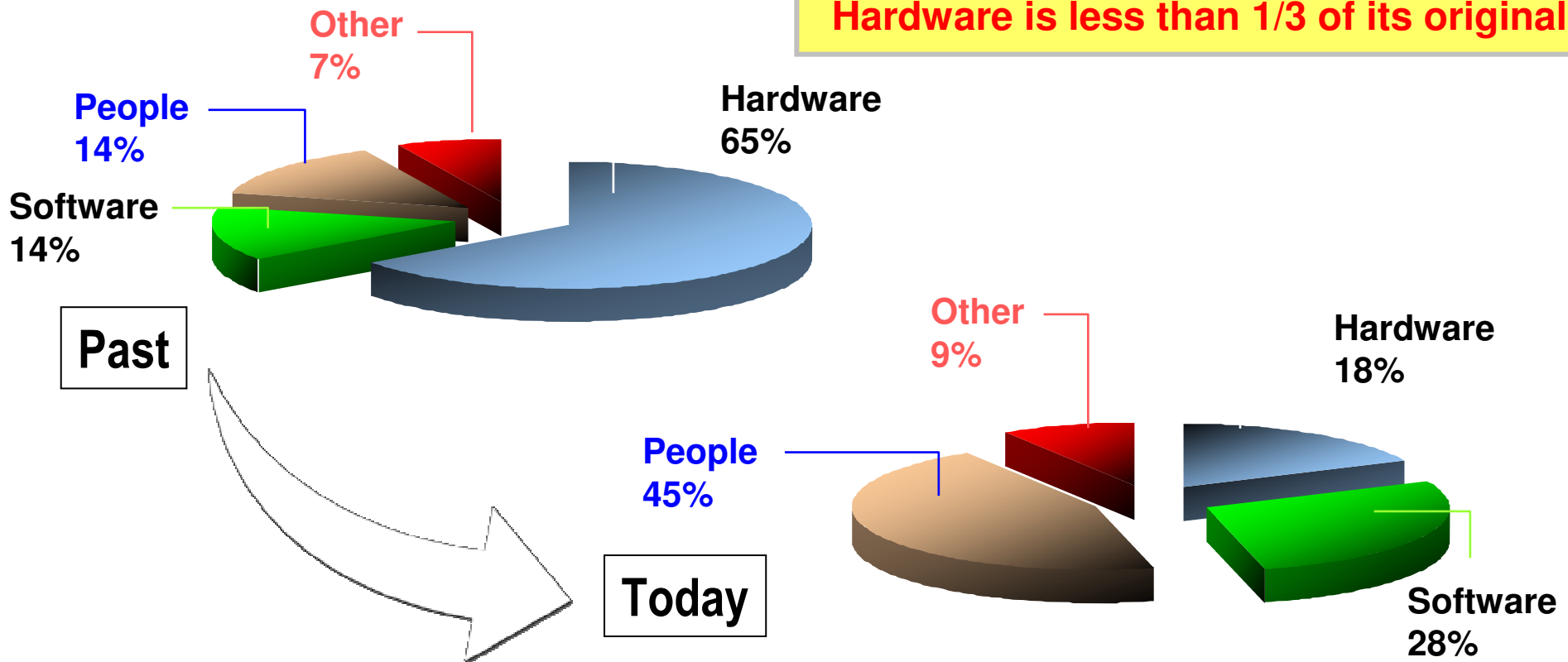


# What's driving the growth – Complexity reduction

*Throughout the past 10 years the cost dynamics of supporting corporate IT infrastructures has changed significantly*

