The future runs on System z

System z Software – Strategy and Direction
Maximizing your Return from New and Legacy Software Assets

Ray Jones
WW Vice President, z Software

Data Centre on a truck

System z Software Strategy

Capitalize on Traditional System z Strengths

- Batch processing, Transaction processing, Messaging, Quality of Service, and Data Serving

Extend Value Proposition to New and Mixed Workloads

- Systematic re-engineering of the software stack for SOA

- Deliver extensive Data Management services

- Leverage the wave of workload consolidation; zLinux

- Simplify System z – make it easier to install and manage for better TCO
  - New faces of z
  - More end-to-end management capability from a z central point of control
  - Simplified labor intensive tasks
  - Integration with modern Application Development environments

Reinvigorate the System z Ecosystem

- Attract new System z customers and ISV application workloads
- Make System z relevant to the new IT generation

The expanding System z community

- Continued growth on the System z platform in 2008
  - Over 150 new ISV partners and 1,000 new applications
  - **More than 500 new Linux applications added**
  - 174 new/upgraded WebSphere Application Server, DB2, CICS® and IMS™ application/tools on z/OS
- ISV Partner loyalty
  - Over 1,500 ISVs building applications for System z
  - Over 1,800 applications on z/OS 1.8 and above (over 3,500 for all z/OS releases)
  - **2,800+ applications for Linux on System z**
  - 86% of our ISVs maintain OS currency
- Academic Initiative delivering mainframe skills:
  - More than 600 schools participating
  - More than 50,000 students trained
  - 30 courses and more to come
  - Student MF Contests
  - System z Skills Help Desk
  - Over 200 System z IBM Mainframe ambassadors

Simplified
Energy efficient
Virtualized
Secure

IBM Software and ISV Solutions Available for Linux on System z – Where to Find Them

Comprehensive Software Leveraging the Strengths of System z

Development Tools
Compilers C/C++
Exploits new z10 instructions
And Floating Decimal Point

Information Management
System z on Linux
Cognos 8 Business Intelligence
InfoSphere MDM Server
DB2
FileNet CM for InfoSphere Warehouse

Transaction Management
IMS, CICS, WAS, Portal

Software Lifecycle Management Tools

Systems Management
Omegamon
Tivoli Asset Management
Tivoli Service Center for System z
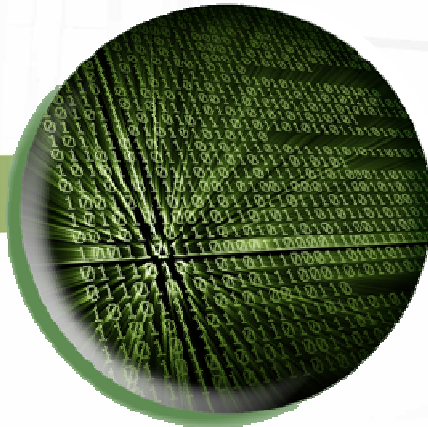
Rational   WebSphere   Information Management   Lotus   Tivoli

Summary of Recent Announcements

Information Management
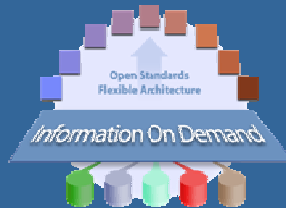
Business Intelligence & Data Warehousing
- Cognos 8 BI for Linux on System z V4
- InfoSphere Warehouse for System z

Database and Content Management
- DB2 for z/OS Vx   (Tech Preview)
- IMS V11 (In Beta)
- FileNet Content Manager for System z on Linux V4.5

Database Tools
- Optim Data Growth Solution for z/OS
  – Siebel Customer Relationship Management
- Optim Solution for Application Retirement for z/OS
- Tivoli OMEGAMON XE for DB2 Performance and Monitoring on z/OS
- DB2 Buffer pool Analyzer for z/OS

Transaction Processing
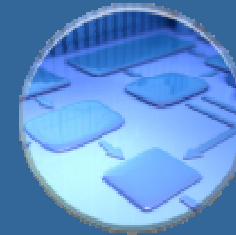
CICS
- CICS TS V4.1
- CICS Performance Analyzer V3.1

WebSphere
- WebSphere Application Server for z/OS V7.0.0.4 (Optimized Local Adapters)
- WebSphere MQ File Transfer for z/OS V7.0.1
- WebSphere Business Events for z/OS V6.2.1
- WebSphere Service Registry and Repository for z/OS V6.3

Summary of Recent Announcements *(continued)*

Systems Management

VISIBILITY   CONTROL   AUTOMATION

Tivoli

- **Tivoli OMEGAMON (multiple releases)**

- **Tivoli Key Lifecycle Management for z/OS**

- **Tivoli Workload Scheduler V8.5**

- **ITCAM for Transactions**
  – Tech Preview (GA 07/09)

- **Tivoli Asset Management for IT V7.2**
  – Tech Preview (GA 4Q09)

- **Tivoli Asset Discovery for z/OS V7.2**
  – Tech Preview (GA 4Q09)

Application Development

Applications

People Teams

Rational

- **Rational System Architect V11.3**

- **Rational Focal Point for Product and Portfolio Management V6.4**

- **Rational Developer for System z V7.6**
  – Tech Preview (GA 3Q09)

- **Rational Team Concert for System z V2**
  – Tech Preview (GA 4Q09)

Collaboration

Lotus

- **WebSphere Portal V6.1**

Extending leadership capabilities for the Dynamic Infrastructure

- **A preview of z/OS Version 1 Release 11***

  - Synergies - with new IBM System Storage DS8000 Release 4.2

  - Trusted - the latest encryption technologies, centralized security certificates, and foundation for unified enterprise-wide identity and access management reduce risk of fraud.

