



# 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

+ Software

+ Labor

+ Environmentals

+ required Quality-of-Service

(Availability, Security, Disaster/Recovery...)

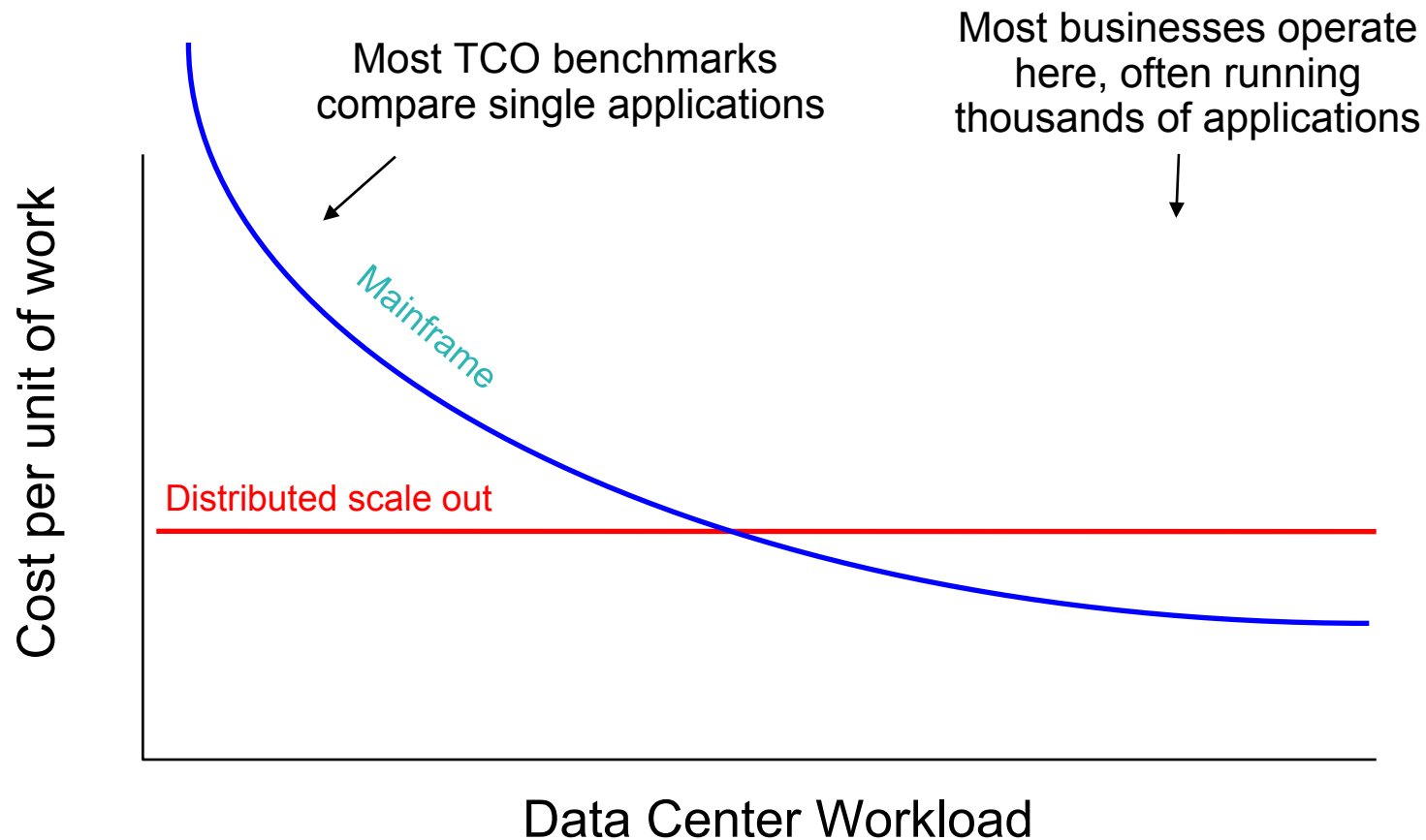
+ other Elements

(ISV software, Development Productivity, Reuse through SOA...)