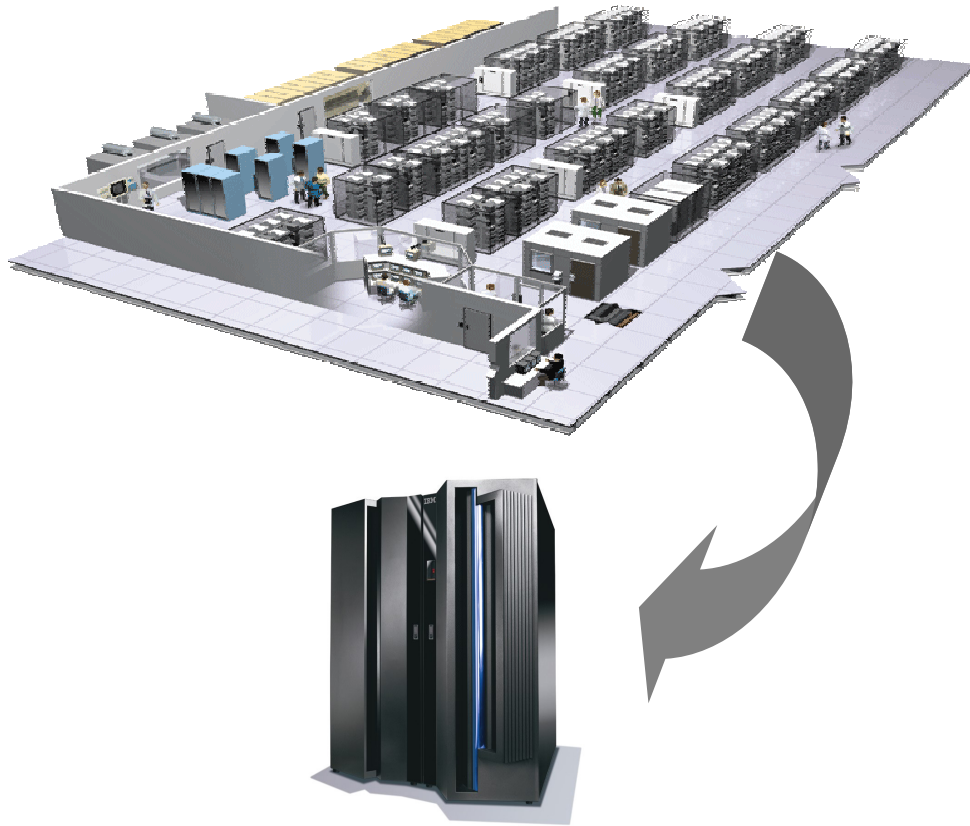
**We typically see . . .**

**People expense has tripled as a %  
Software expense has doubled as a %  
Hardware is less than 1/3 of its original %**



Source: IBM Scorpion studies – analysis of typical CIO budget for Mainframe plus UNIX/Windows servers