  - Responsive - communications that improve network recoverability, availability, and reduce complexity and latency of transactions

  - Accountable - enhanced measurement to support comprehensive control, analysis, risk management, audit, and compliance plans

  - Smart - a system that learns heuristically from its own environment and is able to anticipate and report on potential issues for predictive analysis

**z/OS
Version 1
Release 11**

z/OS Version 1 Release 11*
Planned availability September 2009

System z With DB2 Scales Further Than Best HP Superdome Banking Benchmark

- Asian Bank
  - IBM System z9 and DB2
  - TCS BaNCS (Cobol)
  - 15,353 Transactions/second
  - 50 Million Accounts
  - IBM benchmark for customer

- Bank of China **
  - IBM System z9 and DB2
  - TCS BaNCS (Cobol)
  - 8,024*** Transactions/second
  - 380 Million Accounts
  - IBM benchmark for customer

- HP/Temenos *
  - HP Itanium
  - Temenos T24 (Java)
  - 2,153 Transactions/second
  - 13 Million Accounts
  - Largest banking benchmark performance claimed by HP

System z and BaNCS Online Banking Benchmarks

* SOURCE: TEMENOS BENCHMARKS; http://h71028.www7.hp.com/enterprise/downloads/TemenosBenchmark.pdf
** SOURCE:http://www.enterprisenetworksandservers.com/monthly/art.php?2976 Source: InfoSizing FNS BANCS Scalability on IBM System z – Report Date: September 20, 2006
*** Standard benchmark configuration reached 8,024 tps, a modified prototype reached 9,445 tps

System z With DB2 Scales Further Than Best HP Superdome Banking Benchmark, with Java

- **Asian Bank**
  - **IBM System z9 and DB2**
  - **TCS BaNCS (Cobol)**
  - **15,353** Transactions/second
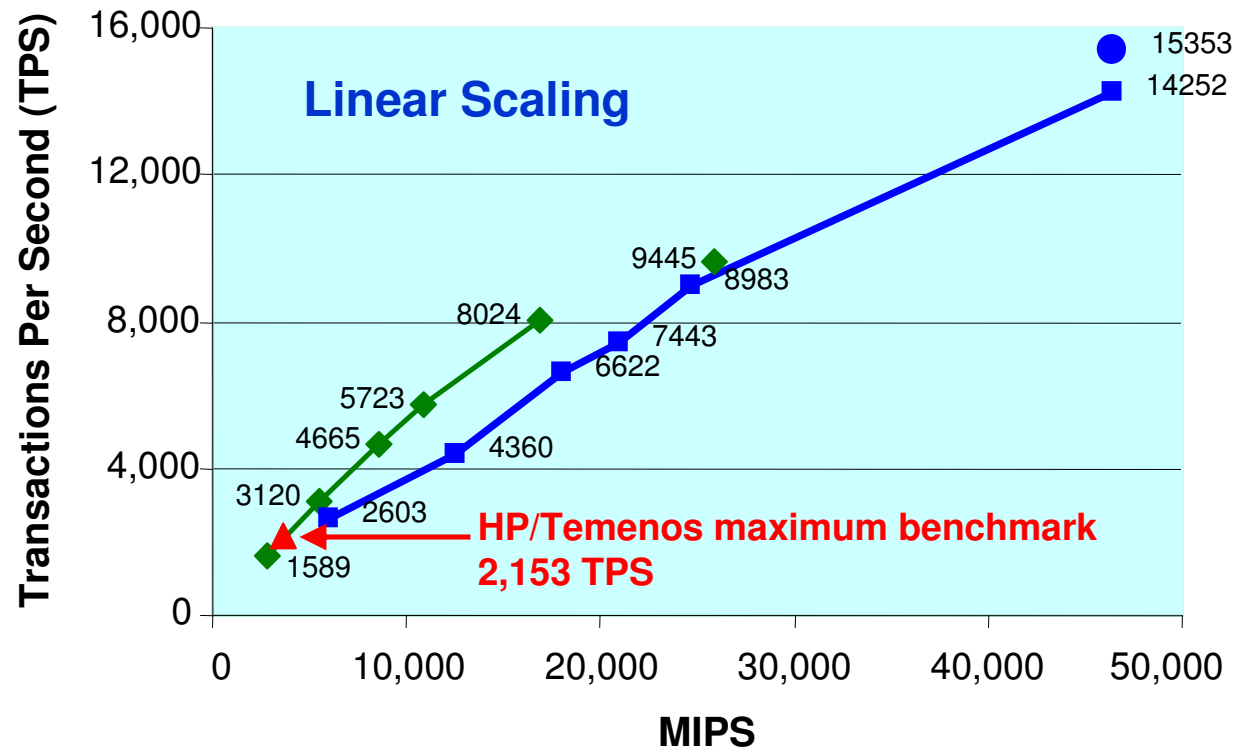 - **50** Million Accounts
  - IBM benchmark for customer

- **IBM Benchmark**
  - **IBM System z10, WAS, DB2**
  - **Temenos TCB (Java)**
  - Result of preliminary Temenos TCB optimization prototype

- **HP/Temenos** *
  - **HP Itanium**
  - **Temenos T24 (Java)**
  - **2,153** Transactions/second
  - **13** Million Accounts
  - Largest banking benchmark performance claimed by HP

System z and Temenos TCB Online Banking Benchmarks

Transactions Per Second (TPS) vs **MIPS**

Linear Scaling

15353
15000
14252

9445
8983
8024
7443
6622
5723
4665
4360
3120
2603
1589

IBM/Temenos Java z-benchmark

HP/Temenos maximum benchmark 2,153 TPS

* **SOURCE**: TEMENOS BENCHMARKS; http://h71028.www7.hp.com/enterprise/downloads/TemenosBenchmark.pdf
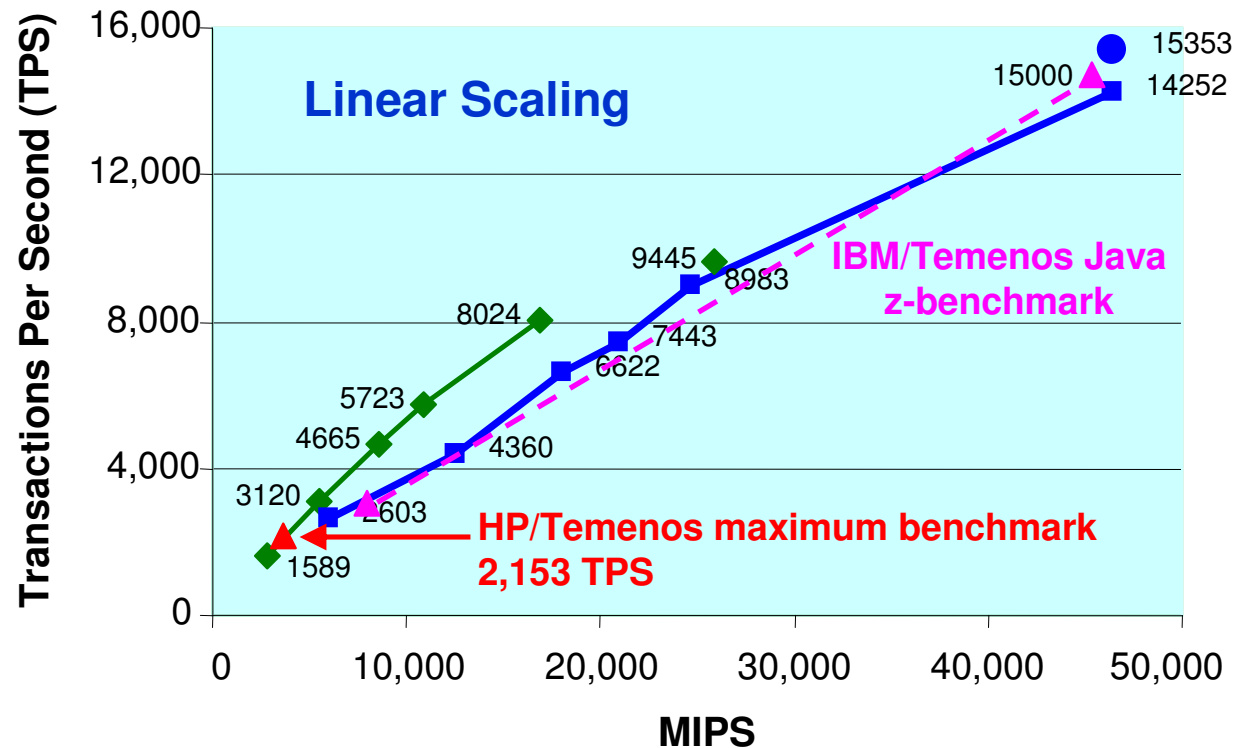
Processing *WLM Resources*

