



# **Extending Your Mainframe For More Business Value**

The Truth About Offloading

# Typical Scenarios

- Most data centers are not green field projects
- Cost concerns drive typical scenarios:
- Large transactional workloads and database
  - ▶ Scale may compel platform choice
- Adding new workload to an existing System z
  - ▶ The rule of three
- Server consolidation to Linux on IFLs
  - ▶ Consolidation Math
- Offloading projects
  - ▶ Proliferation of cores defeats distributed price advantages

# Who Are The Offloading Competitors?

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- Oracle Modernization Alliance
- Application Modernization Initiative (HP, Oracle, Intel)
- Mainframe Migration Alliance (Microsoft-initiated)
- Mainframe Re-hosting Partnership (Sun, BEA-Tuxedo, CSC, MetaWare)
- Migration and Transformation Consortium (Micro Focus-led)

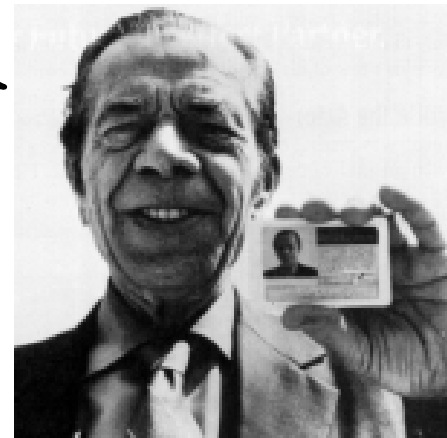
# Typical Promises Made By Mainframe Competitors



**CIO**

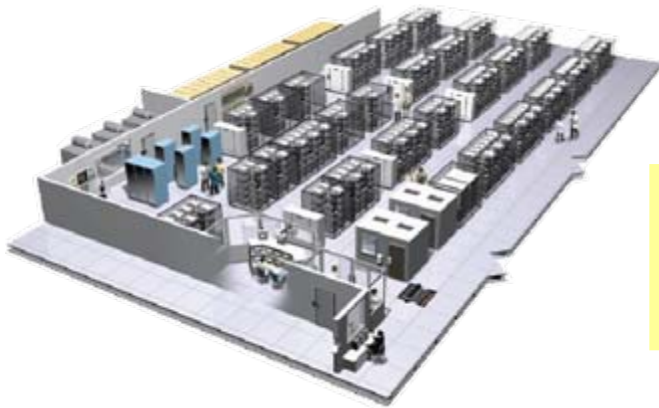
We can help you save a lot of money by offloading to our servers . . .

The quality of service is just as good



**Mainframe Competitor**

# Consolidation Saves Money



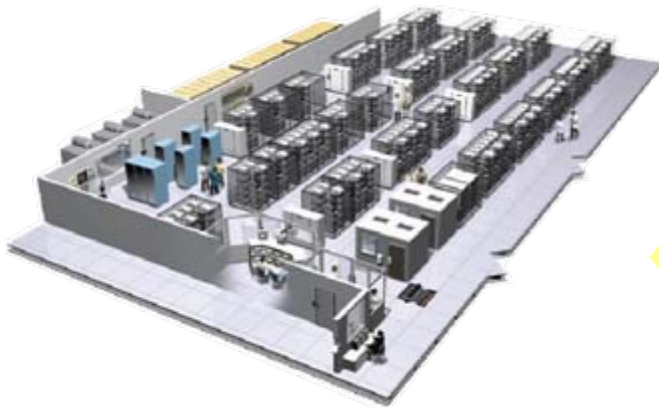
**Consolidation**



High Cost  
Core Proliferation  
Slow Provisioning  
Power Consumption  
Lower Availability

Lower Cost  
High Core Utilization  
Easy Growth  
Power Efficiency  
Business Resiliency

# Offloading Is The Reverse Of Consolidation



High Cost  
Core Proliferation  
Slow Provisioning  
Power Consumption  
Lower Availability



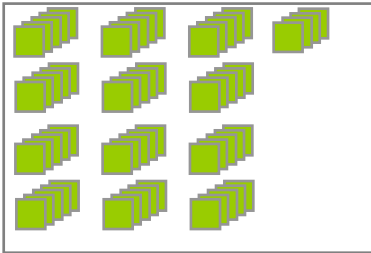
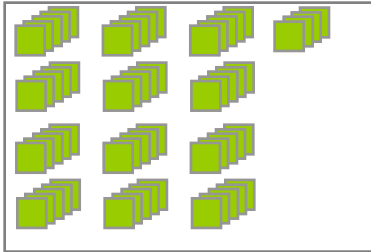
Lower Cost  
High Core Utilization  
Easy Growth  
Power Efficiency  
Business Resiliency

# Common Cost Issues In Offload Comparisons

- Core proliferation not fully taken into account
  - ▶ Utilization, functional separation, and growth drive proliferation
  - ▶ Path length expansion – COBOL to Java
  - ▶ Database expansion – Hierarchical to Relational
- Useful lifecycle of distributed servers
  - ▶ Cost of server refresh for end of life distributed servers
  - ▶ Running dual environments during migration
- Zero or less than 100% disaster recovery
- Cost of system management software
- Failure to take advantage of mainframe pricing concessions – specialty processors, sub capacity, capacity on demand, backup capacity on demand, consolidation opportunities