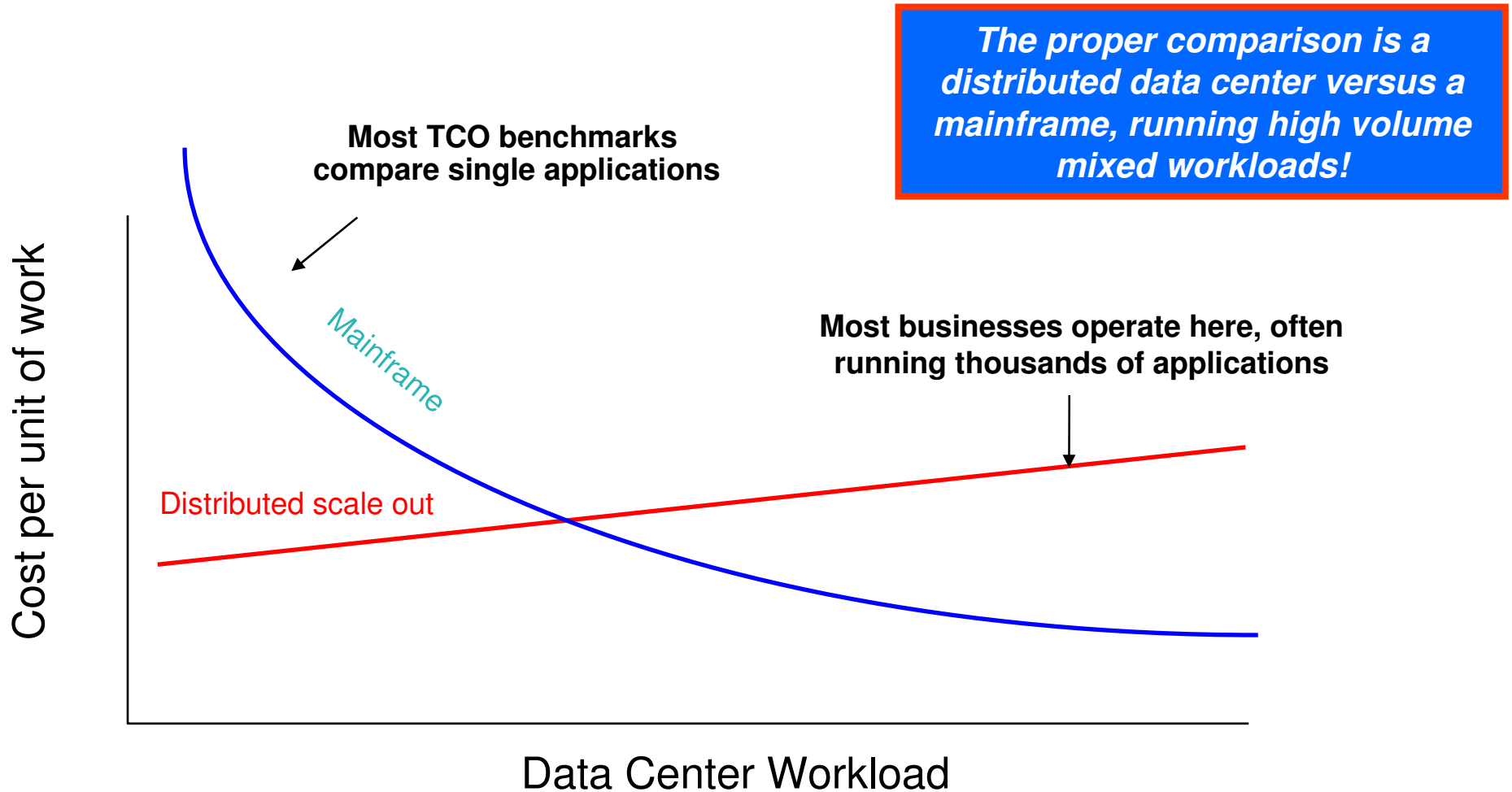
## IT Optimization means moving to a Data Center in a box ..... not rearranging a server farm



- **Central point of management**
- **Higher resource utilization**
- **Lower cost of operations**
- **Less Servers**
  - Fewer SW Licenses
  - Fewer resources to manage
  - Less energy, cooling and space
- **Fewer intrusion Points**
  - tighter Security
- **Fewer points of Failure**
  - Greater Availability

**We needed a solution that could provide high levels of availability around the clock, along with the flexibility to quickly and cost-effectively deploy new services both internally and externally. IBM eServer zSeries fitted the bill perfectly on both counts, enabling us to run multiple Linux virtual machines on a single, ultra-reliable hardware platform. Tim Simpson, IT Support Manager, Dundee City Council**

## Mainframe cost per unit of work goes down as workload increases



## Nexxar – a new mainframe user in 2006

*a financial services company with 800 employees*



### Key Benefits of moving to z9

#### Business Need

A architecture for IT infrastructure to provide very high (24x7) availability and the ability to sustain significant anticipated business growth

- ✓ An architecture that suits requirements for security, manageability, reliability, availability, scalability, extensibility and flexibility
- ✓ The ability to grow Nexxar 's growth by acquisition business while staying within the same platform
- ✓ Consolidation of more than 80 x86 servers onto an IBM System z9 Business Class (BC)
- ✓ A 75% reduction of headcount required to maintain the operating environment in comparison with the x86 systems previously on the floor.

