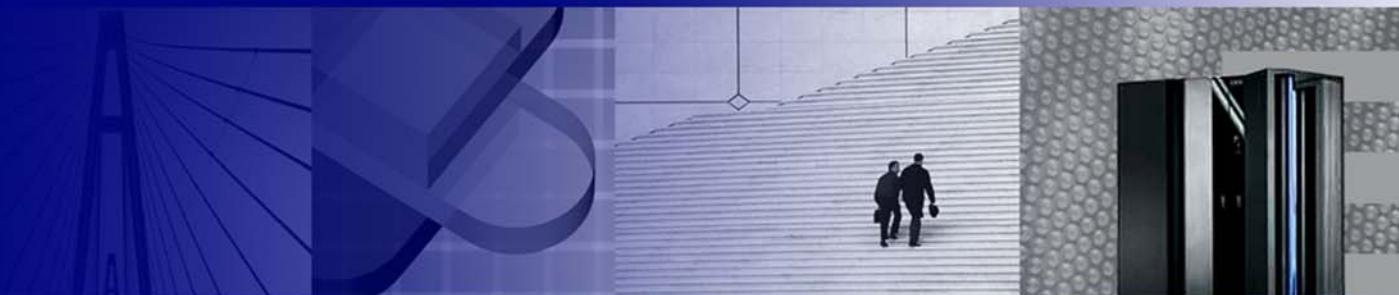




A Fresh Look at the Mainframe When the Mainframe Really IS the Lowest Cost Platform



Ray Jones
WW Vice President, z Software



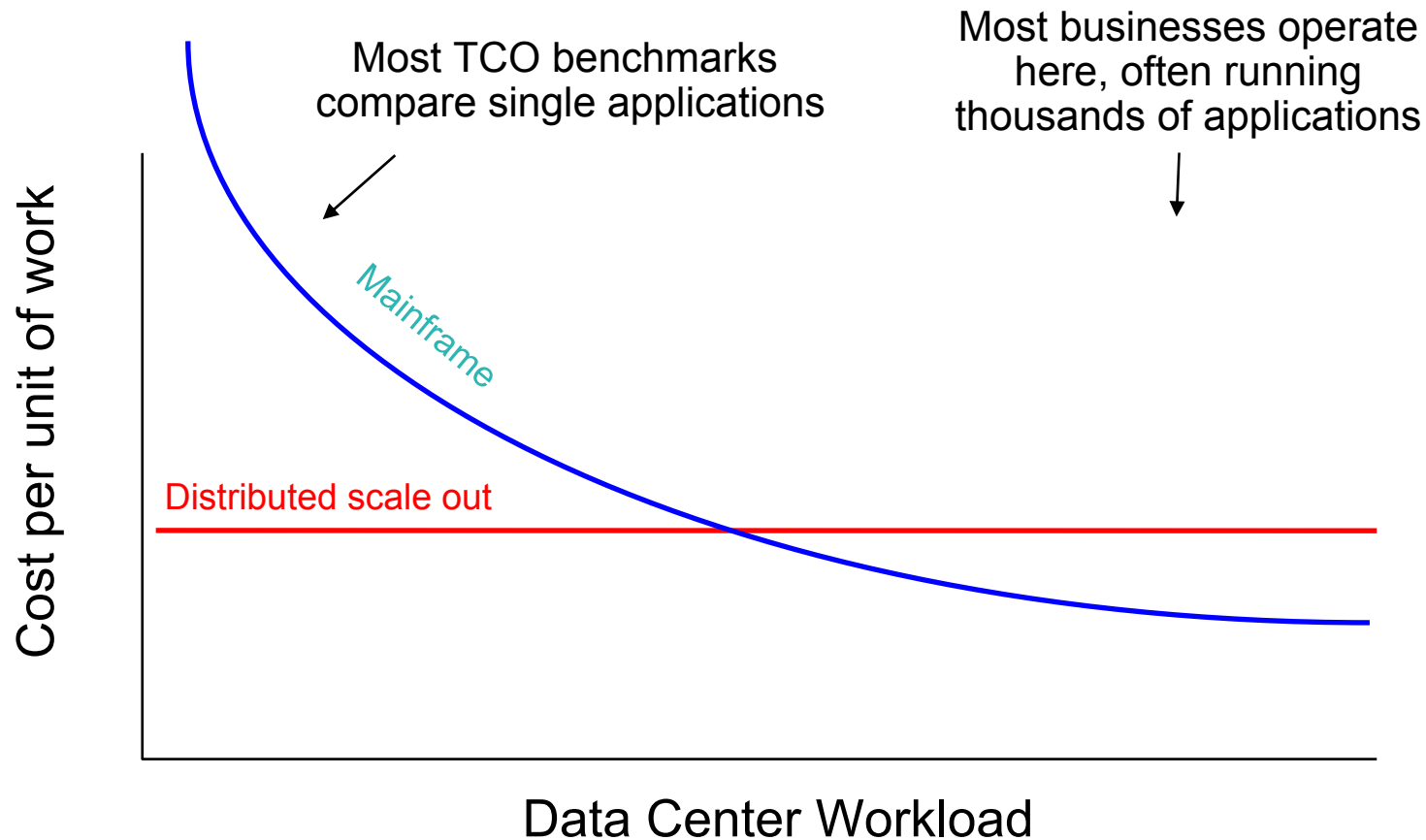
Let's Break Down the Elements of Cost

Total Cost of Ownership =

Hardware/Maintenance
+ IBM Software
+ Labor
+ Environmentals
+ required Quality-of-Service
(Availability, Security, Disaster/Recovery...)
+ other Elements
(ISV software, Exploiting new Function...)

The total cost requires a total picture of your I/T assets and expenses

Mainframe Cost/Unit of Work Decreases as Workload Increases



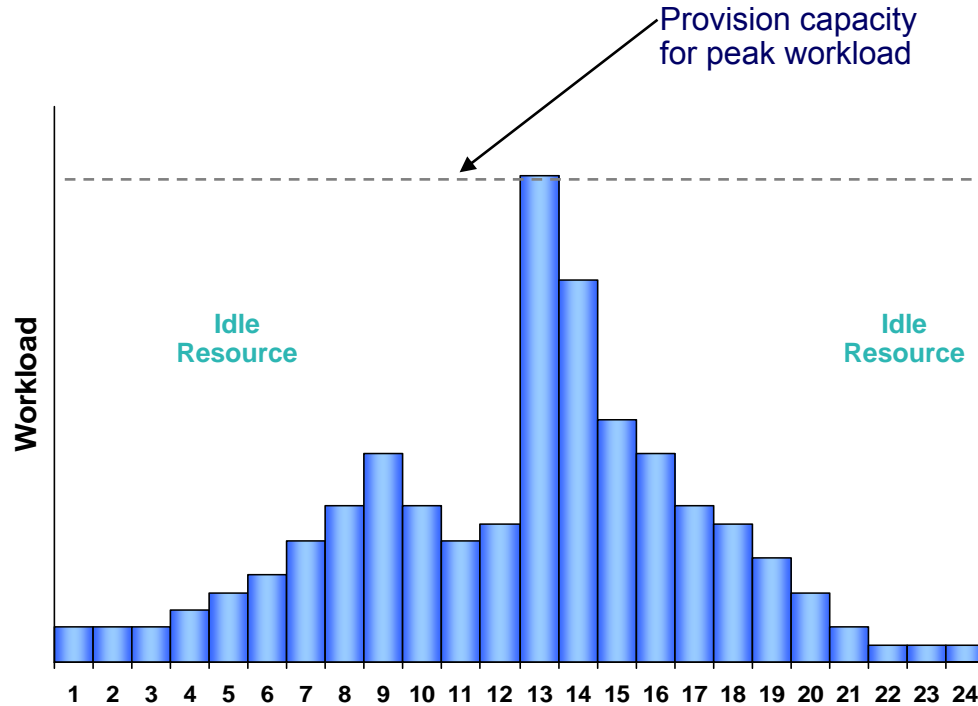
Utilization of Distributed Servers & Storage