# North American Financial Company Offload Project

2x 64-way Production Application  
And Development



6x 8-way Production Application  
And Development



**6 processors  
(1,660 MIPS)**



**176 Unix processors  
(800,072 Performance  
Units)**

2x z900 3-way



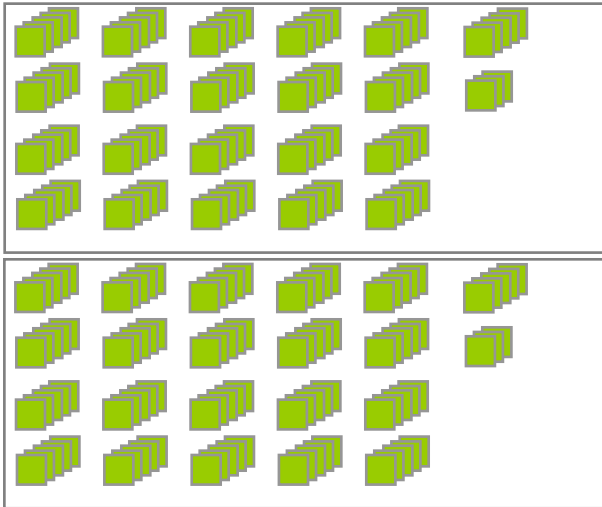
**482 Performance Units per MIP**

***No separate QA/Test Environment***



# 5 Year TCA Comparison If HP Servers Are Used

2x HP 108-way Production Application And Development



6 processors  
(1,660 MIPS)



2x z900 3-way



264 Unix processors  
(802,798 Performance Units)

6x HP 8-way Production Application And Development



**\$76.3M**

**\$20.7M**

482 Performance Units per MIP

***No separate QA/Test Environment***

# North American Financial Company Five Year Total Cost of Ownership Breakdown

## Mainframe Cost

## Distributed Cost

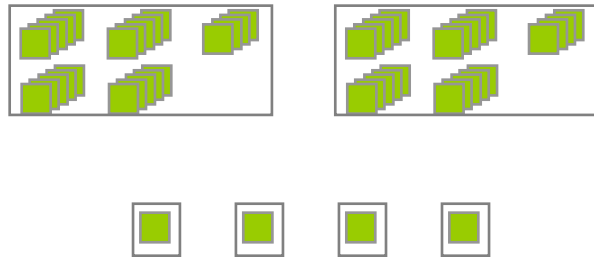
	OTC	Annual
Hardware 6 Processors Maintenance		\$503,000
Software z/OS, CICS, COBOL, DB2		\$2,600,000
ISV		\$1,000,000
Migration Labor		\$0
Power and Facilities		\$33,987
<b>TOTAL</b>		<b>\$4,136,987</b>

	OTC	Annual
Hardware 2x HP Superdomes 6x HP DL 585 Hardware Refresh Y3	\$4,939,830 \$135,070 \$5,074,900	Not Paid Y1,2,3 \$509,444 \$3,150
Software Transaction Processing Oracle ISV	\$916,800 \$12,960,000 \$13,209,960	Not Paid Y1 \$229,200 \$2,851,200 \$2,784,241
Migration Labor		\$600,000 Paid Y1,2,3
Power and Facilities		\$67,865
Parallel Running		\$4,136,987 Paid Y1,2,3
<b>TOTAL</b>	<b>\$37,236,560</b>	<b>4,804,852 Y1 10,669,493 Y2,3 6,445,100, Y4,5</b>

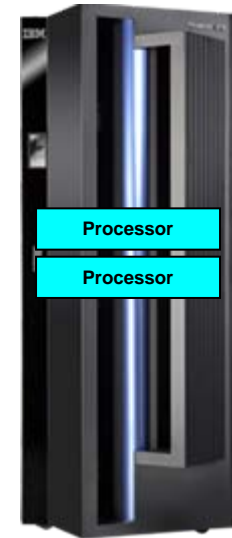
# European Financial Services Offload Project

- 2x 24-way Production / Dev / Test / Education Application, DB, Security, Print and Monitoring
- 4x 1-way Admin / Provisioning / Batch Scheduling

z890 2-way Production / Dev / Test / Education App, DB, Security, Print, Admin & Monitoring



**2 processors  
(332 MIPS)**



**52 Unix processors  
(222,292 Performance Units)**

**\$17.9M**

**\$4.9M**

**670 Performance Units per MIP**

No disaster recovery

Plus:  
2x HP SAN Servers (existing)  
Many (existing) Windows servers

# European Financial Services Four Year Total Cost Of Acquisition Breakdown

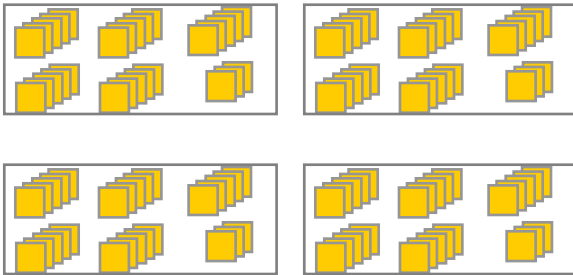
## Mainframe Cost

## Distributed Cost

	OTC	Annual		OTC	Annual
2 GP Growth MIPS	SUNK COST \$280,000	\$3,505 (avg, Incl. growth)	2x HP Superdome	\$2,506,892	\$0 (paid up front)
			4x HP rx2660	\$30,192	\$0 (paid up front)
			Hardware Refresh	\$2,537,084	\$0
Software			Software		Not paid Y1
z/OS, CICS, COBOL, HLASM		\$552,048 (avg, incl. growth)	Transaction SW	\$389,640	\$66,300
IDMS		\$552,048	Oracle DB	\$816,000	\$149,600
			Monitoring	\$475,326	\$89,400
			Msg, secy, print etc.	\$963,360	\$162,000
Migration Labor		\$0	Migration Labor		\$1,170,000 Y1 \$1,560,000 Y2,3 \$390,000 Y4
Power and facilities		\$43,014	Power and facilities		\$145,764
			Parallel Running Y1-3	\$160,460	\$1,109,166
<b>TOTAL</b>	<b>\$280,000</b>	<b>\$1,150,615</b>	<b>TOTAL</b>	<b>\$7,878,954</b>	<b>\$2,424,930 (Y1) \$3,282,230 (Y2,3) \$1,003,064 (Y4)</b>