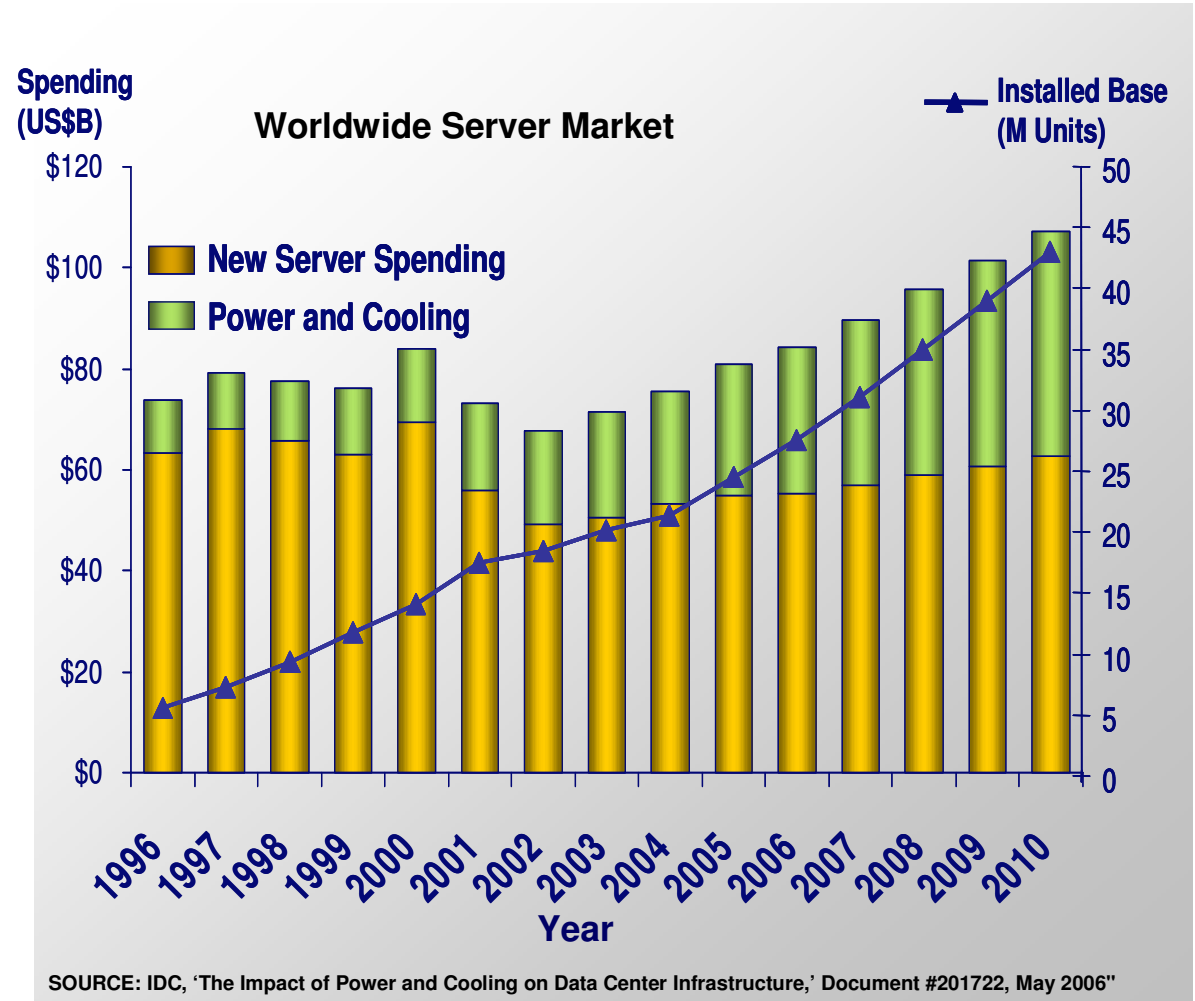
See also - <http://www.redmonk.com/jgovernor/archives/002190.html>