Prevent large queries from monopolizing a system

Number of critical queries that completed: tripled,
Response times for critical work improved 88% and more.

Throughput Effects

Queries Completed / minute

900	
800	
700	
600	
500	
400	
300	
200	
100	
0	

3 x

Triv.Mod/ Med Large   Triv. Mod Med Large

Policy:
Equal Priority

WLM Policy in effect

Response Time Effects

Avg Response Times

180	
160	
140	
120	
100	
80	
60	
40	
20	
0	

88% + faster

Moderate/ Med /Large   Triv   small mod l Large

Policy:
Equal Priority

WLM Policy in effect
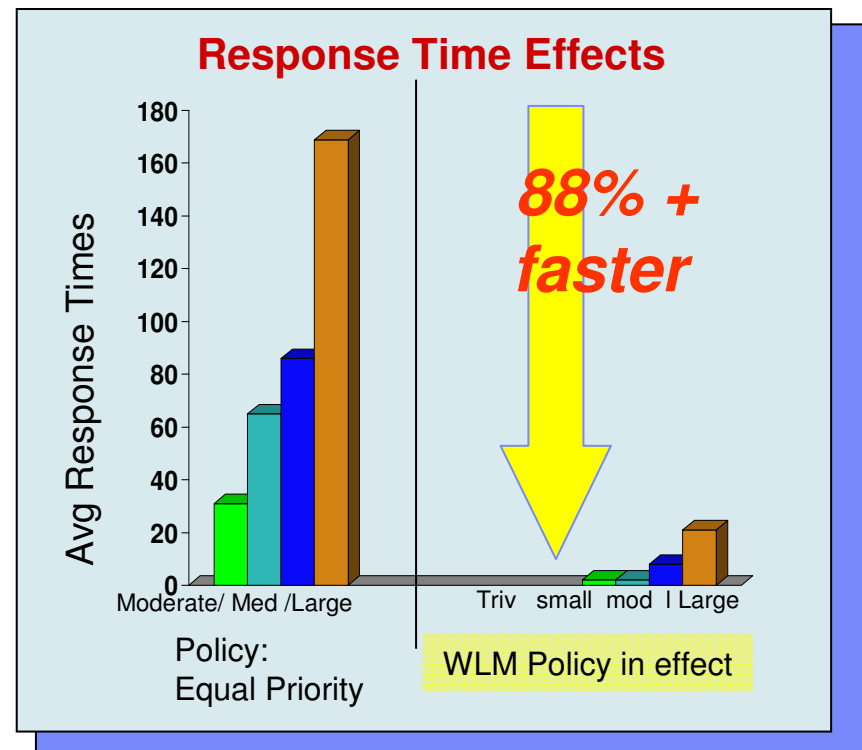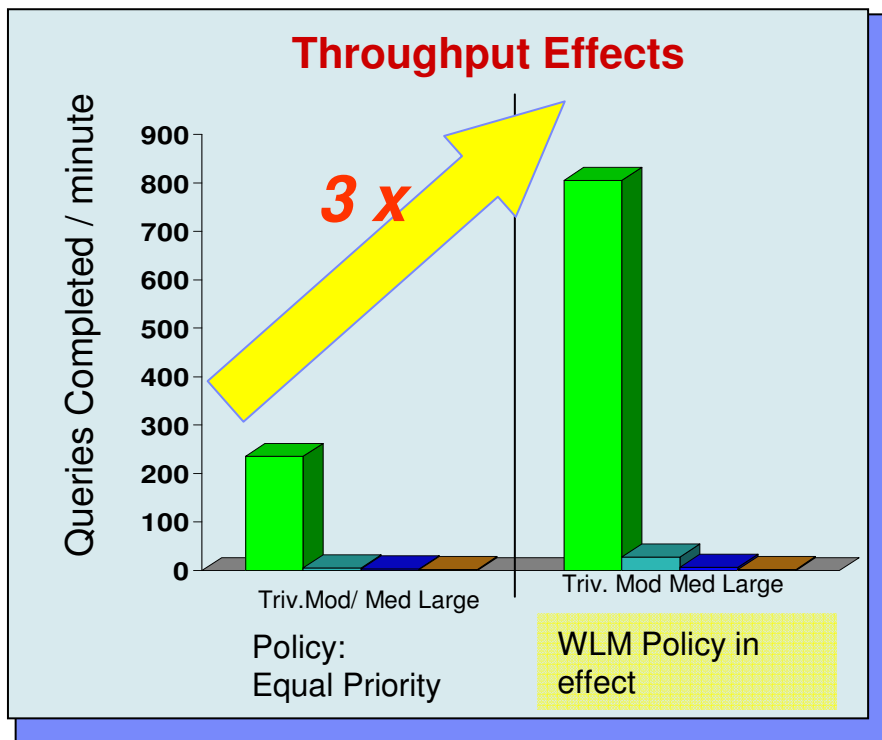
Additional scalability/performance enhancements
*Previewed with z/OS V1.11**

- **Improvement in storage response times**
  - DFSMS™ support planned for DS8000 R4.2 solid state drives (SSD, also called flash memory)
  - New SMS policies to gather usage information using SMF that is intended to help manage data placement to take the best advantage the new SSDs.