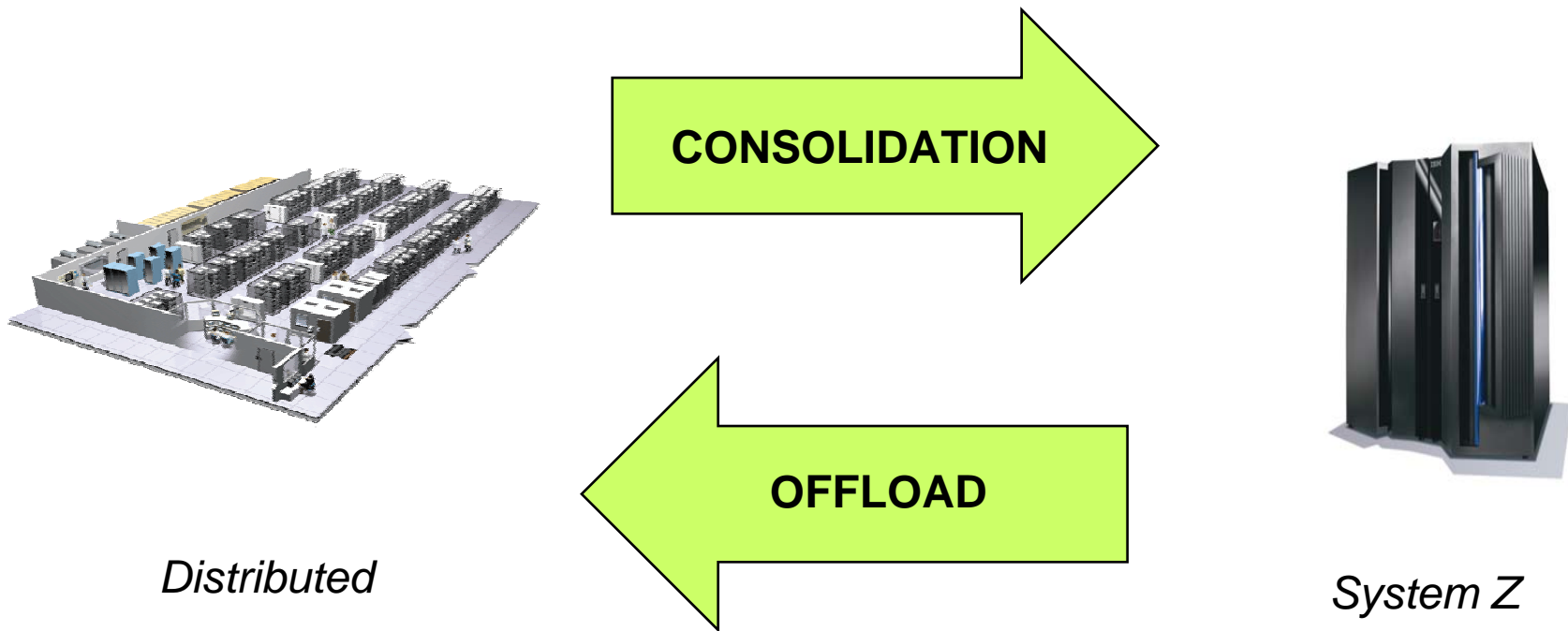
*The total cost requires a total picture of your I/T assets and expenses*



# Mainframe Cost/Unit of Work Decreases as Workload Increases



# TCO Comparisons



## 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



# Utilization of Distributed Servers & Storage

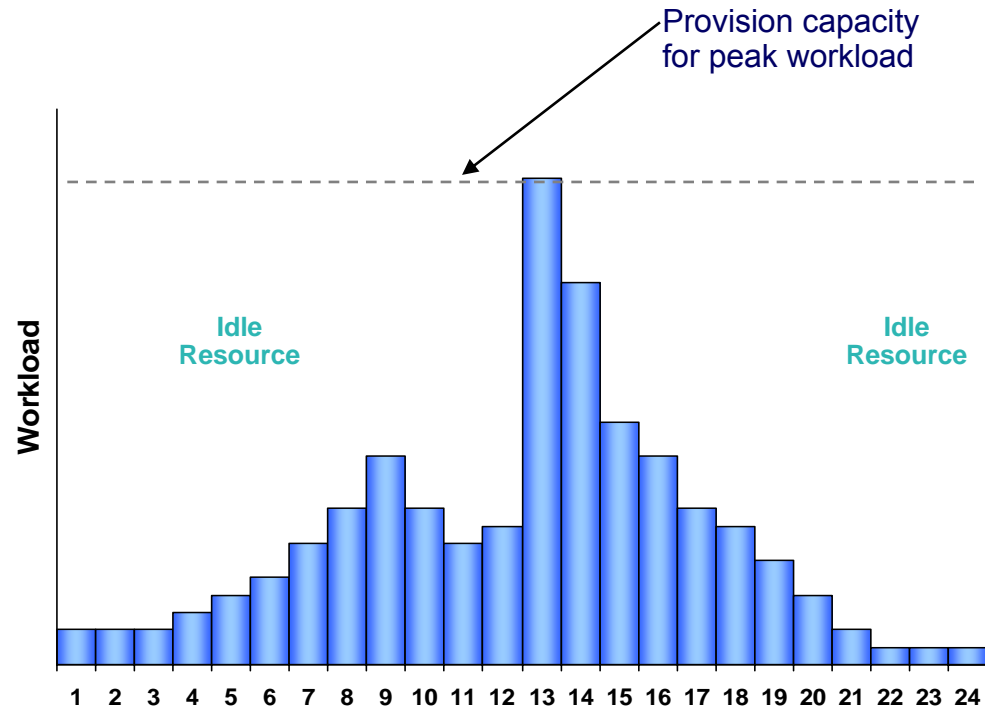
Typical utilization of:

- 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

Application specific storage allocations tend to occur in large units...