# Data Centers are getting hotter!!

*Power and cooling spend may eventually exceed new server spending*

**2000 –** Raw processing “horsepower” is the primary goal, while the infrastructure to support it is assumed ready

**2006 –** Raw processing “horsepower” is a given, but the infrastructure to support deployment is a limiting factor



## Energy Efficiency

# RFG analyst case study: Retailer consolidated 600 x86 servers onto a single mainframe

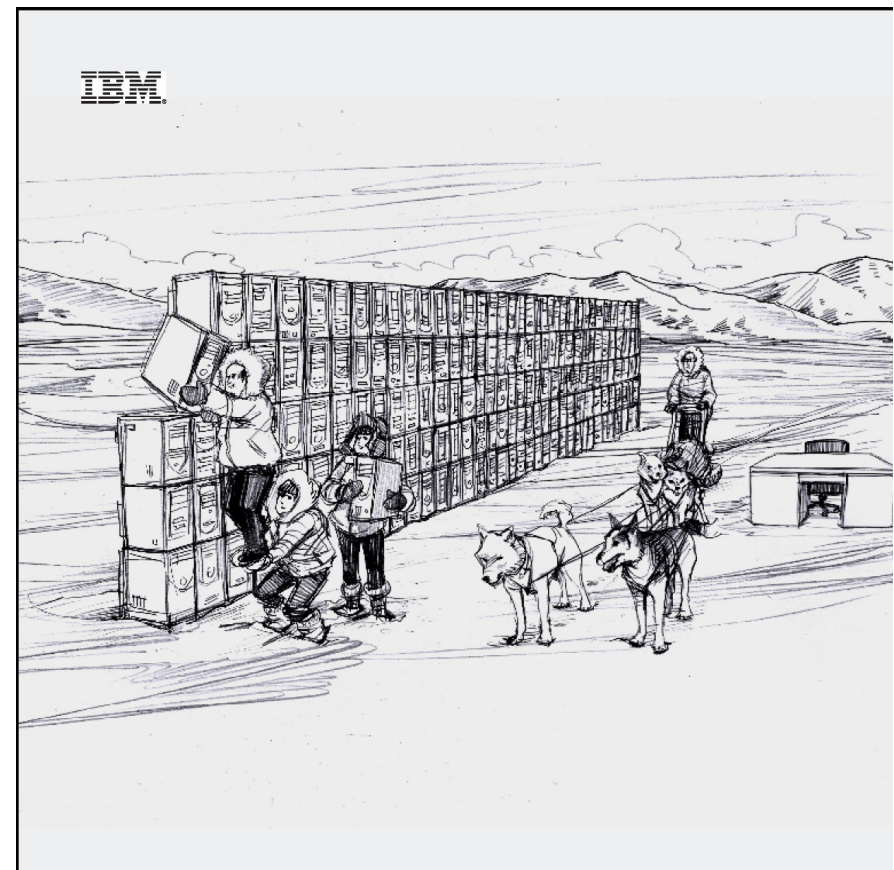
**Eliminated an entire floor of servers**

**Reduced administrative staff by 10**

**Cut power and cooling costs by 80%**



Source: Robert Frances Group, The  
Mainframe is Baaack, July 2006



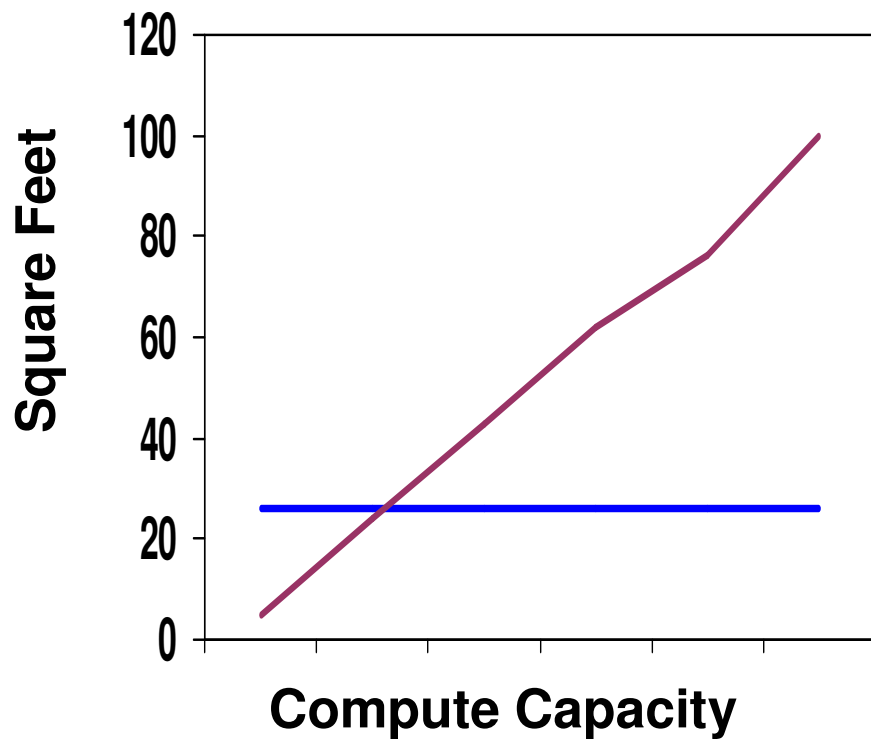
# System z - Energy and Space Efficient

*Mainframe consumes one twelfth the electrical power ,  
Provides four times the work in the same space*