- **Performance improvements for XL C/C++ applications on System z10 servers**.
  - New prefetch capability can heuristically generate System z10 prefetch instructions as appropriate

- **Reduced memory management with large (1MB) page support**
  - Support for AMODE 64 XL C/C++ Language Environment applications, in addition to current exploitation by the 64-bit SDK for z/OS, Java® Technology Edition, V6

- **Performance improvements for large systems with many zIIPs**
  - Faster processors can actually spend more time waiting for memory access! HiperDispatch helps improve cache management and overall system performance.
  - HiperDispatch algorithms to be updated for zIIP processors.

- **Increase the efficiency of batch windows**
  - Use IEFBR14 to delete catalogue reference to unneeded data sets and avoids the lengthy process of recalling the DS just to delete it

- **Virtual Storage Constraint Relief !**
  - Removes constraints within the base z/OS operation system and can allow more work to be processed on a single z/OS system.
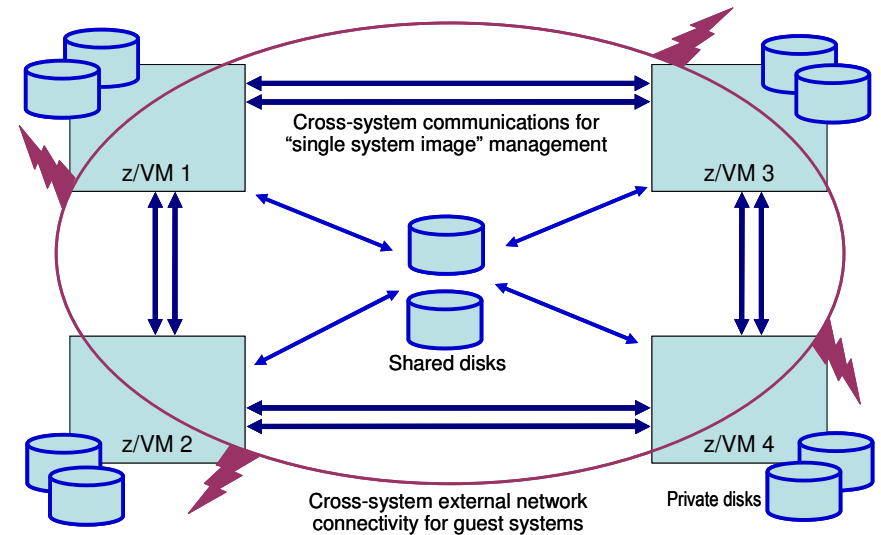
z/VM Version 6.1
The Foundation for System z Virtualization Growth

- **New function and packaging in z/VM V6.1**
  - Exploitation of the System z10 server cache management instructions to help improve the performance of z/VM virtual networking
  - Better integration with IBM Systems Director by shipping the Manageability Access Point (MAP) agent with z/VM V6.1 for easier installation of the agent

- **Establishes a new z/VM technology base for IBM System z10 and future systems**
  - Acknowledges the highly attractive economics of workload consolidation on z10 servers
    - z/VM V6.1 only operates on z10 EC, z10 BC, and future generation servers
  - Allows optimization of z/VM function for greater business value on newer hardware
  - Support for FICON Express8 – designed to provide faster access to data with a link data rate of 8 Gigabits per second (Gbps)
  - Inclusion of several functional enhancements previously delivered in the z/VM V5.4 service stream

- **Preview announcement includes statements of direction for future z/VM support**
  - z/VM hypervisor clustering support: "Single System Image"
  - Linux virtual machine mobility support: "Live Guest Relocation"

z/VM Statements of Direction
Clustered Hypervisor Support and Guest Mobility

- **Provides shared resources for the z/VM systems and virtual machines**

- **Users can run z/VM system images on the same and/or different System z10 servers**

- **Simplifies systems management of a multi-z/VM environment**
  - Single user directory
  - Cluster management from any system

- **Clients can cluster up to four z/VM systems**

- **in a Single System Image (SSI)**
  - Apply maintenance to all systems in the cluster from one location
  - Issue commands from one system to operate on another
  - Built-in cross-system capabilities
  - Resource coordination and protection: network and disks

- **Dynamically move Linux guests from one z/VM system to another with Live Guest Relocation**
  - Reduce planned outages; enhance workload management
  - Non-disruptively move work to available system resources **and** non-disruptively move system resources to work

Cross-system communications for "single system image" management

z/VM 1

z/VM 3

Shared disks

z/VM 2

z/VM 4

Private disks

Cross-system external network connectivity for guest systems

Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Fractional Availability Improvements Are Important

Example: Financial Services Company

- – $300B assets, 2500+ branches, 15M customers
- – Retail banking, loans, mortgages, wealth management, credit cards
- – CRM System – branches, financial advisors, call centers, internet
- – Number of users – 20,000+

	Unix/ Oracle	Systemz DB2
Availability %	99.825%	99.975%
Annual outage	15h 20m	2h 11m
Cost of Downtime	$22.9M	$3.3M

Sources: ITG Value Proposition for Siebel Enterprise Applications, Business case for IBM System z & Robert Frances Group

Financial Impact of Downtime Per Hour

| Industry segment	Cost
Energy	$2,818K
Telecommunications	$2,066K
Manufacturing	$1,611K
Financial	$1,495K
Information Technology	$1,345K
Insurance	$1,202K
Retail	$1,107K
Pharmaceuticals	$1,082K
Banking	$997K
Consumer Products	$786K
Chemicals	$704K
Transportation	$669K

z/OS availability enhancements
*Previewed with z/OS V1.11**

- **z/OS V1.11 plans to extend predictive failure analysis -** z/OS system heuristically learns from its own environment and is able to anticipate and report on potential system issues (however rare) before they are an impact to your business.

- **z/OS UNIX® System Services with System Call (Syscall) Trace** - intended to gather more information about program processing history to facilitate application debugging.

- **New Allocation commands** - can help improve system availability by allowing you to change Allocation settings without an IPL.