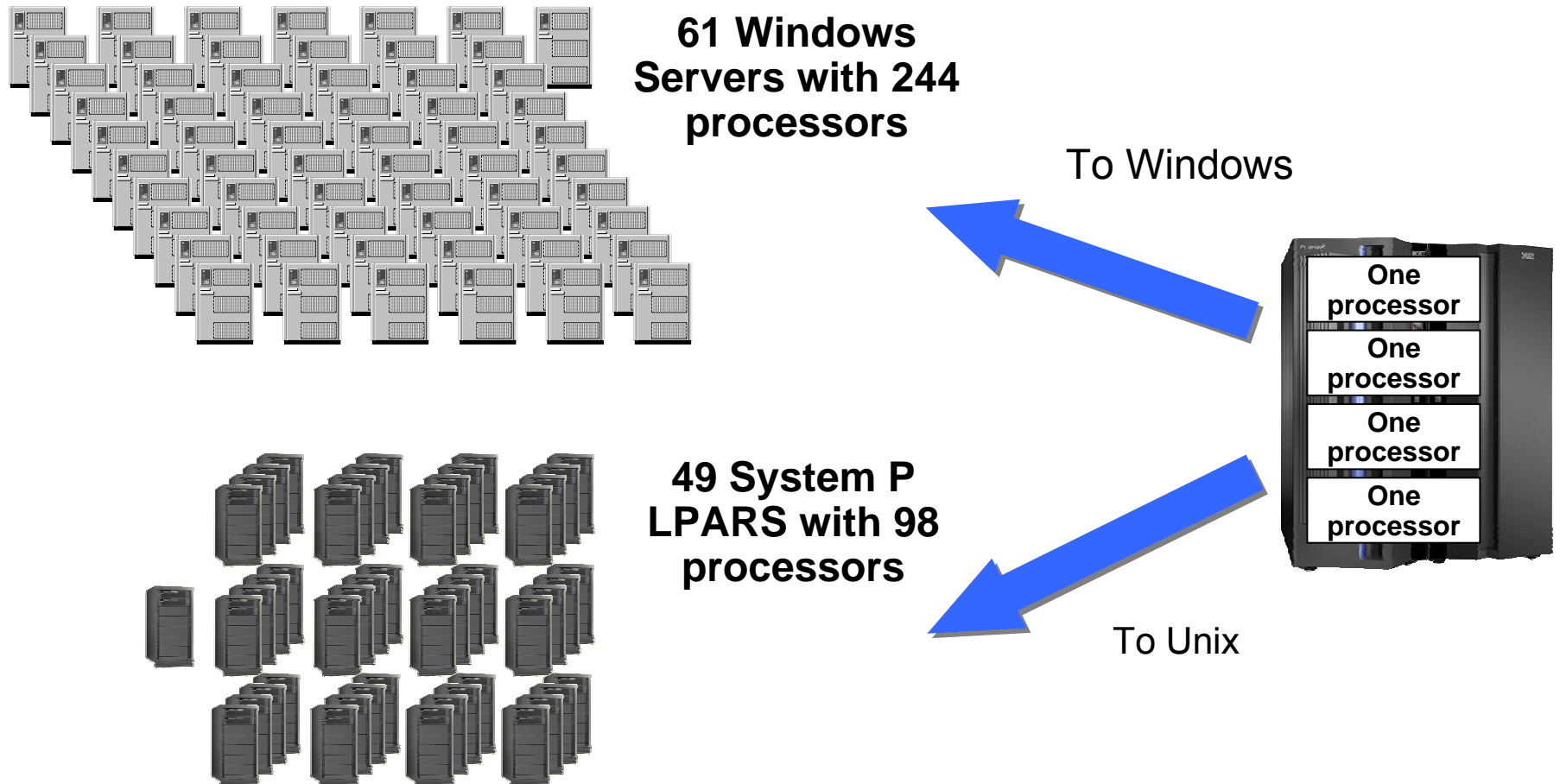


resulting typically in single digit utilization



# European Banking Customer

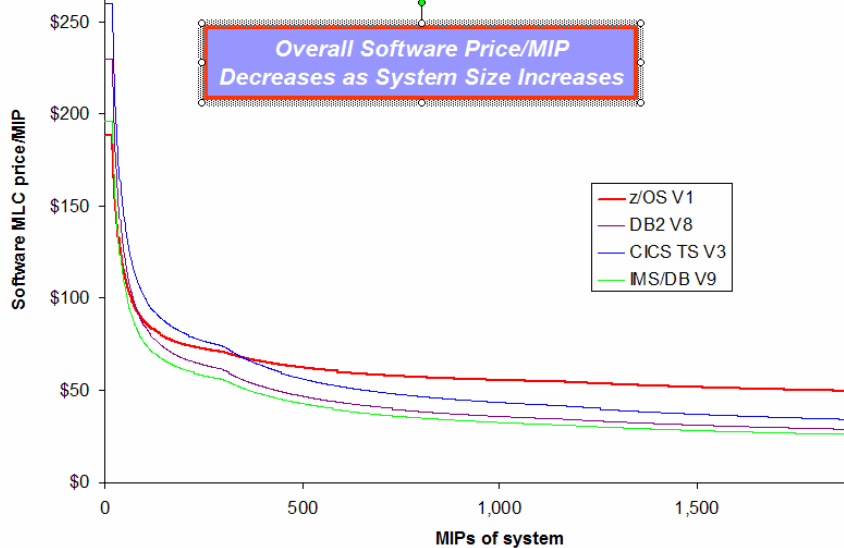
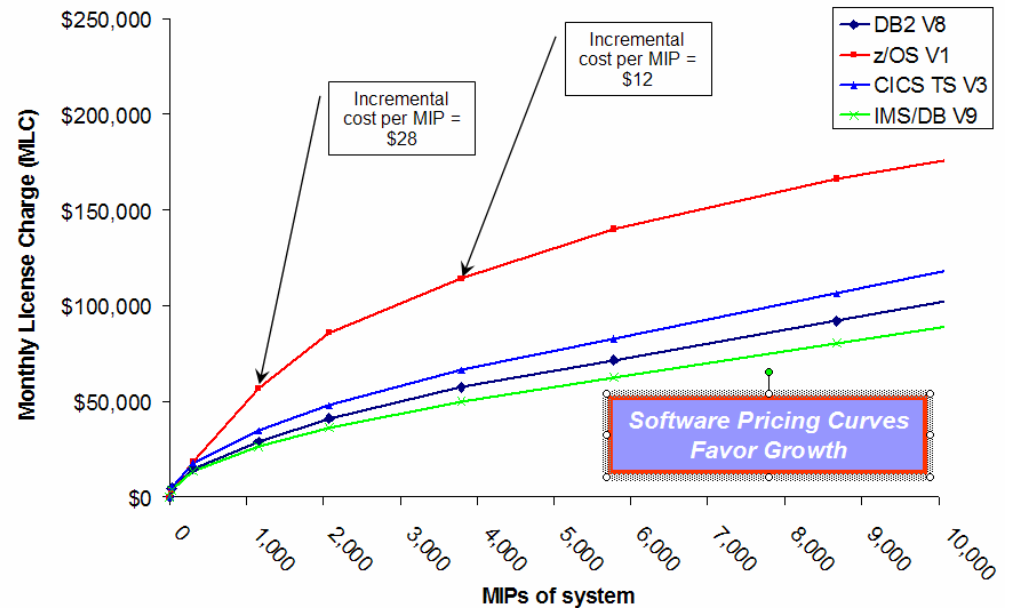