Typical utilization of:
 Windows Servers 5-10%
 UNIX Servers 10-20%
 System z Servers 85-100%



Server dedicated to one application

The cost of storage is typically three times more in distributed environments



Storage Allocation

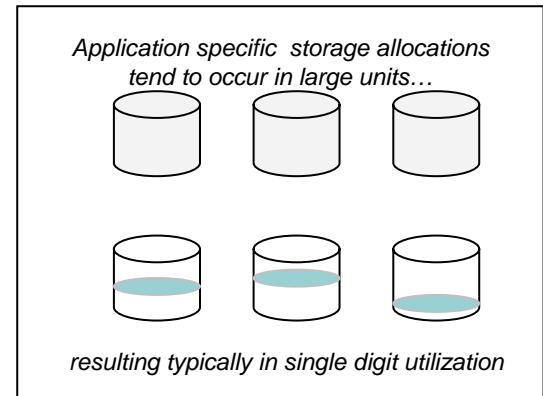
- ▶ Application-specific resulting in over-allocations
- ▶ Fine grained storage allocation mechanisms characteristic of mainframe storage are uncommon in distributed environments.

Storage Utilization

- ▶ Single digit utilization for distributed environments is not uncommon
- ▶ Storage utilization of 80% + is typical for mainframe

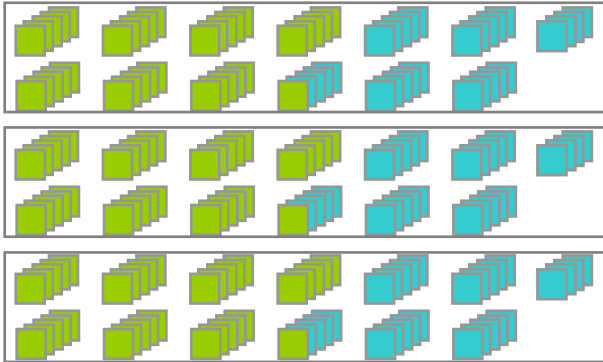
Storage Management

- ▶ Data disaster recovery, synchronization, and transfer requirements add complexity and cost



Asian Financial Services Customer Offload Project - Overall

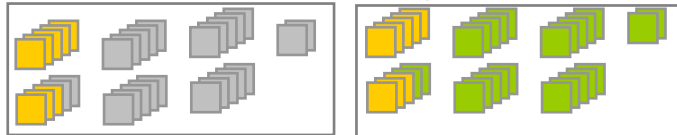
3x HP 64-way Production Application and DB



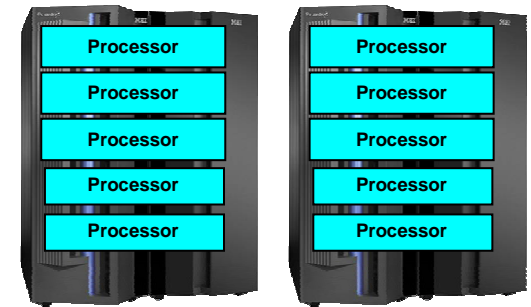
1x HP 64-way Dev&Test / Batch



2x HP 32-way PL/1 (Mgmt, Dev&Test, and Batch)



2x z990 5-way (production)



Z990 7-way (production + test)



17 processors
(6700 MIPS)



320 Unix
processors
(816,002 RPE's)

122 RPE's per MIP

Plus:

2x HP 16-way servers : external, HP rx8620

3x IBM P570 servers : Web Appl server

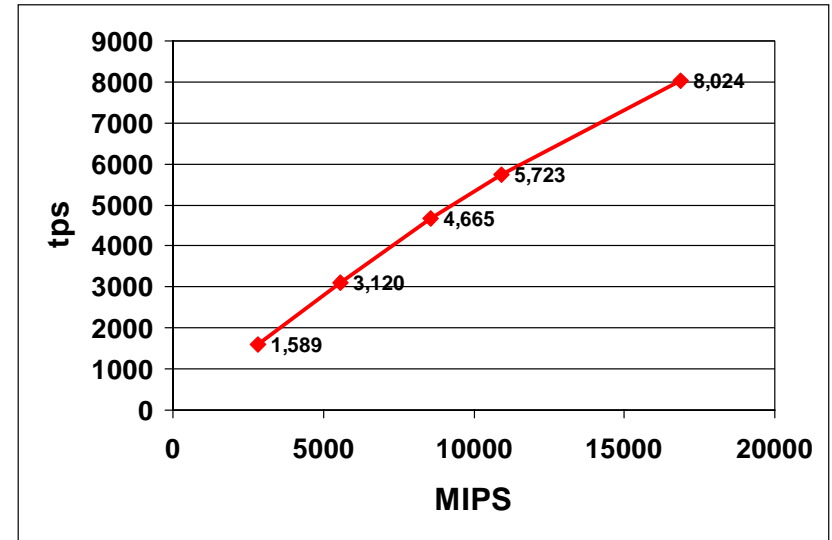
No disaster recovery

FNS and IBM Deliver Record-breaking Banking Benchmark Performance



2 54-way z9
52 TB Storage
380 Million Accounts

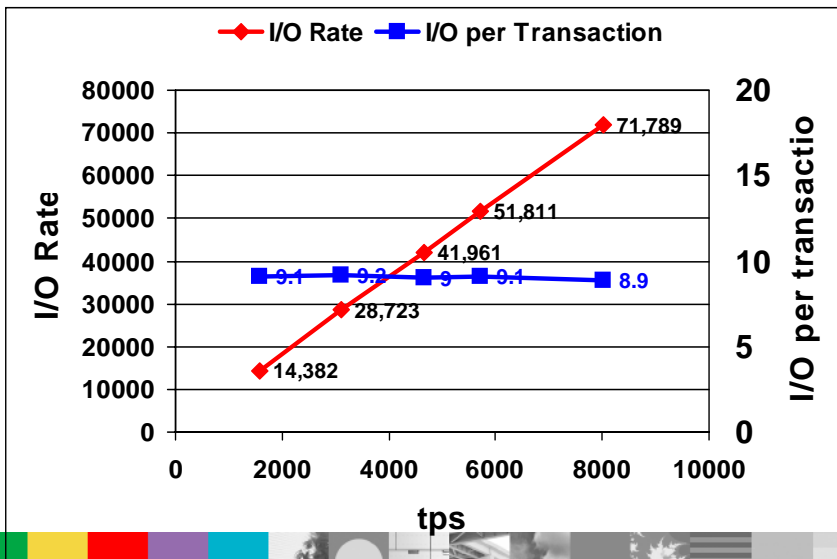
CICS
DB2
3 Billion Transaction Histories



9,445 tps at 85% utilization

"FNS and IBM have delivered an outstanding core banking benchmark result which highlights FNS's ability to deliver a core banking platform that will attain high levels of availability, scalability and robustness for the largest banks in the world."