- **New latch identity service for improved latch contention**

- **Improved serviceability,** including IPL restart improvements and improved dump management

- **Parallel Sysplex:**

- **Networking** (Sysplex Distributor)
  - New WLM routing algorithms for better zIIP and zAAP workload routing
  - Connection routing accelerator for performance
  - Intelligent routing for multitier z/OS applications

- **Availability**
  - New health checks for DAE and STP
  - Alternate Sysplex root file system support
  - Enhancement to XCF and XEC
  - Auto IPL (R10)

High Cost of Security Breaches

- Average cost of security breaches continues to rise according to a 2008 Ponemon Security Study

- Average costs of a data breach: $202 *per record*

  ▶ Average total: $6.6M *per breach*

  ▶ Cost of lost business: on average $4.59 M

  ▶ Over 84% of organizations had over one breach

- Each breach involved paper notifications wasting energy and paper

 - Worst of all, damages company reputation

Costs per Breach

$8 $15

$39

$139

- ■ Detection ■ Notification
- ■ Further Response ■ Lost Business
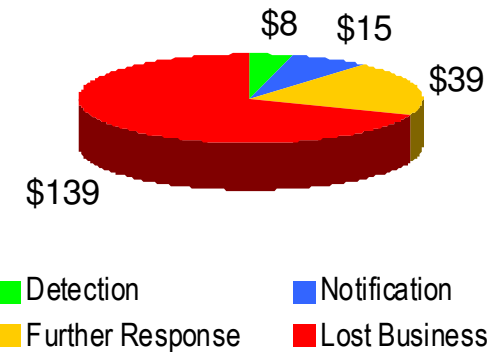
Notifications also consume at least one ton of paper!

(You don't see System z cited on front page news covering security breaches.)

System z – Advancing security

- *Application Intrusion Detection*
  - "Defense in depth" with improved network and application network security through network security services provided by z/OS
  - DataPower and ISS appliances leverage System z Security and Crypto services for improved threat detection and centralized controls
- *Continued focus on z/OS Health Checks to help maintain best practice" configurations*
- *Continued focus on industry standard encryption algorithms and encryption standards*
  - Improved performance and security to address industry and compliance needs
  - FIPS evaluations expanded to include SW cryptography & protocols
- *Enterprise hub for key management*
  - System z cryptography & key management for heterogeneous servers and devices with open standards
- *Digital Certificate provisioning & management*
  - Centralized provisioning of certificates and keys with additional protocols to facilitate integration with applications and heterogeneous platforms
- *Improved Auditing and Compliance*
  - Reducing auditor workloads and Improved scope of enterprise-wide compliance reporting with end to end propogation of user identity for greater accountability
- *Cryptographic processing*
  - Increased scale and functionality to meeting emerging requirements
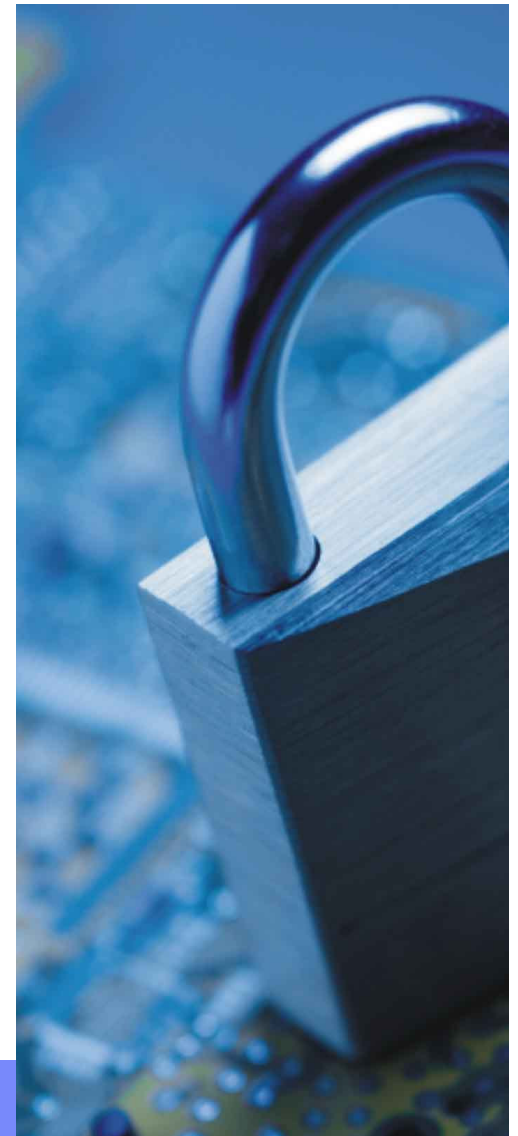
Network Simplification
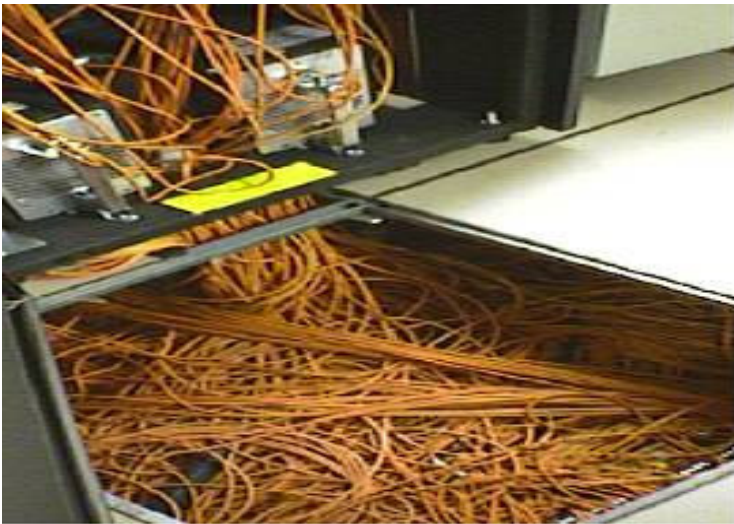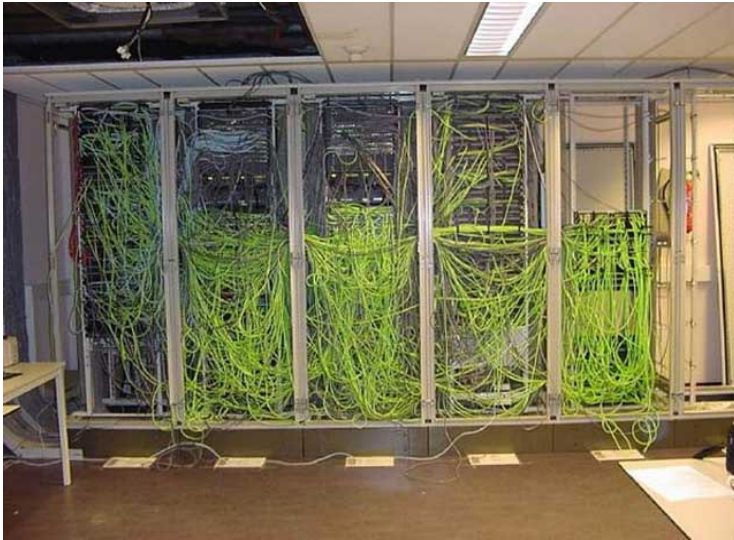
- **Consolidation replaces cables and routers with internal connections**