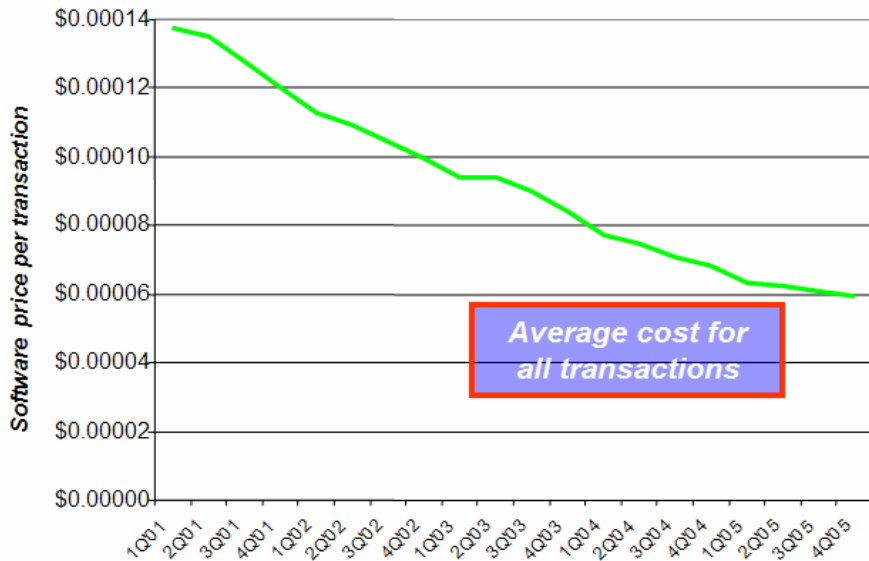
## TCA Analysis to Offload CICS Transaction Workload



Conclusion: Same TCA with no benefit from additional migration cost & project risk