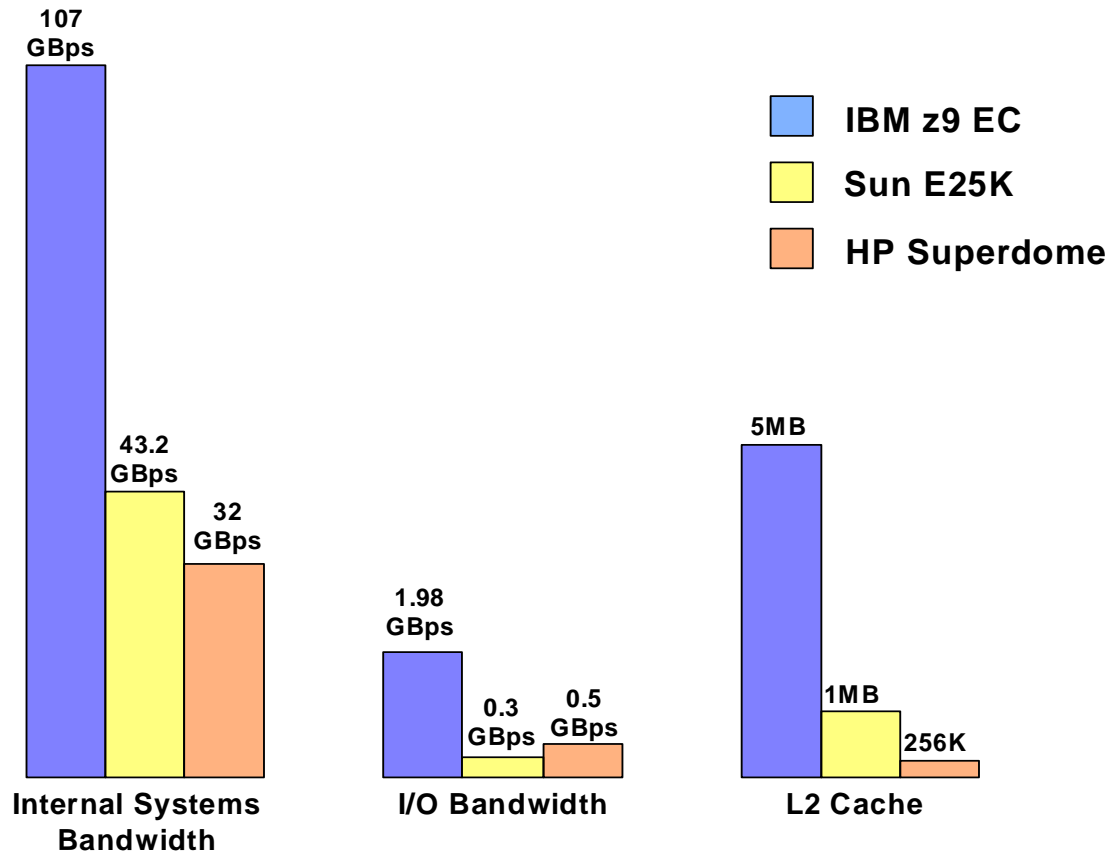
Tony Ward, CEO Financial Network Services



System z designed for high-throughput scalability

Comparison of mainframe with distributed

Per Processor Capacity

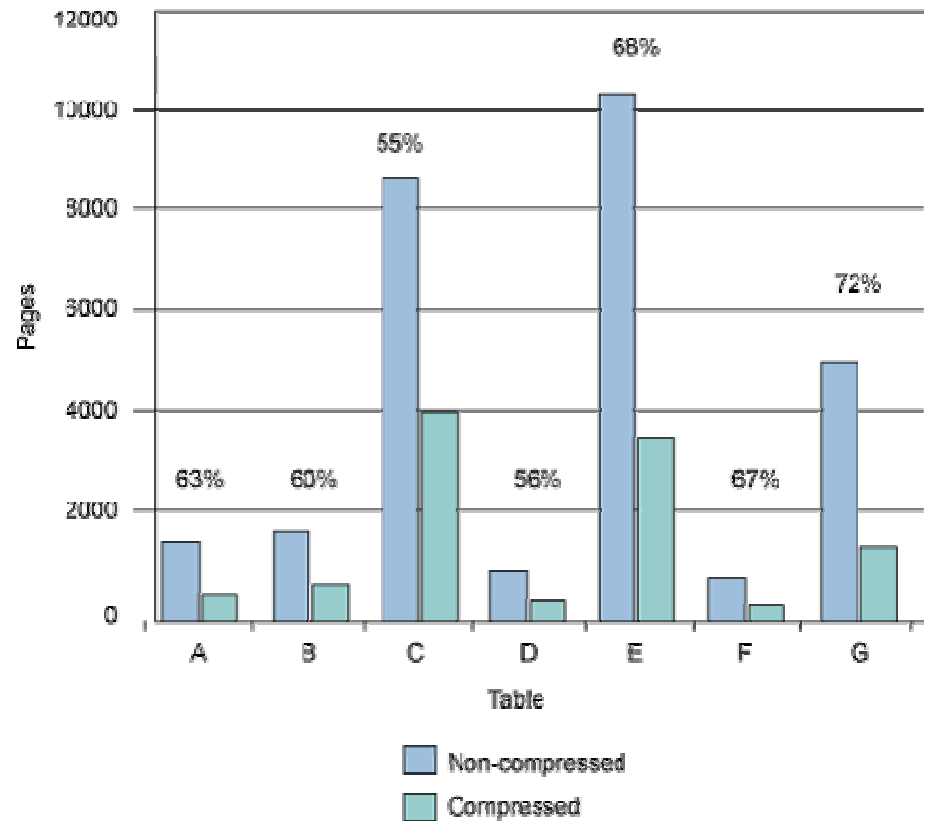


Storage savings from DB2 9 data sharing/compression

- Customers using beta versions of DB2 9 reported 50–80% savings for certain large database installations
- For one customer data set, a 179.9GB table using 32KB pages was reduced to only 42.5GB: a savings of 76.4%