# Asian Insurance Company Offload Project

4x HP 28-way  
Application and DB



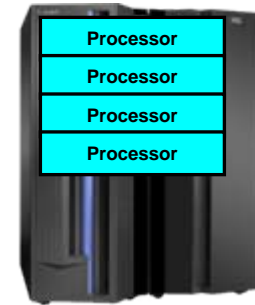
**\$25.4M**

**4 processors  
(1,620 MIPS)**



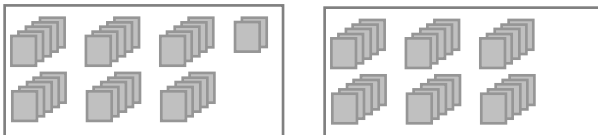
**112 Unix processors  
(437,992 Performance Units)**

1x z990 4-way  
(production & test)



**\$18.1M**

Plus:  
Disaster Recover  
2x HP Superdome (62 cores)



**270 Performance Units per MIP  
(D/R not included)**

# Asian Insurance Company

## Five Year Total Cost Of Ownership Breakdown

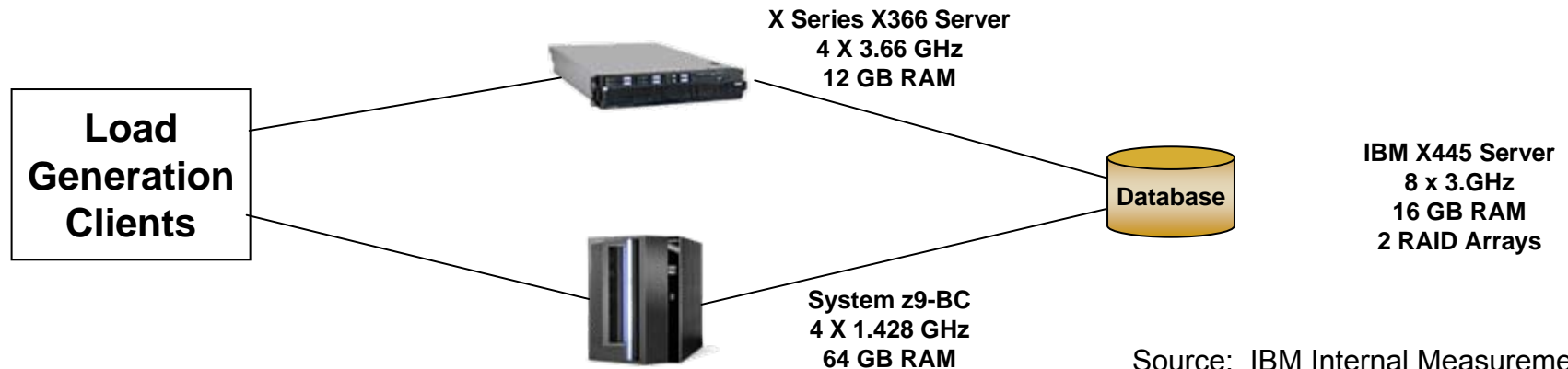
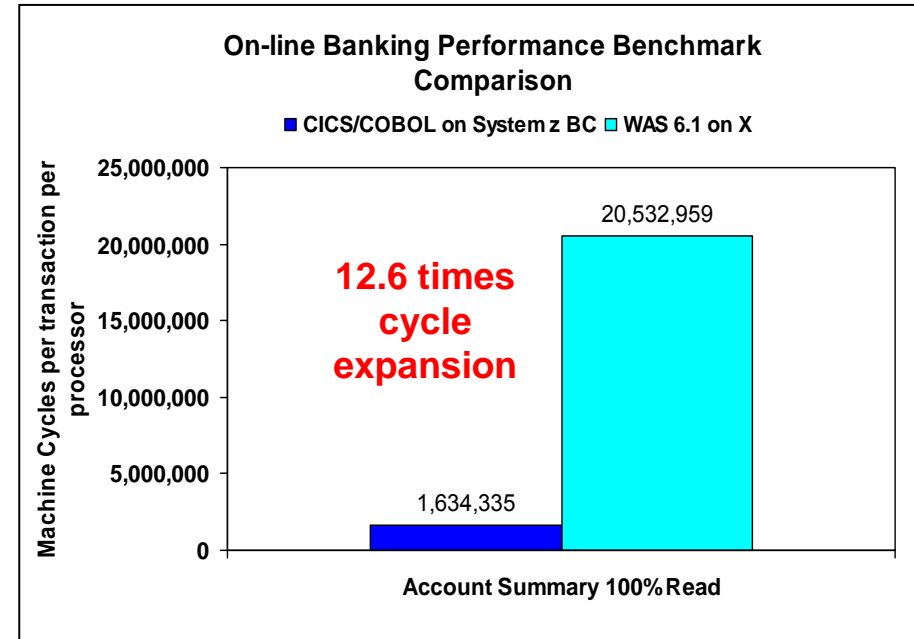
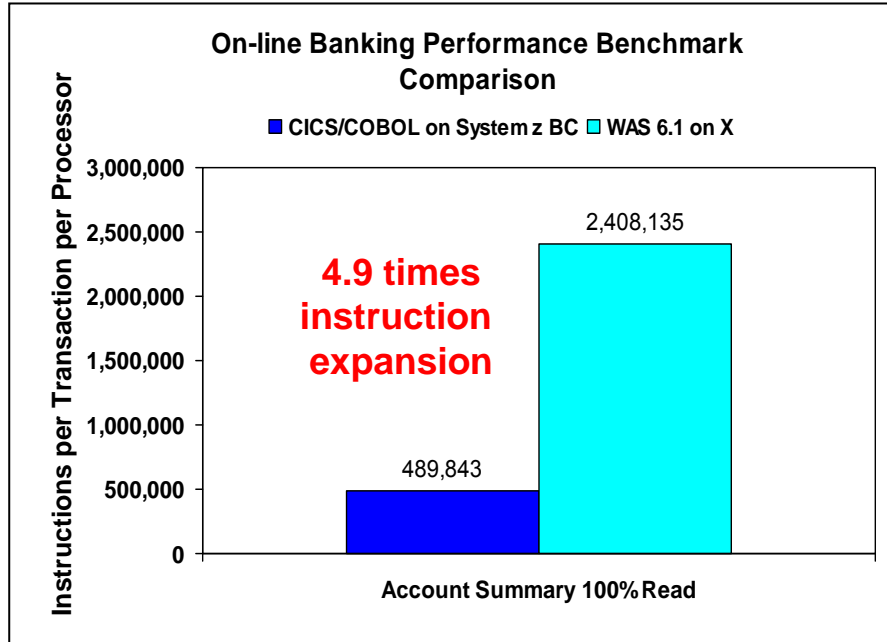
### Mainframe Cost