# IBM Software Price Per Transaction is Going Down



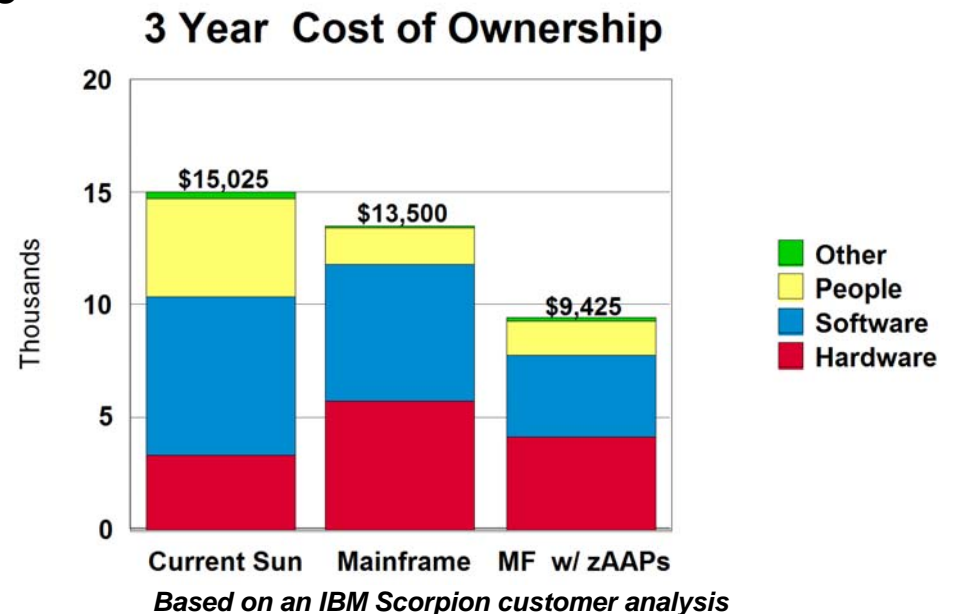
## Putting This in Perspective

- 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



## zAAPs can reduce charges by 40%

- They needed 14 people to support these 73 servers
  - ▶ At only 20% utilization
  - ▶ Each server cost \$20K per annum to support
  - ▶ \$7M of Software over 3 Years
- A comparable z- implementation would have required just 20 processors
  - ▶ 5 additional people to support
  - ▶ \$6M of Software over 3 Years – pre zAAP
- The customer thought the Solaris environment was 1/5 the cost of the mainframe...  
...but in fact the **z-TCO was 37% less**



# Abercrombie & Fitch Improves AD Productivity and Application Time-To-Market

- Leading specialty clothing retailer headquartered in Columbus, Ohio, US.  
Four divisions: *Abercrombie & Fitch*, *Hollister Co.*, *abercrombie kids*, and *Reuhl*
- **Situation:**
  - ▶ Many different programming languages required to create A&F's enterprise applications,
    - including CICS/COBOL, Lotus Notes/Domino, Java, C/C++ and RPG
- **Problems:**
  - ▶ Developers are proficient in different programming models and can't collaborate on enterprise-class application projects
  - ▶ Maintaining this nonintegrated setup was costly and inefficient
- **Solution:**
  - ▶ Upgrade and standardize AD environment for improved productivity and collaboration
    - Use Java/J2EE as the standard programming development and runtime environment
  - ▶ Upgrade existing System z with a zAAP specialty engine for Java workload
    - Close to the company's CICS transactions and mainframe data, and fully integrated with existing mainframe operational procedures
- **Result: Improved competitiveness by deploying new enterprise applications faster, without increased software costs, and support for Java growth**

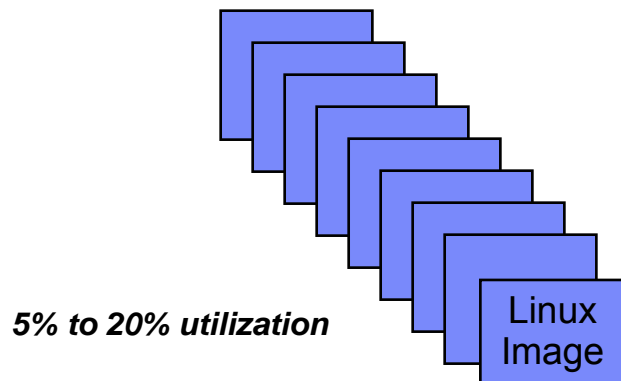
**"The zAAP works as advertised."**

**Rich Olimpio**

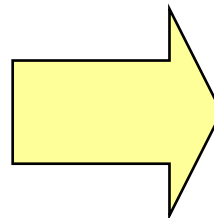
Tech Services Manager, Abercrombie & Fitch

# The Economics of zLinux Workload Consolidation

- CIOs are increasingly dissatisfied with the TCO of their ever-growing distributed server infrastructure
  - ▶ Distributed server scalability
  - ▶ Software costs in the distributed environment
  - ▶ Infrastructure complexities in support of mission critical applications
- Distributed servers typically run at utilization levels in the range of 5% to 20%
  - ▶ Production servers, development servers, test servers
- Virtualization and workload management enable consolidation on the mainframe
  - ▶ Run multiple images on fewer processors
  - ▶ Achieve utilization levels of 85% or more



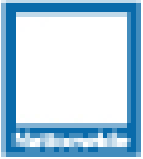
62 Linux servers with low utilization  
 62 @ \$5,000 = \$310,000  
 Plus 62 middleware licenses  
 Plus \$6,500 x 62 = \$403,000/yr labor



*Full utilization*

One IFL processor with high utilization  
 1 @ \$125,000 = \$125,000  
 Plus one middleware license  
 Little additional labor