⇒ **Typical TCA savings of \$945K**

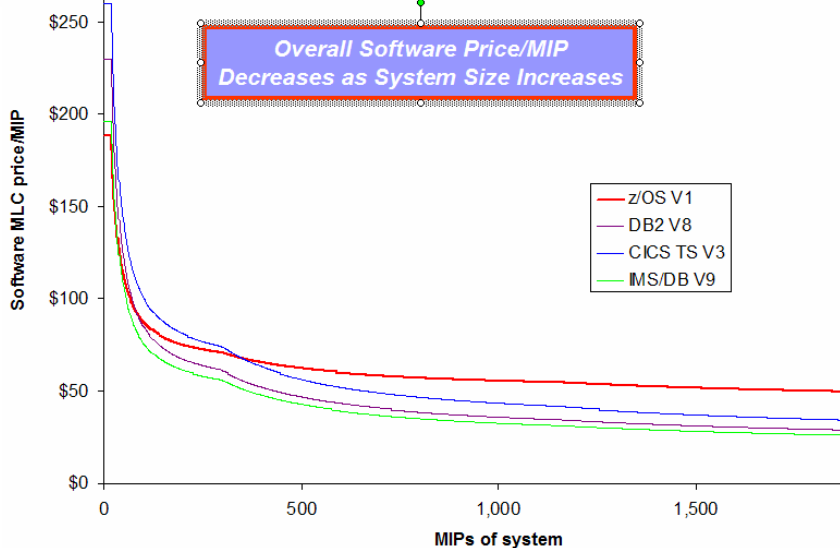
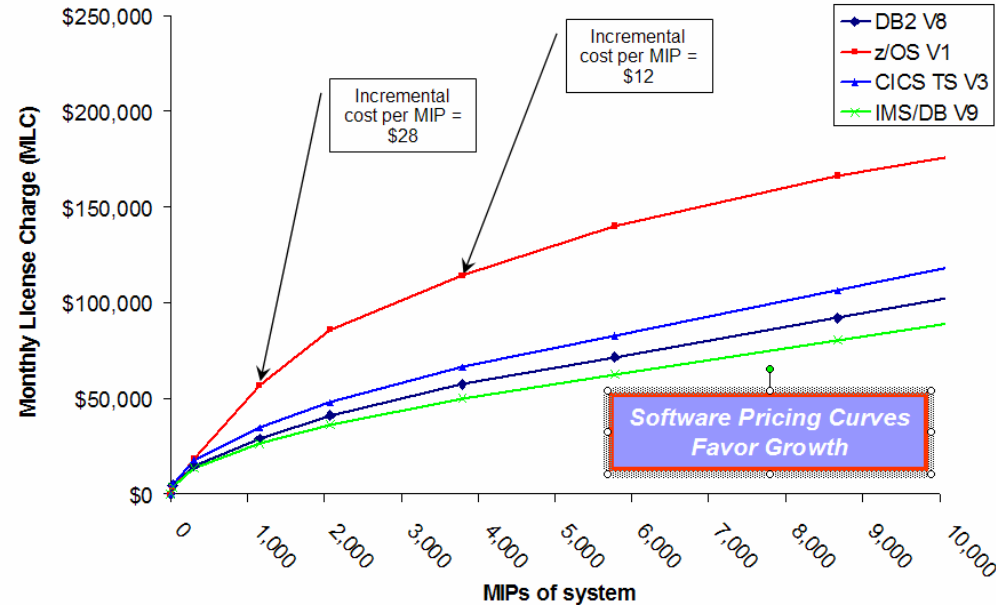
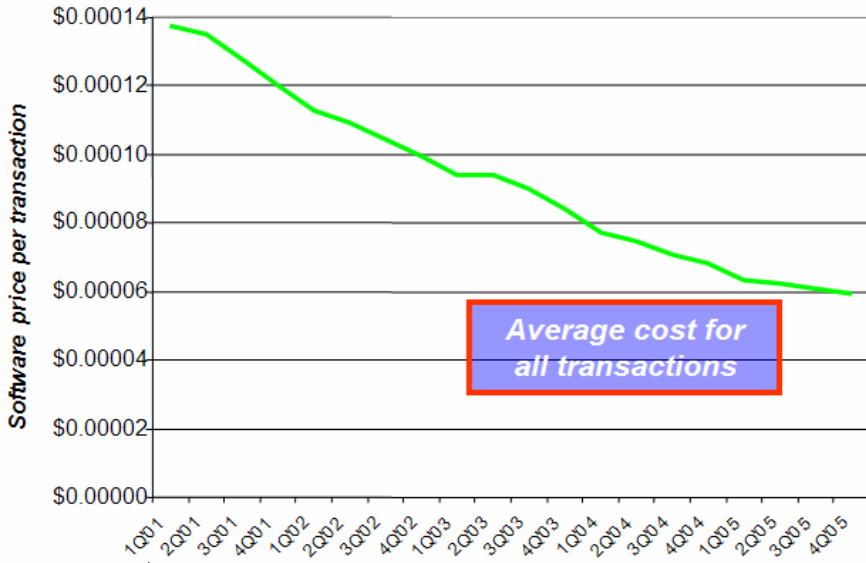
- ▶ DS8000 TCA \$30K/TB
- ▶ DB2 storage of 45 TB
- ▶ 70% compression
- ▶ $\$30K * 45 * 70\%$



“With DB2 9, we’re seeing compression rates up to 83% on the data warehouse. The projected cost savings are more than \$2M initially with ongoing savings of \$500,000 a year.”

Michael Henson
DB2 Unix Team Lead, SunTrust Bank, Inc.

IBM Software Price Per Transaction is Going Down

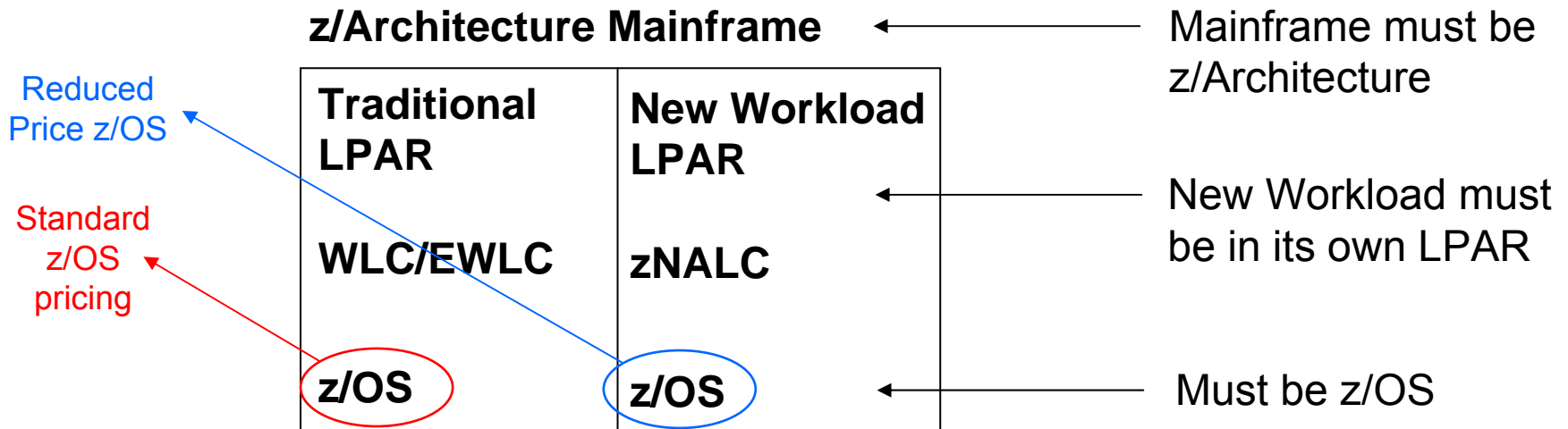


Putting This in Perspective

- For a typical system of 1,400 MIPS, MLC software stack costs \$59 per incremental MIP
- If a transaction is 1 million instructions, an incremental MIP can perform >2½ million additional transactions per month for Δ\$59 software cost (44K transactions per dollar)
- If these are credit card transactions** of average \$100 with a commission of 2%, the business makes \$5.2M per month for a software cost of \$59 per month (88,000 times return)
- If this is a bank account** averaging 3 transactions a day, the business can do 40 years of account management for a software cost of \$1

zNALC – It's NALC, only BETTER!