	OTC	Annual
Hardware		
z990		\$194,400
DR hardware	\$180,000	
EMC Storage	\$875,000	\$75,000 (Y2+)
Software		
z/OS, CICS, DB2, and tools		\$1,948,308
Utility Space		\$5,676 \$23,420
Costs for 20% annual growth	\$3,559,400	\$6,722,596 (5 year total)
<b>TOTAL</b>	<b>\$4,614,400</b> (1 <sup>st</sup> year)	<b>\$13,267,718</b> (5 year total)

### Distributed Cost

	OTC	Annual
Hardware		
HP Superdome	\$2,554,165	\$814,827 (3YR at Y1)
HP Superdome (DR)	\$815,389	\$279,369 (3YR at Y1)
EMC Storage	\$1,750,000	\$150,000
Software		
Tmax OpenFrame	\$1,160,000	\$255,200
HP-UX	\$271,128	\$296,754 (3YR at Y1)
Oracle	\$1,392,000	\$306,240
System tools	\$450,000	\$99,000 (Y2+)
Utility Space		\$93,094 \$40,320
Migration Services z990 in the 1 <sup>st</sup> year	\$2,100,000 \$2,160,144	
Costs for 20% annual growth	\$1,636,902	\$152,162 (5 year total)
<b>TOTAL</b>	<b>\$14,289,728</b> (1 <sup>st</sup> year)	<b>\$10,789,816</b> (5 year total)

# Benchmark – Code Expansion When Moving From CICS/Cobol To Java On Wintel (Higher Is Worse)



Source: IBM Internal Measurements

# European Government Organization – Data Base Expansion

- Migration of existing IMS hierarchical database required a redesign and reimplemention of the database and the application
  - ▶ Hierarchical to relational database migration was estimated to result in a 2-3x database and processing expansion
- Offload projected to cost 1.9x more over 5 years
  - ▶ €386M vs. €204M



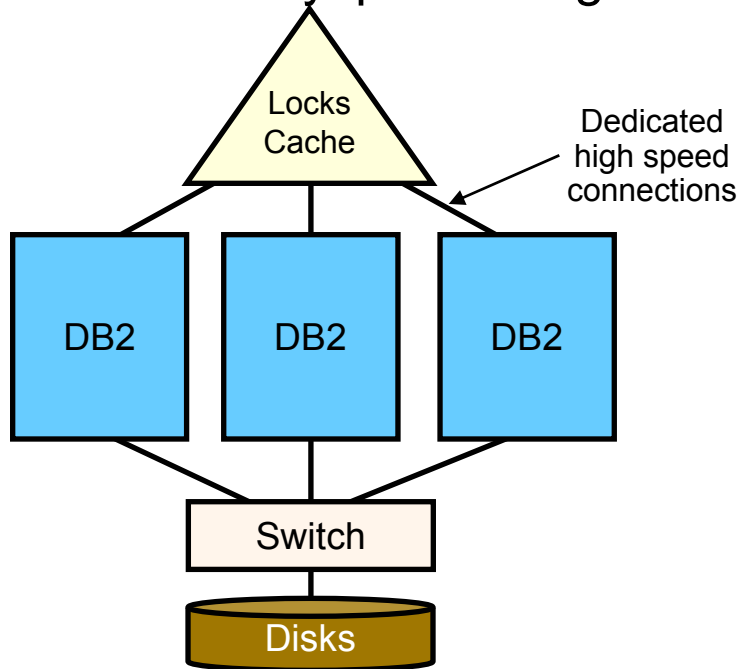
# Database Is A Key Consideration In Any Large Offload Proposal

- The only distributed replacement option for DB2 is Oracle RAC
- Let's take a brief look at Oracle RAC
  - ▶ Scalability
  - ▶ Core Proliferation
  - ▶ Availability
  - ▶ Security