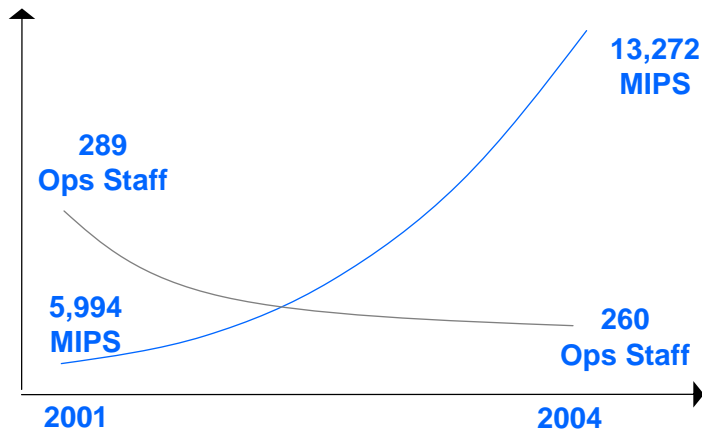


## Nationwide\* saves \$16+ million with Linux on System z On Your Side™

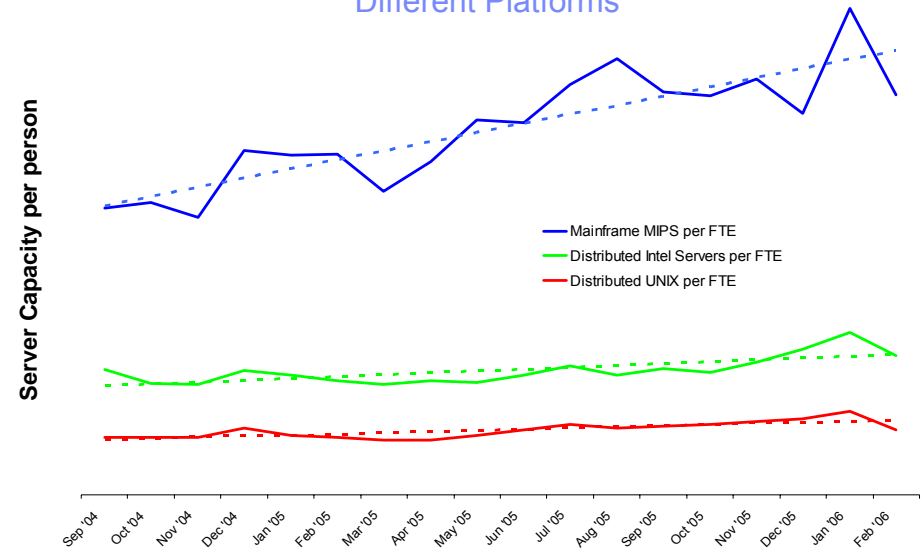
- **Nationwide** is a US-based Fortune 100 insurance & financial services company
  - ▶ \$21B+ revenue, 30,000+ employees (6,000 in IT)
- **Situation:**
  - ▶ 5000+ distributed servers under management with low utilizations
  - ▶ Linux and J2EE being used for new applications, with no single point of 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

# Mainframe Labor Costs Are Going Down

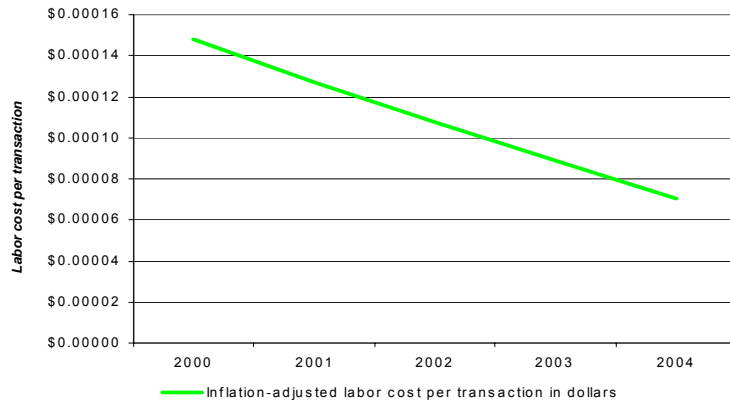
Data Center Staffing Levels for System z Have Not Increased Despite Large Increase in MIPS