- NALC with...
 - ▶ LPAR-Level Granularity (sub-capacity)
 - ▶ 'New Workload' Criteria replaces Fixed Application List
 - ▶ Sysplex-Wide Aggregation
 - ▶ Incremental Price/Performance
- Announce & GA: 1Q2007



Example: Consolidate New Data Warehouse Application on Mainframe with zIIP

Existing Mainframe

Existing Disaster Recovery Site

Add 1 LPAR for New Data Warehouse w 42 TB Storage

And Add Disaster Recovery



1954 MIPS additional workload



3 year cost of acquisition \$4.78M

Add four processors:
 3 zIIP's
 1464 MIPS (75%)
 1 General purpose
 489 MIPS (25%)

Pay for no additional processors until disaster switchover

Existing processors:
2 general purpose

Existing processors:
Pay for one general purpose processor until disaster switch over

Or add Superdome 9000 Server w 75 TB storage



169,998 *
RPE's

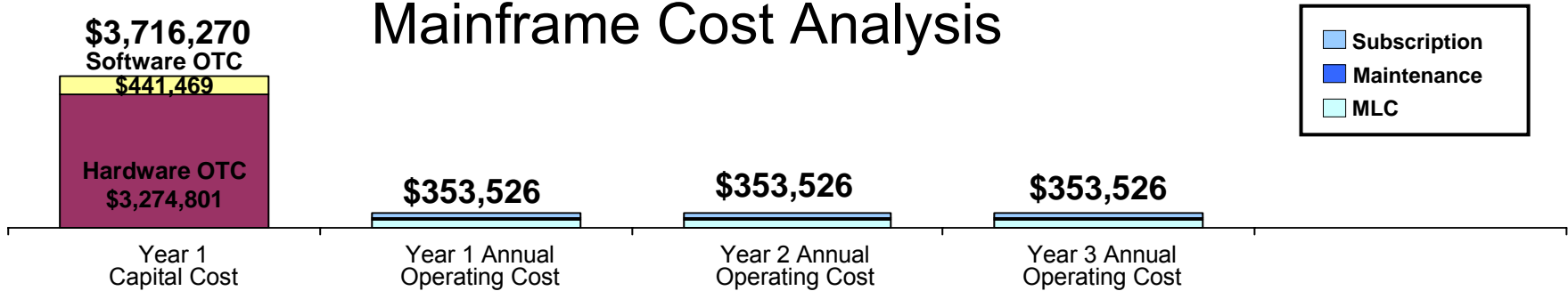
Disaster Recovery typically not considered

3 year cost of acquisition \$8.24M

* Production RPE's required = 1954 x 87 = 169,998

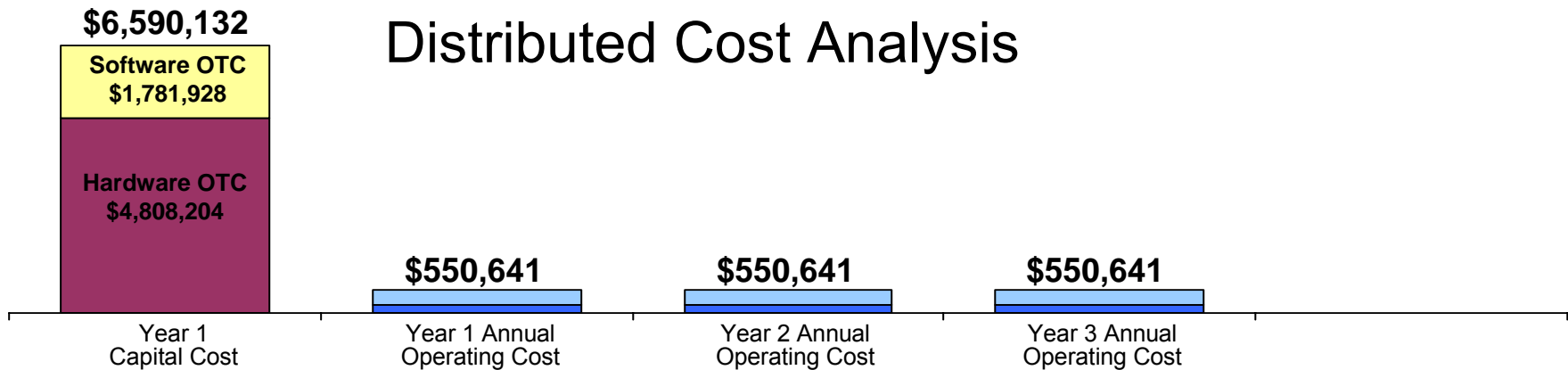
zIIP Processors Lower the Cost of Acquisition

Mainframe Cost Analysis



Total cost = **\$4,776,848**

Distributed Cost Analysis



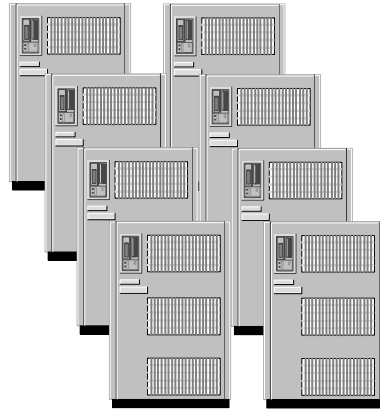
Total cost = **\$8,242,052**

1.7 times more expensive

Potential Savings from Linux Consolidation on System z

\$1.8M saving over 3 years

60 Linux Servers



1 IFL

	<i>Distributed Linux/Intel @ low utilization</i>				<i>Mainframe IFL @ high utilization</i>			
	<i>Unit cost</i>	<i>Quantity</i>	<i>Sub Total</i>	<i>3 year total</i>	<i>Unit cost</i>	<i>Quantity</i>	<i>Sub Total</i>	<i>3 year total</i>
Hardware & OS - every 3 years	\$4,000	60	\$240,000	\$240,000	\$125,000	1	\$125,000	\$125,000
HW Maintenance		Included			\$19,944	1	\$19,944	\$39,888
VM virtualization		N/A			\$22,500	1	\$22,500	\$22,500
VM S&S (25%)		N/A			\$5,625	1	\$5,625	\$16,875
Annual Linux support	\$1,000	60	\$60,000	\$180,000	\$14,000	1	\$14,000	\$42,000
OTC Software license – WAS*	\$4,000	60	\$240,000	\$240,000	\$4,000	1	\$4,000	\$4,000
WAS S&S for 2 years	\$800	60	\$48,000	\$96,000	\$800	1	\$800	\$1,600
Annual labor for support	\$6,500	60	\$390,000	\$1,170,000	\$6,500	1	\$6,500	\$19,500
Annual power & cooling	\$920	60	\$55,188	\$165,564	\$920	1	\$920	\$2,759
Grand Total				<u>\$2,091,564</u>				<u>\$274,122</u>