# Oracle RAC Is Designed For Commodity Hardware

## DB2 for z/OS

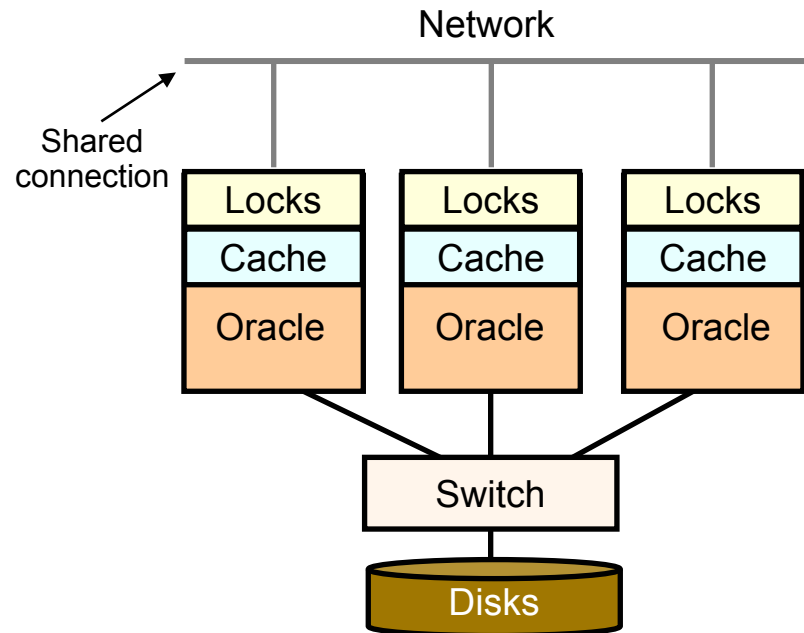
Centralized Sysplex Design



**High speed centralized**  
lock manager in  
coupling facility

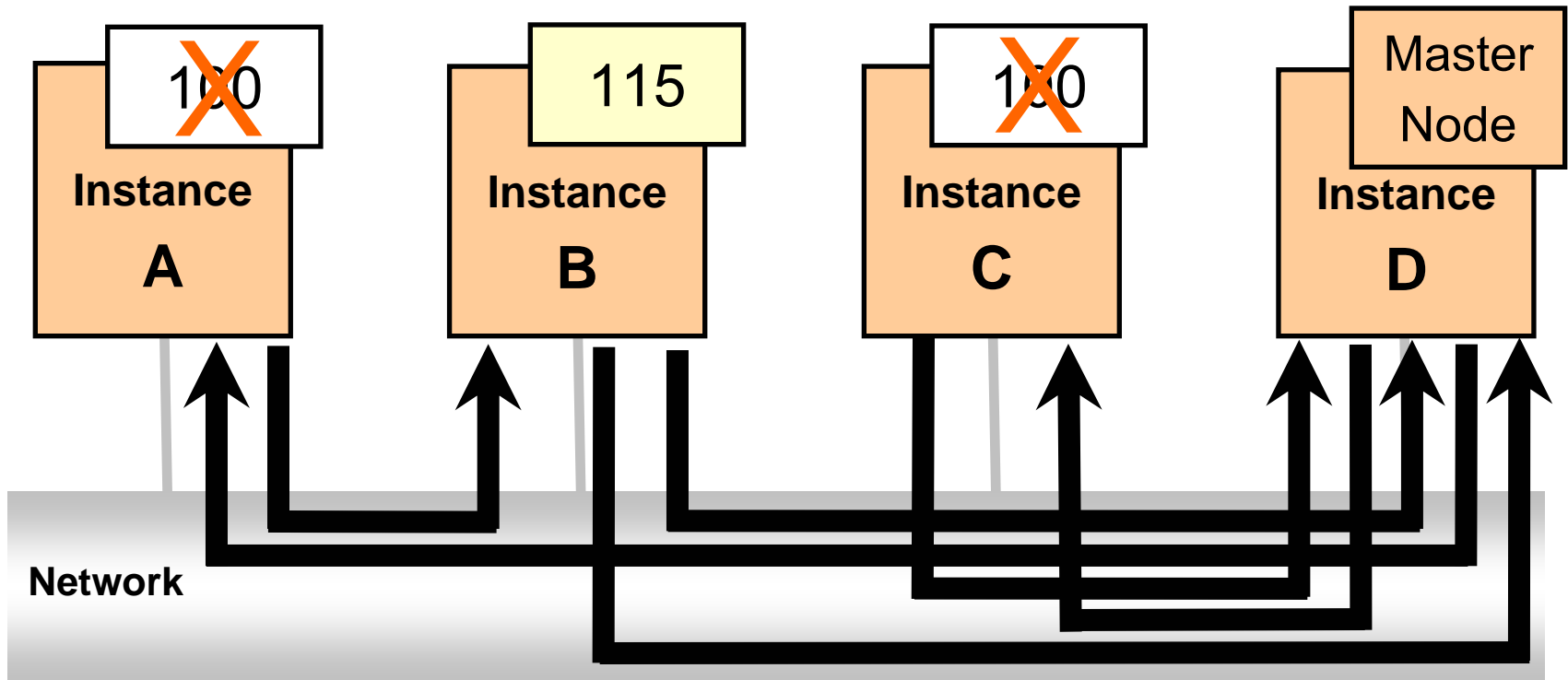
## Oracle RAC

Distributed Lock and Data Design



**Distributed lock**  
management with  
high messaging **overhead**

# Oracle RAC: Lock Management Overhead



**Lock Assume**

7. B Updates local copy