Hardware Managed Per Person for Different Platforms



Labor Cost Per Transaction on System z is Decreasing



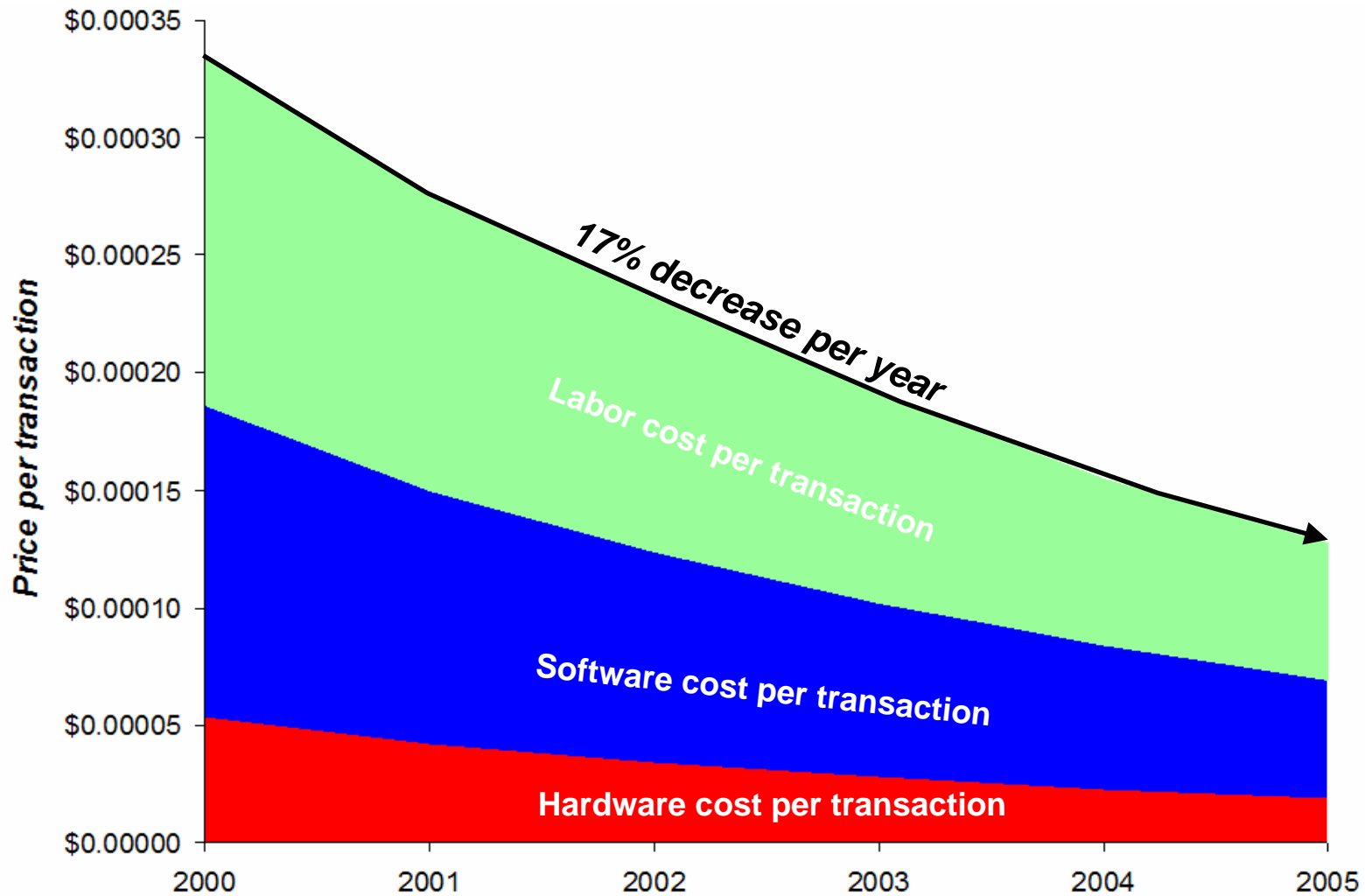
First National Bank of Omaha

	Servers	Reliability	Utilization	Staff
<b>First move:</b> Implemented distributed computing architecture that became <b>too difficult to monitor, maintain, upgrade and scale</b>	<ul style="list-style-type: none"> <li>30+ Sun Solaris servers</li> <li>560+ Intel servers</li> </ul>	Un-acceptable	12%	24 people growing at 30% year
<b>Next move:</b> Consolidated back on the mainframe	z990	Much improved	84% with additional reserve capacity <b>on-demand</b>	Reduced to 8 people

**Staff growth reversed by consolidating to the mainframe**



# Conclusion: Total Mainframe Transaction Costs Have Reduced by 62% in 5 Years



# 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





## NEW YORK STATE 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 Translate Into \$Ms

## Example 1: Financial Services Company

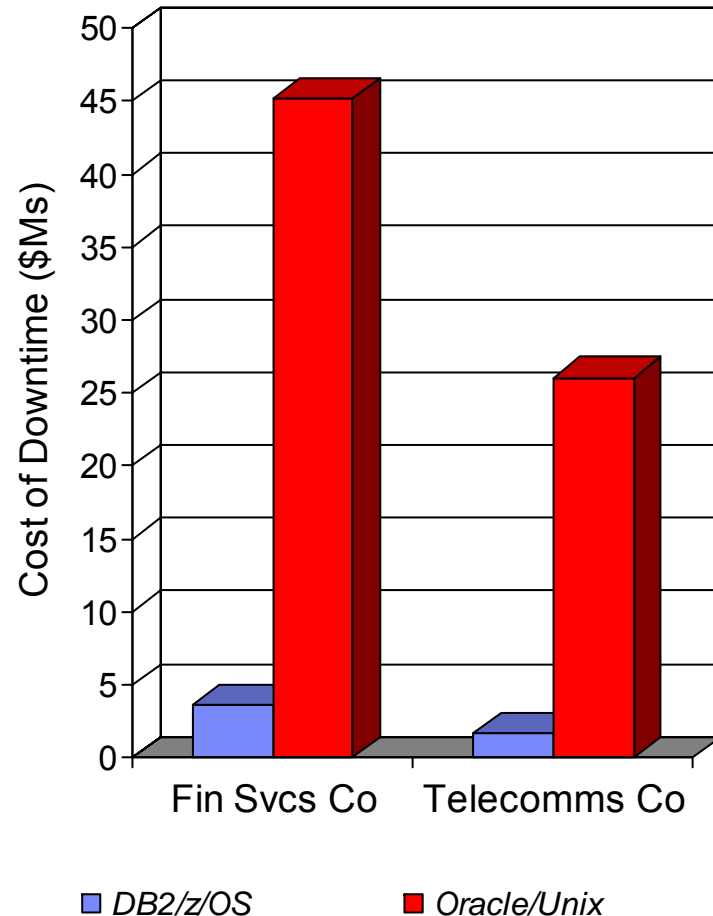
- ▶ \$300B assets, 2500+ branches, 15M customers
- ▶ Retail banking, loans, mortgages, wealth management, credit cards
- ▶ CRM System – branches, financial advisors, call centers, internet
- ▶ Number of users – 20,000+