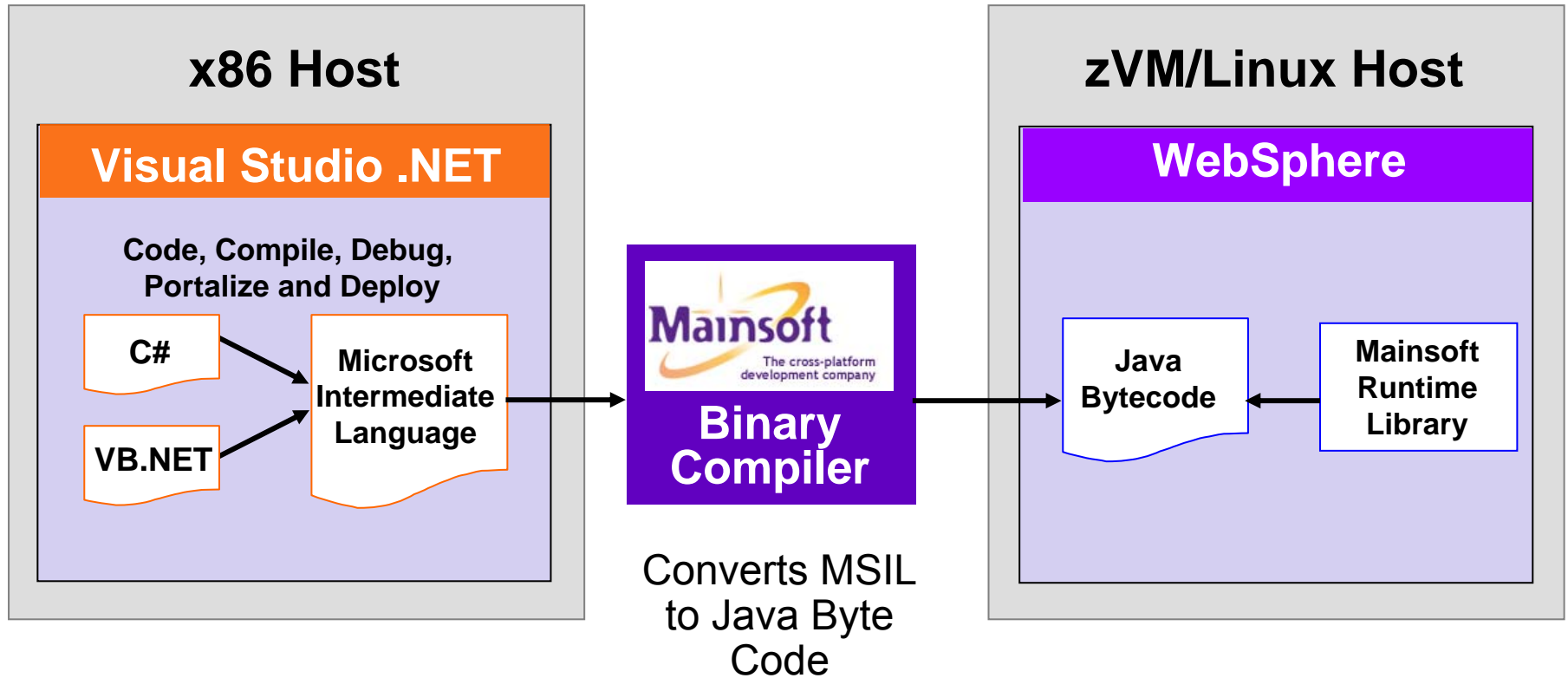
Nationwide[®] saves \$16+ million with Linux on System z On Your Side[™]

- **Nationwide** is a US-based Fortune 100 insurance & financial services company
 - ▶ \$21B+ revenue, 30,000+ employees (6,000 in IT)
- **Situation:**
 - ▶ 5000+ distributed servers under management with low utilizations
 - ▶ Linux and J2EE being used for new applications, with no single point of failure
- **Problems:**
 - ▶ High TCO including data center power and floor space scarcity (new facility would cost \$10M+)
 - ▶ Long server provisioning process
 - ▶ Need to “over-provision” for peaks leading to inefficient utilization
- **Solution:**
 - ▶ Server Consolidation using System z Virtualization (System z990, IFLs, z/VM...)
- **Result: Vastly improved TCO, Speed & Simplification**
 - ▶ 50% reduction in Web hosting monthly costs, 80% reduction in floor space & power conservation
 - ▶ 50% reduction in hardware & OS support efforts; significant savings on middleware costs
 - ▶ 350 servers virtualized with 15 z990 IFLs, supported by 3 FTEs
 - 12 mission critical applications with 100,000+ users/day
 - ▶ Fast deployment (4 months)
 - ▶ Significantly faster provisioning speed (months → days)
 - Provisioned 22x the anticipated load for SuperBowl AD using CoD (1 processor for 2 weeks)
 - ▶ Dynamic allocation of compute power eliminates need to “over-provision”
 - ▶ Simple, robust mainframe high availability & disaster recovery

NEW!

Execute .NET Code on the Mainframe at IFL Prices

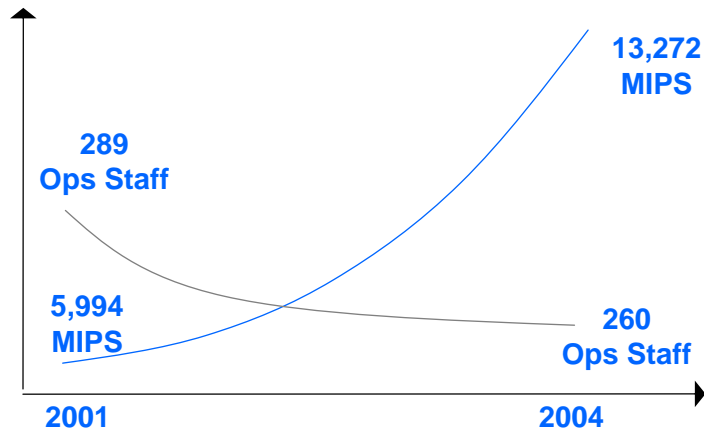
Visual MainWin for J2EE



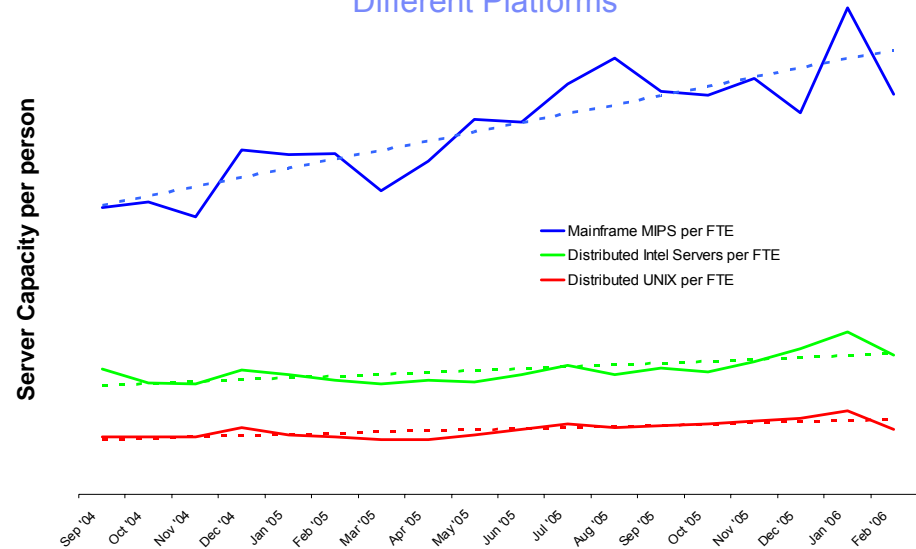
Contact: Ron Johnsen – VP WW Sales, ronj@mainsoft.com USA 408 200 4023