**Inter-node connections: 6**

**In a cluster with 4 nodes, an update operation may need 6 network connections and two in-memory calls (not shown).**

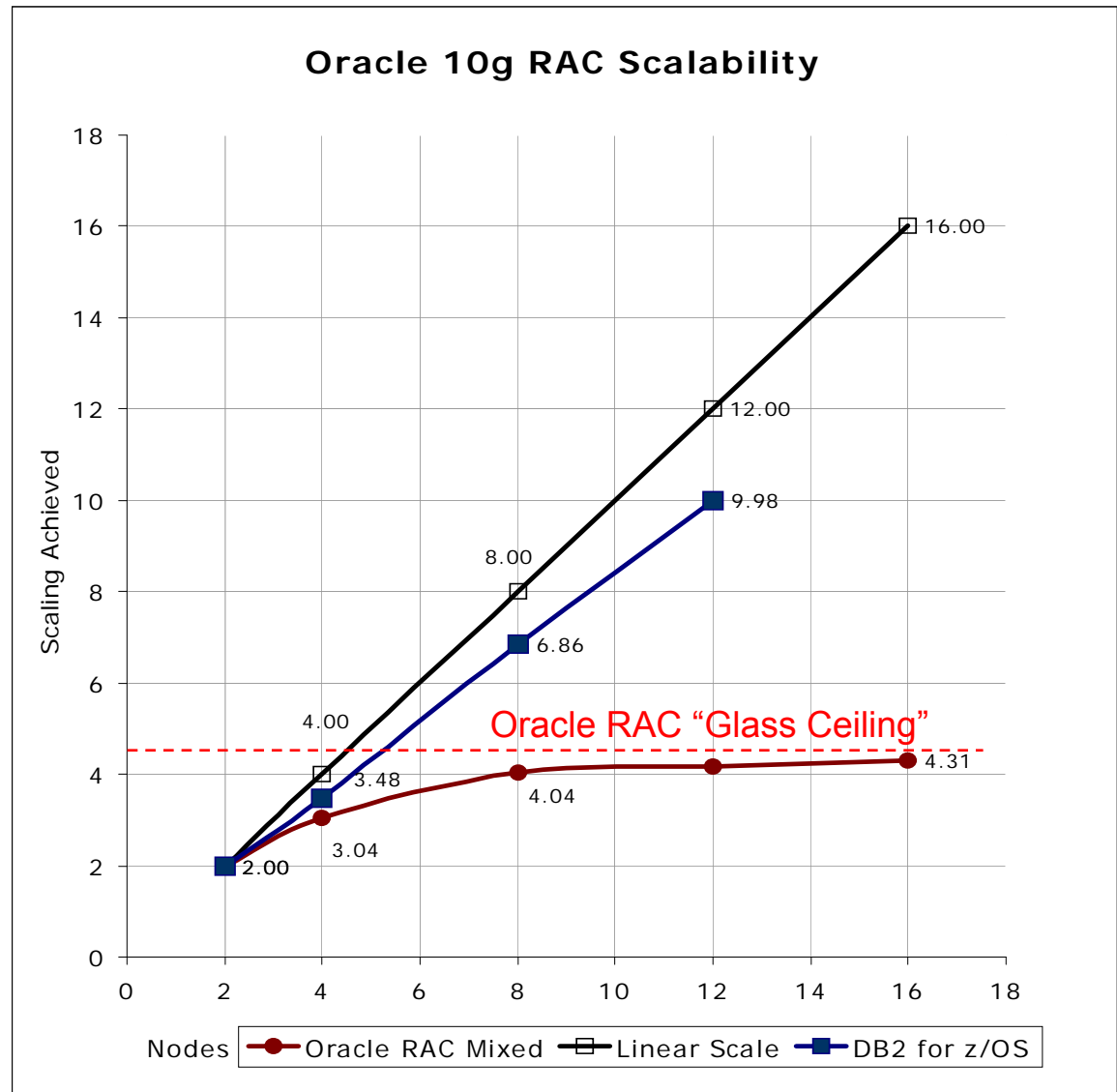
Example based on Oracle's US Patent 7,107,319 B2.

# HP Agrees! Oracle RAC Scale Out Is Limited

- DB2 for z/OS provides near-linear scalability with relatively little overhead as nodes are added
- With Oracle RAC, overhead increases rapidly as additional nodes are added and performance degrades after only 4 to 6 nodes