	Unix/Oracle	zSeries/DB2
Availability	99.825%	99.975%
Cost of Downtime	<b>\$45.188M</b>	<b>\$3.591M</b>

## Example 2: Telecommunications Company

- ▶ \$20B sales, 2500+ branches, 25M customers
- ▶ Wireless, wire line, internet services
- ▶ CRM System – call centers and internet
- ▶ Number of users – 20,000

	Unix/Oracle	zSeries/DB2
Availability	99.725%	99.95%
Cost of Downtime	<b>\$26.038M</b>	<b>\$1.684M</b>



Source: ITG Value Proposition for Siebel Enterprise Applications, Business case for IBM eServer zSeries, 2004

# 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
<b>Total cost of worst incident on average</b>	<b>£8,000 - £17,000</b>	<b>£65,000 - £130,000</b>

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**



## ***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](mailto:Becknel@us.ibm.com).





BlueCross BlueShield  
of Tennessee

## Saves by Replacing ISV Tools with IBM While Gaining flexibility

- **BCBS of Tennessee** is the leading healthcare provide in the US state of Tennessee and one of the most financially healthy BCBS plans in the country
  - ▶ Mainframe is vital so must focus on its cost-effectiveness
- **Problems:**
  - ▶ Recent hardware growth of 30-40% lead to unacceptable doubling of ISV SW costs
  - ▶ Need to be able to react to competition by change cost structure *dynamically* according to business volumes but mainframe ISVs won't adjust monthly charges
- **Solution:**
  - ▶ Conducted an IBM Portfolio Review Analysis with under strict non-disclosure
    - Initially anticipated \$8M savings over 4 years, later increased list of "switch out" products to 28
    - Aggressive timetable – account teams helped migration (some foundational software for 20 years)
  - ▶ Smooth migration with no major impact, on-time, under budget due to IBM Specialists
- **Result: On track to save \$17.5M by 2007, but most important, much more flexibility to change internal cost as business volumes change**  
**Functionality and UI of the IBM tools have "leap-frogged vendors in place"**

*"... a year and a half into our contract, our savings now are over \$14M. It's just amazing, if we can cut our costs and provide the same or better service, that is going to give us a business competitive advantage"*



**Bob Venable**

Manager of Enterprise Systems, BlueCross BlueShield of Tennessee

## Flexible IT requires Service-Oriented Architecture (SOA) tools from IBM

Branham Group has done the analysis vs MS .NET!

“IBM Tools are more productive for building robust server side applications”

- |   |                        |
|---|------------------------|
| ▪ <b>Model key components of the app</b>              | <b>IBM 2.4x faster</b> |
| ▪ <b>Build Web Services from scratch</b>              | <b>IBM 2.1x faster</b> |
| ▪ <b>Build Web Services from existing code</b>        | <b>IBM 2.6x faster</b> |
| ▪ <b>Build a portlet</b>                              | <b>IBM 2.2x faster</b> |
| ▪ <b>Build a portlet &amp; attach to core systems</b> | <b>IBM 3.2x faster</b> |



# SOA Featuring an Integration Hub on System z

*Wachovia prepares for the future by integrating – today and tomorrow*

## ***What is the business challenge?***

Wachovia needed to improve their speed to market with functionality, while decreasing production costs. They required simple, streamlined integration technology delivery that fit into their SOA strategic direction, as well as their business environment. And they needed to be able to staff their solution effectively.

## ***Benefits***

- Create a centralized integration hub on System z in close proximity to the majority of the customer data
- Realized a 300-400% increase in productivity per associate using open standard based applications
- Wachovia modified its trust-services processes – reducing what took three days to perform down to hours
- Exceeded 99.9% SLA

## ***Actions taken***

- Remove the redundant business logic and replace with a centralized common shared logic
- Replaced proprietary aging integration mechanisms with open standard based solution based on process adoption
- Deployed critical applications on WebSphere Application Server for z/OS for integration with core IMS and DB2 assets
- Realized 92% Java offload rates by implementing zAAPs



## Key Points:

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

*This pricing discussion uses published list prices*