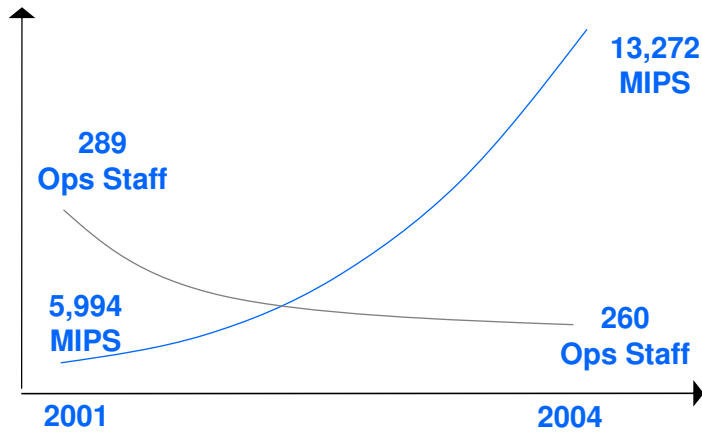- **Better performance and security**
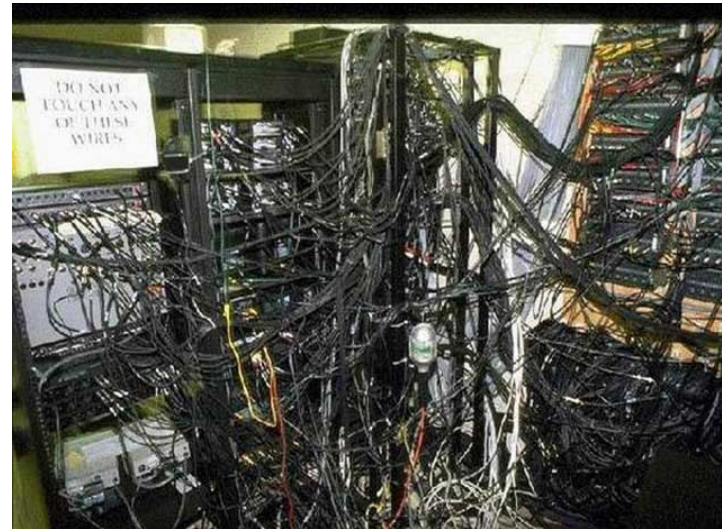
Enhancements in networking performance
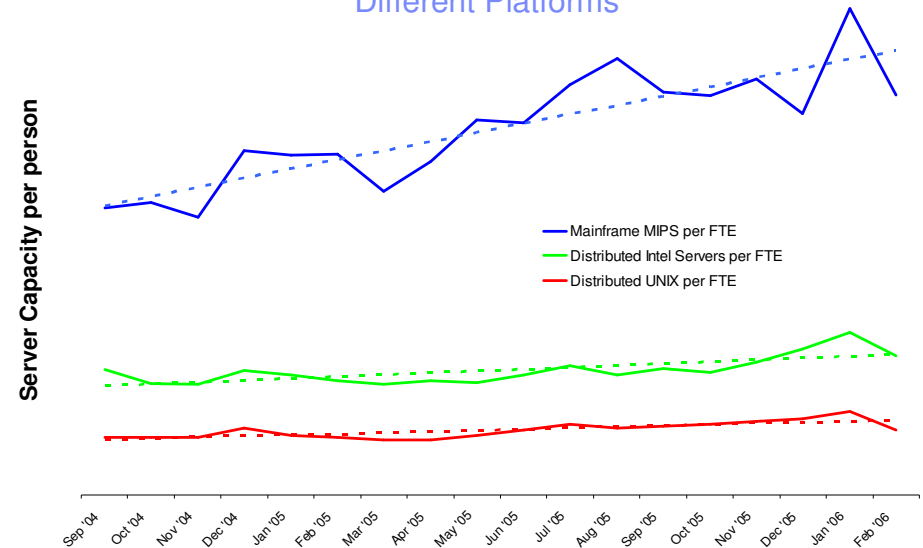## *Previewed with z/OS V1.11**

- **z/OS Communications Server designs for networking performance:**
  - Improved throughput in support of disaster recovery or global operations
    - Dynamic tuning of TCP window for bulk transfers over high-latency, long distance networks

  - More performance for Web-based applications
    - System-wide caching of domain name server (DNS) responses
    - Applications with frequent resolver queries can benefit.
    - Improved Fast Cache Accelerator function

  - Intelligent sysplex networking
    - The Sysplex Distributor plans to take into account the capacity, performance and health characteristics of both the tier 1 and the tier 2 z/OS server applications. This new function is intended to improve the quality of the load balancing decisions made by Sysplex Distributor in a multi-tier z/OS server environment

  - Many other performance improvements
    - New TCP/IP resolver improvements, Sysplex Distributor routing accelerators and WLM algorithms, socket error detection, QDIO accelerator function, Enterprise Extender and SMB improvements.
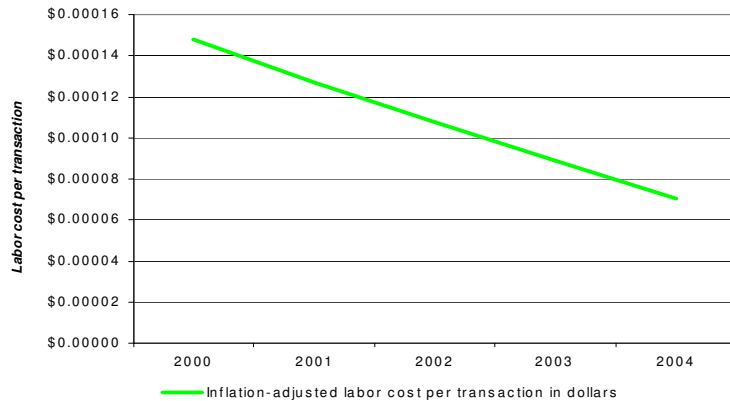
Mainframe Labor Costs Are Going Down

Data Center Staffing Levels for System z Have Not Increased Despite Large Increase in MIPS

13,272 MIPS

289 Ops Staff

5,994 MIPS

260 Ops Staff

2001

2004

Hardware Managed Per Person for Different Platforms

Server Capacity per person

— Mainframe MIPS per FTE
— Distributed Intel Servers per FTE
— Distributed UNIX per FTE

Sep '04 Oct '04 Nov '04 Dec '04 Jan '05 Feb '05 Mar '05 Apr '05 May '05 Jun '05 Jul '05 Aug '05 Sep '05 Oct '05 Nov '05 Dec '05 Jan '06 Feb '06