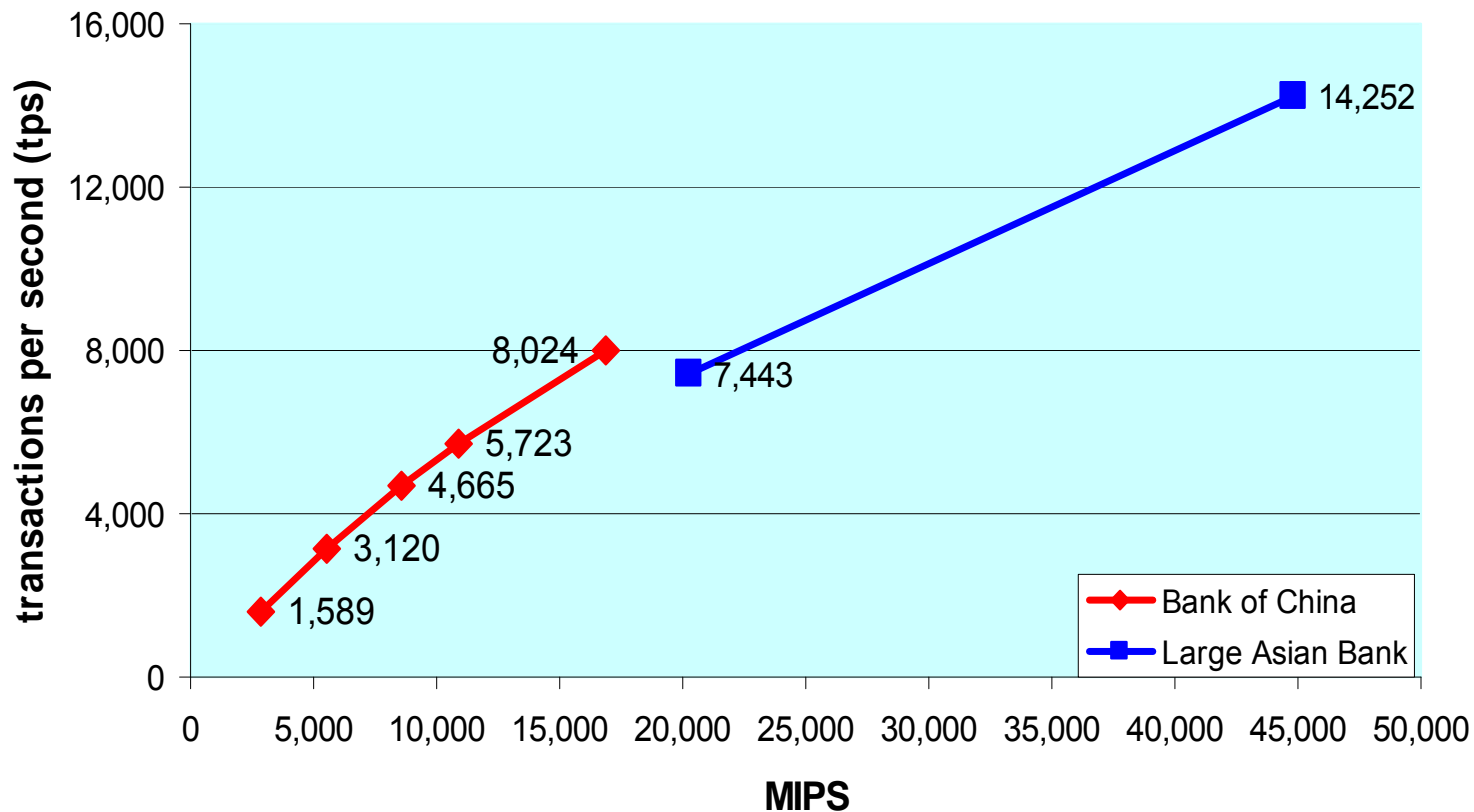
Sources: "Scale-up versus scale-out using Oracle 10g with HP StorageWorks", Hewlett-Packard, 2005

"Enterprise Data Base Clustering Solutions" ITG, October 2003



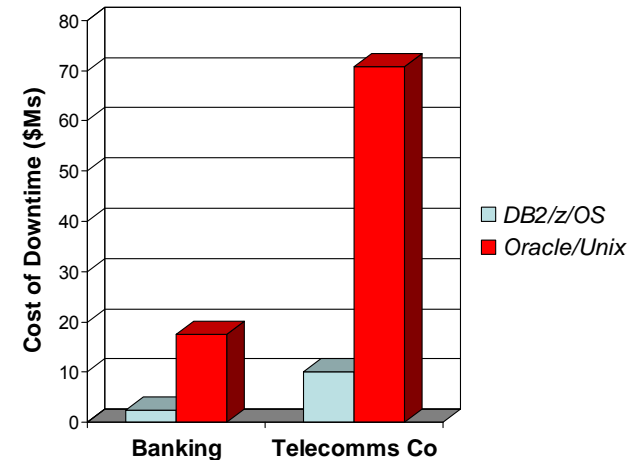
# Centralized Coupling Facility Enables Near Linear Scalability With DB2 For z/OS

- IBM benchmarked the workloads of Bank of China and another large Asian bank to demonstrate workload capacity
- Near linear scaling was achieved through a range of MIPS



# DB2 For z/OS Delivers Better Availability

- Fractional Improvements Result in Millions in Savings
- Financial Impact of Downtime Per Hour for financial industry is \$1.145M
- Financial Services Company Example:
  - ▶ \$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
<b>Cost of Downtime</b>	<b>\$17.6M</b>	<b>\$2.5M</b>

**\$15.1 Million dollar difference!**

Sources: Picking up the value of PKI: Leveraging z/OS for Improving Manageability, Reliability, and Total Cost of Ownership of PKI and Digital Certificates by Jerald Murphy: 2007

# DB2 For z/OS Has A Proven Security Track Record

## DB2 for z/OS Security

- 5 security related patches in the last 10 years
- Proven RACF and Multi Level Security
- End-to-end encryption via hardware assist
- Optim Test Data Management
  - ▶ Ensures anonymous access to data necessary for testing
- Optim Archiving Expert
  - ▶ Allows customers to easily archive and access data
- DB2 Audit Management Expert
  - ▶ Supports compliance requirements
  - ▶ Consul for enterprise wide audit

## Oracle's Security Exposures

- **Oracle.com – January 2009**  
41 security patches, including **20** for database
- **Oracle.com – October 2008**  
36 security patches, including **15** for database
- **Oracle.com – July 2008**  
45 security patches, including **14** for database
- **Oracle.com – April 2008**  
41 security patches, including **17** for database
- **eWeek.com – January 2008**  
26 security patches, including **9** for database