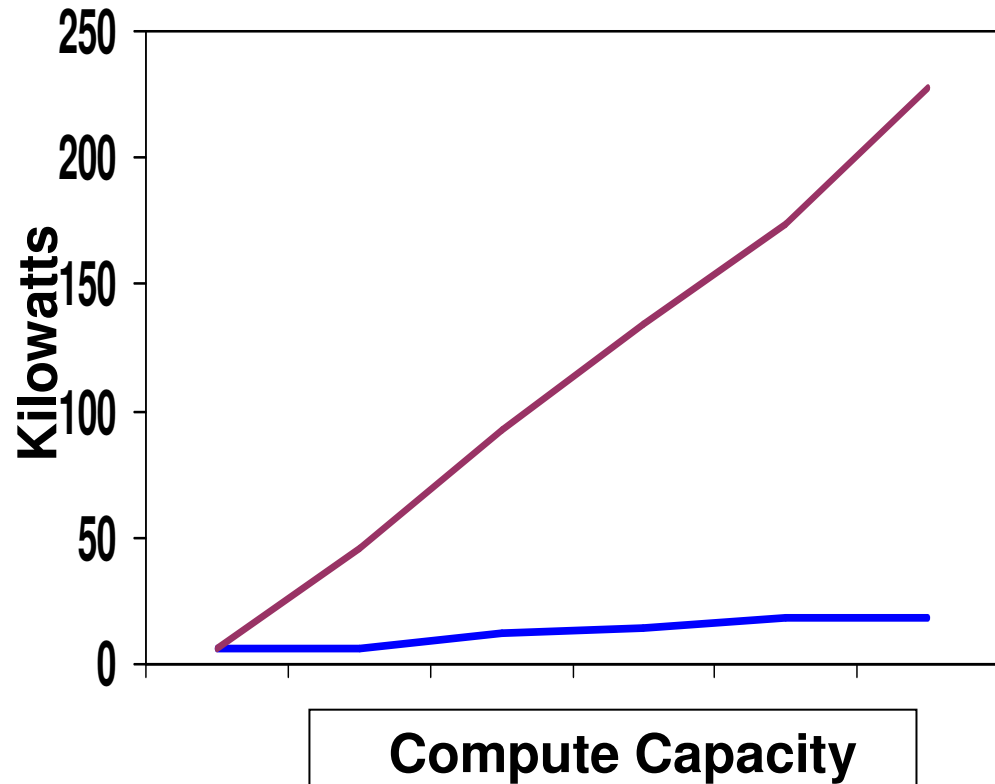
**Over past 10 years Power vs Perf.  
improvement has averaged 28.2 % / yr**

- Performance has improved 168 X
- Watts / MIPS has improved 16 X
- Density has improved 8 X