Labor Cost Per Transaction on System z is Decreasing

Labor cost per transaction

$0.00016
$0.00014
$0.00012
$0.00010
$0.00008
$0.00006
$0.00004
$0.00002
$0.00000

2000 2001 2002 2003 2004

— Inflation-adjusted labor cost per transaction in dollars

First National Bank of Omaha

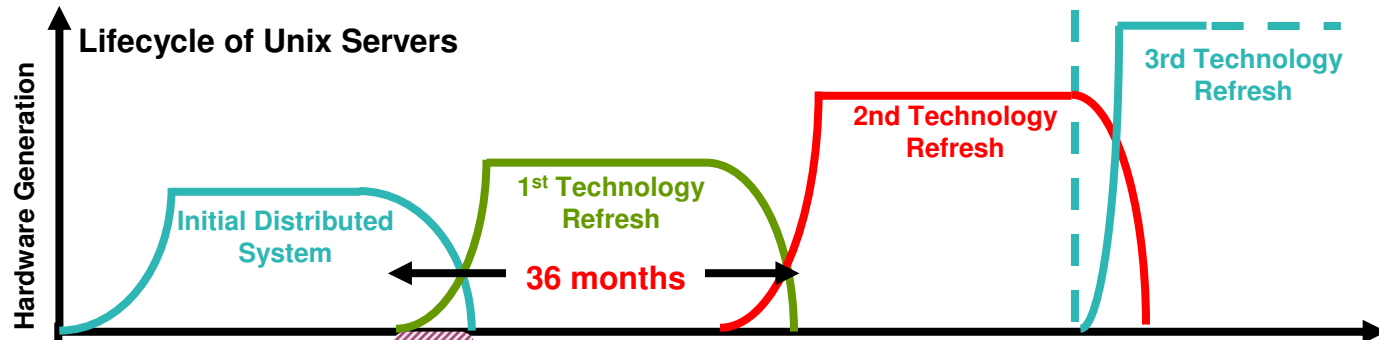|	Servers	Reliability	Utilization	Staff
First move: Implemented distributed computing architecture that became **too difficult to monitor, maintain, upgrade and scale**	▪ 30+ Sun Solaris servers ▪ 560+ Intel ser...	Un-acceptable	12%	24 people growing at 30% year
Next move: Consolidated back on the mainframe	z990	Much improved	84% with additional reserve capacity *on-demand*	Reduced to 8 people

Staff growth reversed by consolidating to the mainframe

z/OS Simplifying operations and programming
*Previewed with z/OS V1.11**

- A z/OS Management Facility (Statement of Direction)*
  - More easily manage system
  - Initial release to facilitate problem data management

- IBM Health Checker for z/OS
  - New health checks for:
    - Auto IPL best practices and device validation
    - DFSMS to detect IMBED and REPLICATE
    - Static resource manager
    - Dump Analysis and Elimination
    - SDSF using SAF
  - New migration checks for:
    - IPSec filter rules, BIND9 DNS usage, DFSMSrmm, STP/ ETR, Message Flood Automation

- Advanced Communications Facility Trace Analysis Program (ACF/TAP) is planned to be made a part of z/OS Communications Server element **(no need for use the Advanced Communications Facility Network Control Program (ACF/NCP)).**

- Faster and easier report generation for DFSMSrmm and RMF.

- Lots of ISPF updates

- Lots of DFSMSrmm updates

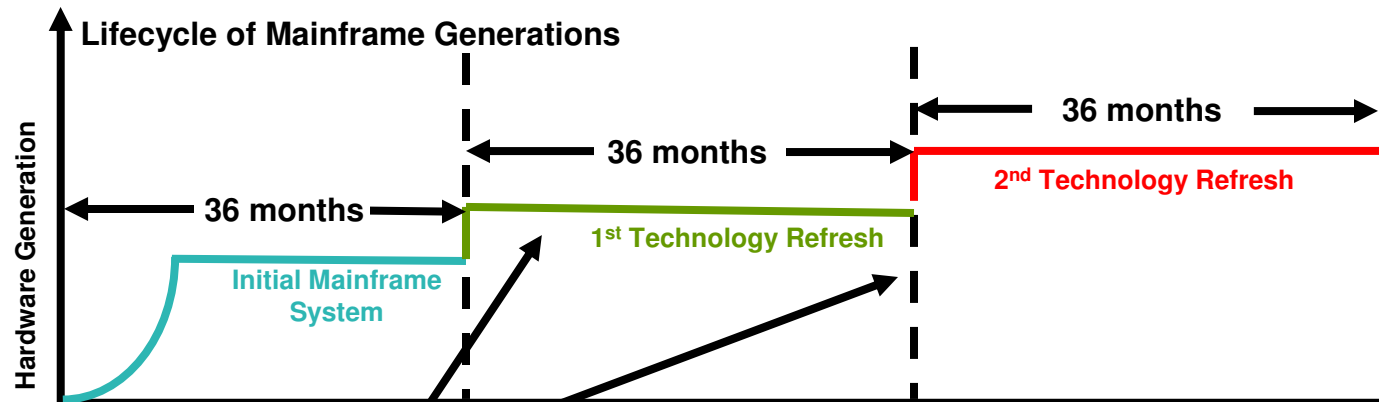# New York Financial Services Company – Useful Lifetime Of 36 Month Lease

Lifecycle of Unix Servers

Hardware Generation

Initial Distributed System

1st Technology Refresh

2nd Technology Refresh

3rd Technology Refresh

36 months

6 months provisioning

30 months production

Setup and tear down 15 People, 5 full time

Observed at a large

financial service customer

In each 36 month lease there are only 30 months production use

Setup and tear-down time costs 25% more. Plus . . . 41 hours of FTE setup and tear down labor per server = $3,075

Lifecycle of Mainframe Generations

Hardware Generation

Initial Mainframe System

36 months

1st Technology Refresh

36 months

2nd Technology Refresh

36 months

1 Weekend upgrading to new hardware and software levels

36 months production

**No need to retire the server, upgrade in place**

Weekend upgrades performed by IBM

Capacity on demand pricing

System z10 Capacity Provisioning Manager
Efficient management of System z10 server capacity