Mainframe Labor Costs Are Going Down

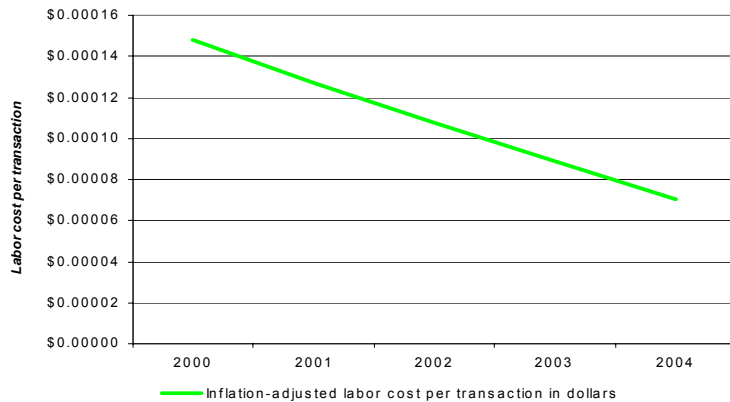
Data Center Staffing Levels for System z Have Not Increased Despite Large Increase in MIPS



Hardware Managed Per Person for Different Platforms



Labor Cost Per Transaction on System z is Decreasing



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	<ul style="list-style-type: none"> 30+ Sun Solaris servers 560+ Intel servers 	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

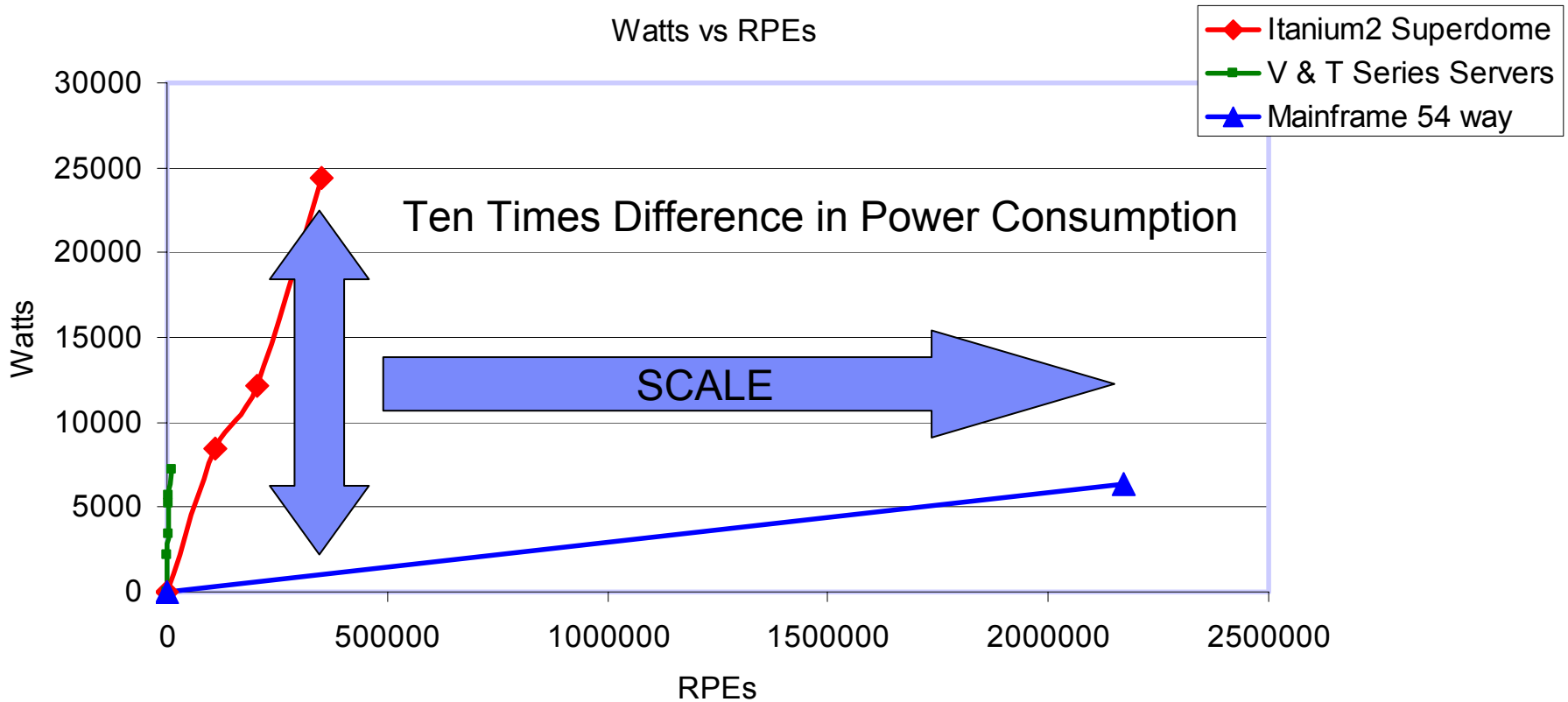
Staff growth reversed by consolidating to the mainframe

Power and Cooling

- Mainframes Can Save Customers Substantial Environmental Costs:
 - ▶ *The Wall Street Journal* stated that distributed server farms now generate up to **3,800** watts per square foot (in 1992 it was 250 watts/sq foot)
 - ▶ According to *The Robert Francis Group*, mainframes are
 - **Less than half as expensive** in power and cooling as Unix servers
 - And **less than a fifth as expensive** in power and cooling as Wintel servers
 - ▶ An average distributed system consumes about 400W
 - Switching on another mainframe processor adds only 60-75W
 - ▶ So 1,000 servers **cost about \$840K** annually to power and cool
 - > \$35K power/month, plus another \$21K - \$35K in cooling/month
 - A mainframe replacement would save \$420K - \$672K in power & cooling annually
- *“Power-related problems in 2005 will cause 4 of the 20 major failures, up from 2 of 20 last year”* (The Uptime Institute)
- More than half of all serious outages are now caused by power problems*
 - ▶ Room temperatures averaging 92°F lead to erratic machine behavior
 - ▶ A failed air conditioner at Pomona Valley Medical Center's data center caused **“temporary shutdown of systems serving the hospital's laboratory, \$40,000 in damage to servers and hard drives, and prompted a \$500,000 retrofitting of the cooling system”**
 - ▶ Costly outcomes – reduce raised-floor occupancy, reconstruct and/or upgrade
 - digging up parking lots, knocking down walls, building new facilities
 - \$20,000 electrical-system upgrade, \$150,000 air-conditioning upgrade

*Source: recent AFCOM survey of 200

Mainframe Scale and Power Efficiency



Source for HP Servers: Ideas International
 Note: Uses equivalence ratio of 122 RPE's per MIPI





Office for Technology Saves Money by Replacing Old Communication Hardware

- **New York State Office for Technology (OFT)** provides IT services to state agencies, employs more than 600 people
 - ▶ Centralized data center, state-wide network infrastructure, data and voice services, and other IT services
 - E.g. Department of Motor Vehicles, NY State Higher Education Services Corporation, NY State Office of General Services.