**Space**



**Energy**



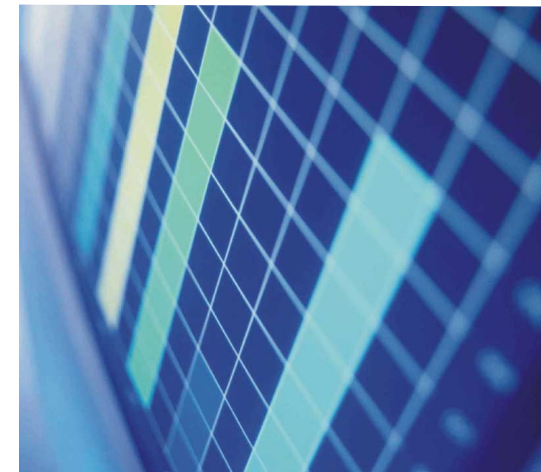
**— IBM System z9**

**— Sun Fire 2100**



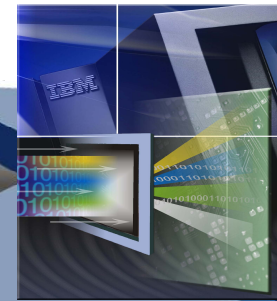
## Nationwide saves with System z

- **TCO: \$15M savings over 3 years**
  - 80% reduction in data center floor space needs; power conservation
  - 50% reduction in hardware & OS support effort
  - 70% average CPU utilization
- **Dynamic allocation of compute power**
  - Capacity on demand
  - Tested 22 times capacity for Super Bowl 2006 Ad blitz traffic



Source: Guru Vasudeva, AVP & Chief Architect, Nationwide Insurance  
LinuxWorld August 2006 presentation

# Driving Value Up and Forcing Cost Down *Evolution of Specialty Engines*



**IBM System z9  
Integrated Information  
Processor (IBM zIIP)  
2006**

Designed to help improve resource optimization for eligible data workloads within the enterprise



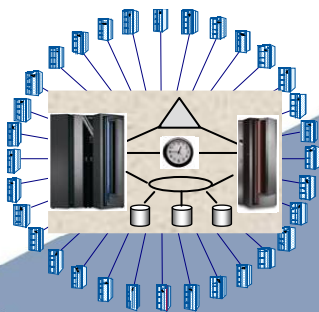
**System z Application  
Assist Processor  
(zAAP) 2004**

Incorporation of Java™ into existing mainframe solutions



**Integrated Facility  
for Linux (IFL) 2001**

Support for new workloads and open standards



**Internal Coupling  
Facility (ICF) 1997**

Centralized data sharing across mainframes

# System z9 – two different pricing models

*Legacy and New Workload*

Workload	HW cost per CP	HW cost Speciality Processors	SW cost	
IMS, CICS, Batch	X	-	Y (MLC)	"Legacy"
New Workload SAP, Domino .....	X	-	zNALC z/OS	
Java running on zAAP	-	X/5	0	"New Workload" Java/XML some DB2 + DW and Linux
Some of DB2 running on zIIP	-	X/5	0	
Linux and z/VM running on zIFL	-	X/5	per CP open source	

*This example shows the potential costs differences between existing "legacy" systems and "new workload" running on System z. Costs for different environments will vary – your IBM representative can explain the costs for specific workload environments.*

# Customers are realizing .....

## “that the per transaction cost is really very modest”

*Kevin Campbell, Chief Application Architect, Univar USA*

### Mainframe Costs

The cost of running incremental workload on the mainframe goes down as the total workload grows

- ▶ Labour costs hold steady as workload grows
- ▶ Mainframe design & pricing favor the addition of more workload
- ▶ Highly Efficient Power and Cooling – Small Footprint
- ▶ Lower software costs per transaction as workload grows – and PRA can lower ISV tool costs
- ▶ High Availability and Security Translate into low cost

Customers have learned that mainframes deliver economies of scale, especially as the workload grows

### Distributed Costs

The cost of running additional workload on distributed servers goes up more linearly

- ▶ Labour is now the highest cost element in distributed environments  
Administrative staff costs increase in proportion to the number of servers
- ▶ New workload requires additional servers and licenses
- ▶ Energy and Space cost is more linear
- ▶ Cost of software licenses is more linear
- ▶ Fractionally less Availability and Security can drive Significant downstream costs

Result – scale out strategies do not deliver equivalent economies of scale as the workload grows

## IBM System z TCO: Man Bites Dog

- ***A new report from analyst Illuminata praises recent IBM studies indicating that the IBM mainframe offers customers Total Cost of Ownership (TCO) advantages of between five and 60 percent over typical Unix, Linux, and Windows alternatives. IBM Big Iron is "no longer your father's mainframe" the report concludes.***
  