- **Unpredictable or recurring workload spikes may exceed System z10 server capacity**
  - You may need to use On/Off Capacity on Demand frequently
  - BUT ... manual processes may be slow, inefficient, or complex
- **The System z10 Capacity Provisioning Manager can help provide:**
  - Autonomic management - supplementing or replacing manual monitoring of OOCoD
  - Flexibility - can activate OOCoD incrementally even in combination with CBU
  - Efficiency -strict adherence to policies can provide capacity on demand
  - Familiarity – CPM uses:
    - WLM and RMF – similar to other WLM-based capabilities
    - Modern graphic interfaces
    - CIM to communicate with other elements and System z subsystems
    - Available on z/OS V1.9 and later
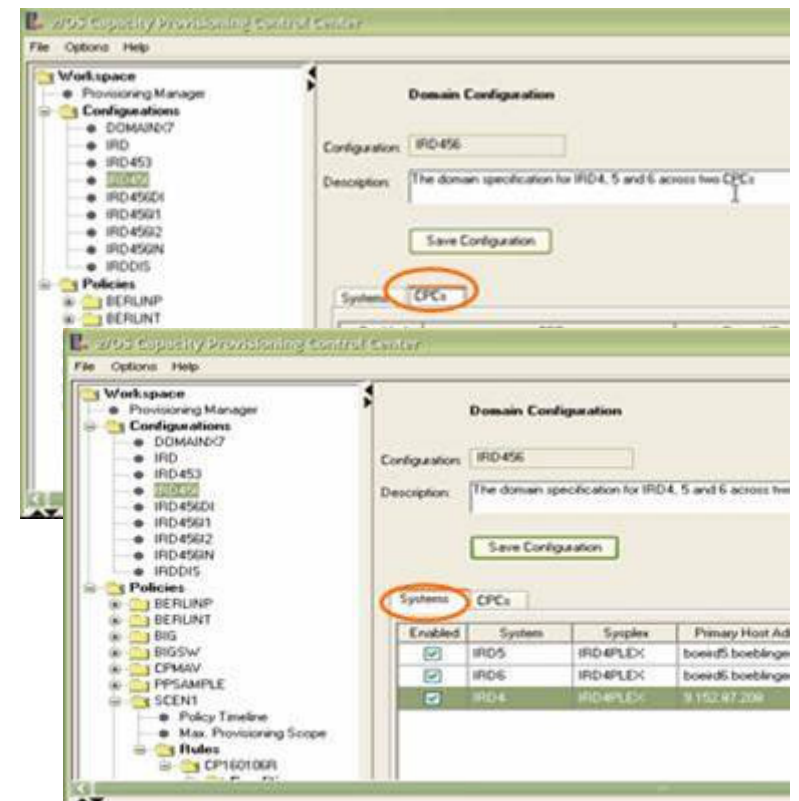
Properly account for your costs

"False Economics":
Over-allocation of Costs to System z

	Intel/UNIX Servers	Mainframes
Direct Costs Hardware, Software, Admin	$ Correct allocation	$ Correct allocation
Shared Costs Power, Facilities, Network, Mgmt overhead, etc.	🚫 Incorrect, zero allocated	$ Correct allocation
	All of Intel/UNIX incurred costs are moved to mainframe	**+$**

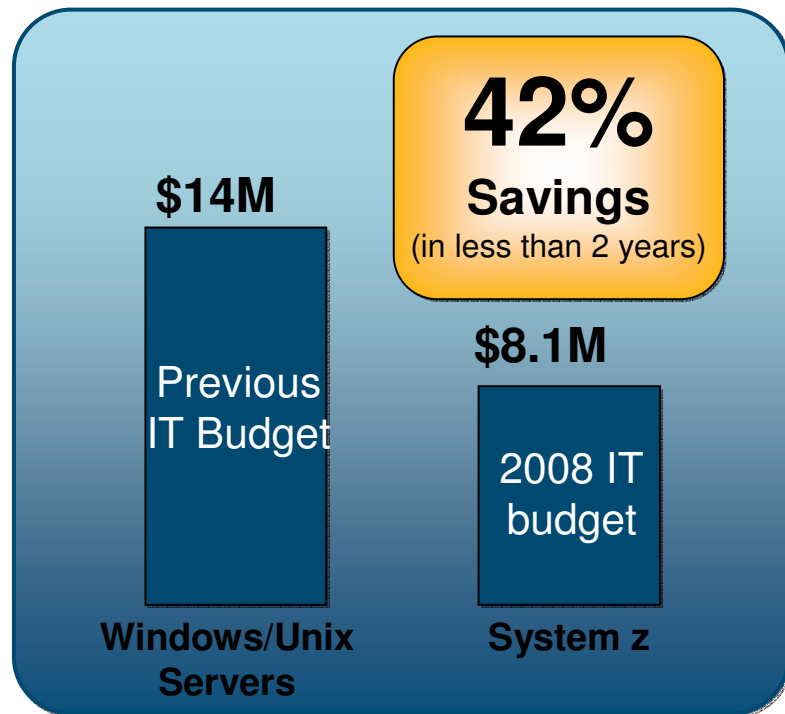## Getting to "True Economics"

Core problem

- Difficult to assign shared costs to platforms
- Shared costs lumped in with mainframe costs
- Thus, mainframe costs tend to be overstated
- Platform decisions are made that waste cash

Pragmatic quick-return remedy

- Meter basic usage
- Identify largest cost distortions
- Incorporate information in decision making

Optimize deployment of applications and data

Deploying SAP database and application servers

42%
Savings
(in less than 2 years)

$14M

Previous
IT Budget

Windows/Unix Servers

$8.1M

2008 IT budget

System z

BALDOR $1.8 billion Electric motors manufacturer

Top three reasons for savings

✓ Software and hardware licensing costs dramatically reduced

✓ Software and hardware maintenance costs are significantly down

✓ Networking costs plunged, while infrastructure was drastically simplified

Expected Benefits Realized: Availability and Performance

The System z decision was driven by expected benefits:

- **Reduced complexity**

- **High availability**

- **Ease of maintenance**

- **Dynamic Workload**

- **Good consistent application response time (SAP)**

- **zLinux for rich toolset, ease of use**

Additional Benefits Realized: Significant Cost Savings

+ **Reduced IT budget by 42% - in less than 2 years**

+ **Reduced floor space by 70%**

+ **Reduced software and hardware maintenance by more than 50%**

+ **Reduced power consumption by more than 60%**

+ **Reduced total TCO from 2% of sales to below 1% - and realized 1 year ahead of schedule**

Summary

- We are delivering a New Generation of z software and hardware

- SOA and System z together, extend and leverage decades of massive business investments

- The z ecosystem now enables leap frogging to the Next Generation of Applications

- System z is being re-architected for Enterprise Data Serving

- It's all about the economies of scale and how System z capabilities and 'Quality of Service' makes a difference

Thank you!