- **Problems:**
 - ▶ OFT needed to update its communication hardware platform as two IBM 3745 Communications Controller devices were becoming obsolete
 - ▶ Needed to reclaim floor space while providing a high level of service

- **Solution:**
 - ▶ Replace and simplify aging communication controller technology with a robust, stable, secure and cost-effective operating platform on IBM System z
 - IBM Communication Controller for Linux (CCL) software emulates the 3745 device on a virtual communication controller within the System z Linux environment to support traditional Systems Network Architecture (SNA)
 - NCP function running on two 3745 base frames and eight 3746 expansion frames hardware replaced by CCL on a new z990 server with two IFL specialty engines (subsequently upgrade to a System z9)
 - ▶ CCL not only maximizes the value in existing SNA applications, but also enables an evolution toward an even simpler network infrastructure, including IP functionality and enhanced hardware independence
 - ▶ Transparently take advantage of z/VM support for zSeries hardware architecture and reliability, availability, and serviceability (RAS) features

- **Result: Quickly saved \$30,000 a year by freeing-up critical data center floor space and easier support costs – 3 year payback**

Fractional Availability Improvements Are Important

Example 1: 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+

	<i>Unix/ Oracle</i>	<i>zSeries/ DB2</i>
Availability %	99.825%	99.975%
Annual outage	15h 20m	2h 11m
Cost of Downtime	\$45.188M	\$3.591M

Sources: ITG Value Proposition for Siebel Enterprise Applications, Business case for IBM eServer zSeries, 2004 & Robert Frances Group, 2005

Financial Impact of Downtime Per Hour

<i>Industry segment</i>	<i>Cost</i>
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

Security Incidents and Cost per Incident Rising

The overall cost of a UK company's worst incident has risen

	ISBS 2006 - overall	ISBS 2006 - large businesses
Business disruption	£6,000 - £12,000 <i>over 1-2 days</i>	£50,000 - £100,000 <i>over 1-2 days</i>
Time spent responding to incident	£600 - £1,200 <i>2-4 man-days</i>	£1,750 - £3,500 <i>5-10 man-days</i>
Direct cash spent responding to incident	£1,000 - £2,000	£5,000 - £10,000
Direct financial loss (e.g. loss of assets, fines etc.)	£500 - £1,000	£3,500 - £5,000
Damage to reputation	£100 - £400	£5,000 - £10,000
Total cost of worst incident on average	£8,000 - £17,000	£65,000 - £130,000

Source: PwC and UK Dept of Trade and Industry

The median number of incidents suffered is **roughly 8 per year**

For large businesses this could mean security losses cost **~\$740K annually**

A number of data points provide the cost of allowing customer information to be exposed:

- ▶ When cleanup and recovery, systems modifications and other indirect costs were considered, **Gartner** estimated the cost of exposure to be \$90 per exposed account
- ▶ *Small customers* – the costs per account can work out to much-higher numbers when amortized across a smaller account base. **Gartner** estimated that when 5,000 accounts were compromised cost per account was closer to \$1,500
- ▶ *Very large exposures* (> 1 million accounts) – the direct cost per account is around \$50, the chance of litigation and loss of goodwill are higher in these cases

Source: Committee on Veterans' Affairs May 25, 2006 Testimony of Avivah Litan, Gartner

Secure and Efficient "Smart Card" Solution at Banco Itaú Fights Fraud and Saves



- **Banco Itaú S.A.** is one of the largest banks in Brazil
 - ▶ 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, Banco Itaú replaced its regular cards with security chip-enabled smart cards.
 - ▶ Need improved security so that new markets and customers can trust the bank while getting quick and easy access to their accounts

- **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**

Tale of Two Customers

	Baldor	Welch's
Supplier	IBM	Dell
Moved From....	3 Mainframes and 8 Unix Servers	S/390 and AS/400
Moved to...	1 z990 System z Server	100 Intel Servers
Virtualization	z/VM	VMWare
Decision to Completion Time	Approximately 6 months	Started sometime before June 2005 "...project will continue into 2007"
IT Staff	Down to 38	50
IT Spending	1.2% of Sales (and still declining....now down to 0.9%)	About 2.5% of Sales
Max Power consumption	15.8 kW	48.4 kW

Three years ago, Baldor's IT director had investigated migrating to a Windows server environment with cluster fail-over. *"We thought we were going to save a ton of money,"* but the systems crashed all the time, he noted, and the idea was quickly abandoned.

"We have a very stringent requirement of being up all the time ... Weighing heavily in support of the mainframe was its track record. There hadn't been any mainframe downtime since 1997"

Mark Shackelford
 Director of Information Services, Baldor Electric

Portfolio Review and Analysis

"PRA" - a study for IBM zSeries customers

- helps understand the potential impact of processing growth on future software budgets by developing predictive costs models.
- provides you with a comparison of your current portfolio cost structure with those of other zSeries/S390 customers.
- analyzes your software portfolio to identify redundant or underutilized software products.
- identifies product alternatives and their cost/ benefit impact.
- provides you with negotiation leverage with incumbent product vendors.
- provides you with the latest Software Asset Management tips to help proactively manage your zSeries/S390 software portfolio

<http://www-3.ibm.com/software/solutions/softwaremigration/sps.html>

Or contact Linda Beckner at (614) 659-7192 or at Becknel@us.ibm.com.



How Customers Can Get the Lowest TCO on the Mainframe

1. Use the latest technology and pricing models
 - ▶ Grow core-business MIPS
 - ▶ Upgrade to System z
 - ▶ Utilize specialty processors
 - ▶ Exploit sub-capacity pricing
 - ▶ Execute an ELA or OIO
2. Maximize utilization
 - ▶ Drive mainframes at 90+% utilization, 24 hours by 7 days
 - ▶ Consolidate workload onto System z
3. Minimize other costs
 - ▶ Minimize software tool costs
 - ▶ Minimize outages and security breaches...
 - ▶ Save energy and floor space
4. Stop spiraling labor costs
5. Ensure accurate charge back of IT assets
6. Practice rigorous software asset management

Key Points:

Mainframe Costs	Distributed Costs
<p>The cost of running incremental workload on the mainframe goes down as the total workload grows</p>	<p>The cost of running additional workload on distributed servers goes up more linearly</p>
<ul style="list-style-type: none"> ▶ Labor costs hold steady as workload grows 	<ul style="list-style-type: none"> ▶ Labor is now the highest cost element in distributed environments Administrative staff costs increase in proportion to the number of servers
<ul style="list-style-type: none"> ▶ IBM pricing policies designed to favor the addition of more workload 	<ul style="list-style-type: none"> ▶ New workload requires additional servers and licenses
<ul style="list-style-type: none"> ▶ Highly Efficient Power and Cooling – Small Footprint 	<ul style="list-style-type: none"> ▶ Energy and Space cost is more linear
<ul style="list-style-type: none"> ▶ Lower software costs per transaction as workload grows – and PRA can lower ISV tool costs 	<ul style="list-style-type: none"> ▶ Cost of software licenses is more linear
<ul style="list-style-type: none"> ▶ High Availability and Security Translate into low cost 	<ul style="list-style-type: none"> ▶ Fractionally less Availability and Security can drive Significant downstream costs
<p>Customers have learned that mainframes deliver economies of scale, especially as the workload grows</p>	<p>Result – scale out strategies do not deliver equivalent economies of scale as the workload grows</p>

This pricing discussion uses published list prices