- **"The mainframe has clearly seen substantial updates over the last decade, becoming more affordable, more attuned to modern APIs and middleware, and more network-savvy," according to the report**
- **"It no longer makes sense for the large enterprise to measure TCO strictly on a one-application-per-server basis," the report asserts that TCO must be measured for 10-50 applications on one mainframe versus 10-20 blades or a grid of 50 distributed systems.**
- **The Illuminata report finds IBM's approach to TCO credible:**
  - **IBM demonstrates that mainframe TCO advantages are 30 to 60 percent better than 30 Sun servers or 300 Linux Servers.**
  - **IBM's focus on cooling technology means the mainframe typically requires less electricity and air conditioning than many 1U servers running the same workload.**
  - **For a mainframe running different workloads, the people costs are a fraction of those costs required for distributed systems. As a percentage of TCO, people costs have skyrocketed over the past decade (from 14 to 43 percent), while hardware costs have shrunk (from 65 to 20 percent).**
  - **Mainframe software license costs are competitive with other platforms - IBM's license costs/unit of workload decreases as the workload increases.**
  - **Specialty processors like zIIP, IFL, and zAAP offer even lower hardware and software pricing.**
  - **The price of mainframe memory and other components have significantly dropped.**

▪Source: <http://biz.yahoo.com/iw/061228/0198515.html> 28<sup>th</sup> December 2006



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# CLOSING THOUGHTS



## 5 Myths about Mainframes

- Mainframes are expensive
- There's nothing new in mainframes
- ISVs are not enthusiastic
- It's hard to get mainframe skills
- Mainframes are inflexible

- Myths based on 1990s mainframe model
- The 'new mainframe' is very different
- Significant developments in last few years are changing these perceptions





# Rethink the future – the journey to On Demand computing

## Extending the reach of Mainframe Qualities of Service into enterprise wide roles:

- Enterprise security management
- Enterprise business resiliency management
- Enterprise hub for data & SOA
- Enterprise workload management

## Enterprise-wide approach can help offer incremental value from IT:

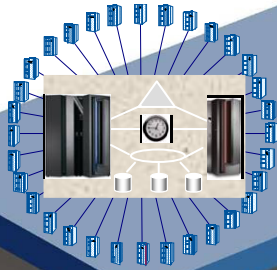
- Align IT to the business opportunities
- Efficiencies of infrastructure wide management help to:
  - Reduce cost
  - Reduce complexity
- Adaptable to ongoing business change
- Security for peace of mind

## Roadmaps for planned delivery of future capabilities

## Evolution of specialty engines

Building on a strong track record of technology innovation with specialty engines -

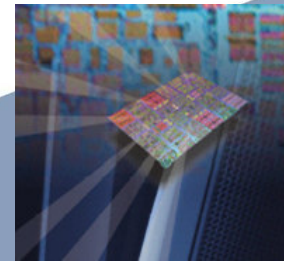
**DB Compression, SORT,  
Encryption, Vector Facility**



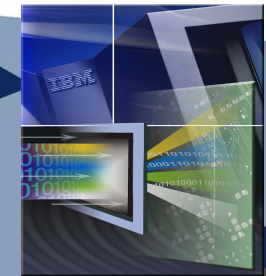
Internal Coupling Facility (ICF) 1997



Integrated Facility for Linux (IFL) 2001



System z9 Application Assist Processor (zAAP) 2004



IBM System z9 Integrated Information Processor (ZIIP) 2006

**Today ~2X offload  
Large X possible  
New opportunities**

**Integrated Technology enablement  
Application Integration offload – expanded scope**

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

## Key messages to take away

- **Over the last 10 years, IBM has invested in transforming the mainframe**
  - usability, flexibility, performance and total cost of ownership – has led a **resurgence in mainframe usage**.
- **Consolidating and sharing IT resources makes good business sense**
  - IBM System z is uniquely architected to be the **most cost effective enterprise transaction server for a mixed workload - offering better security, utilization and lower overheads**.
- **Extracting value from core mainframe applications makes good business sense.**
  - Implementing a **service oriented architecture** from IBM across all platforms will **improve IT flexibility and reuse**, helping to deliver more value to your customers and shareholders.
- **Major application development and migration projects have a high failure rate.**
  - Extending proven applications usually carries **lower risk, lower cost and is faster to production**.
- **IBM has publicly committed to ongoing investments in the mainframe**
  - Now is the time to consider making better use of existing mainframe application assets and the allocation of new workloads to the mainframe.



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