In the last year Oracle has issued 163 security patches, **66** for the database

# TCO Case Studies Consistently Demonstrate Distributed Core Proliferation

Scenarios	Cost of Distributed vs. z	Distributed Cost Ratio	Cores vs. z Processors	Core Ratio	Performance Units per MIP
<b>Offloading cases</b>					
- Banking Benchmark	\$43.3M vs \$18.2M	2.4x	560 vs 7	80 : 1	187:1
- NA financial company	\$84.7M vs \$24.2M	3.5x	264 vs 6	44 : 1	482:1
- European financial	\$17.9M vs \$4.9M	3.7x	52 vs 2	26 : 1	670:1
- Asian financial company	\$119 M vs \$53 M	2.2x	408 vs 17	24 : 1	122:1
<b>Offloading studies</b>					
- European agency	€386M vs €204 M	1.9x	568 vs 30	19 : 1	185:1
- Restaurant chain	\$56.3M vs \$23.3M	2.4x	32 vs 4	8 : 1	116:1
<b>Offloading studies pending</b>					
- US Utility	\$13.4M vs \$6.2M	2.2x	112 vs 3	37 : 1	
- US Manufacturer	\$64.0M vs \$43.3M	1.5x	96 vs 6	16 : 1	

**2.5x**

**32 : 1**

**294:1**

Core proliferation drives higher costs



**In addition to costing more, offload projects result in lower qualities of service...**

**Let's compare the technologies**



**IBM**

# TD Bank Achieves 99.999% Availability

## ■ Background

- ▶ TD Bank has been running Parallel Sysplex
  - no Sysplex-wide outage for **12 years**
- ▶ System z is used for Customer Account Data for applications supporting Tellers, Internet Banking and ATMs

## ■ TD Bank Recommendations

- ▶ Keep sysplex up – do not bring it down
- ▶ Practice Rolling IPLs
- ▶ Exploit concurrent hardware upgrades
- ▶ Use automation
- ▶ Configure your sysplex for availability
  - IMS/DB2 Data-sharing
  - Transaction routing
  - Sysplex Distributor for TCP/IP
  - Online database reorganizations
  - Clone each image
  - Ensure applications exploit parallel sysplex

### ➤ Client Environment


- **System z**
- **z/OS**
- **DB2**
- **IMS**
- **WMQ**
- **GDPS**

Parallel Sysplex Deployment consists of five System z across two sites running 42 M business transactions a day



# HP “Non-Stop” Stopped For Over 9 Hours At Bursa Malaysia

Sequence of events	
5.30am	One hard disk fails
5.35am	Faulty disk replaced
6.00am	Replacement disk faces problems; triggers failure of other disk and the CPU
6.30am	System restarts; several brokers unable to connect to central trading system
8.00am	Over 50% of brokers fail to connect
8.30am	Suspends trading; activates back-up site
1.00pm	Back-up site start-up process takes longer than expected
1.20pm	Decides to start afternoon session from primary site
3.15pm	Pre-opening orders keyed-in; connectivity problem crops up
3.30pm	Unable to resolve connectivity with brokers in time; extends trading suspension



**Estimated  
opportunity  
loss of about  
RM450,000**

*“After spending millions of Ringgit, their information technology (IT) people still haven't got their act together. The IT system should be fail-safe but (in this case) the back-up system also failed.”*

**Jimmy Vong**  
EquitiesTracker Founder

<http://biz.thestar.com.my/news/story.asp?file=/2008/7/4/business/21738638&sec=business>  
<http://biz.thestar.com.my/news/story.asp?file=/2008/7/5/business/21748124&sec=business>

# 300-Year-Old London Stock Exchange Suffers .NET Crash On Fannie and Freddie Bailout Day

## Sequence of events

- 9:00am Traders unable to route orders to LSE
- 9:21am LSE notified clients and FTSE-100 largely froze
- 3:50pm LSE notified clients trading would resume soon
- 4:00pm After 6 hours 45 minutes downtime trading platform finally back up



*“Microsoft .NET Framework is simply incapable of performing this kind of work, and SQL Server 2000, or any version of SQL Server really, can’t possibly handle the world’s number three stock exchange’s transaction load on a consistent basis”*

**Leaving  
Billions of  
Dollars in  
Business  
undone!**

**Steven J. Vaughan-Nichols**  
Computerworld Blogger

[http://blogs.computerworld.com/london\\_stock\\_exchange\\_suffers\\_net\\_crash](http://blogs.computerworld.com/london_stock_exchange_suffers_net_crash)

[http://online.wsj.com/article\\_email/SB122088611707510173-IMyQjAxMDI4MjAwOTgwODk2Wj.html](http://online.wsj.com/article_email/SB122088611707510173-IMyQjAxMDI4MjAwOTgwODk2Wj.html)

**Nevertheless, I'm paying a lot of money to mainframe ISVs for software**



**Service Oriented Finance  
CIO**

# National Restaurant Chain Avoids High Cost ISV Software

- Existing environment of 1,600 MIPS included high cost ISV system management software
- Competitor's proposal was only a partial offload
  - ▶ Complete offload projected to cost 2.3x more
  - ▶ \$56M vs \$24M over 5 years
- System management software costs more in the offload case
  - ▶ Mainframe systems management
    - \$2.0M MLC per year (48 products, mostly third party)
  - ▶ Distributed systems management
    - \$2.6M Yearly Maintenance (26 products)
    - \$13.3M One Time Charge
- Better: Replace high cost ISV software with lower cost IBM Software

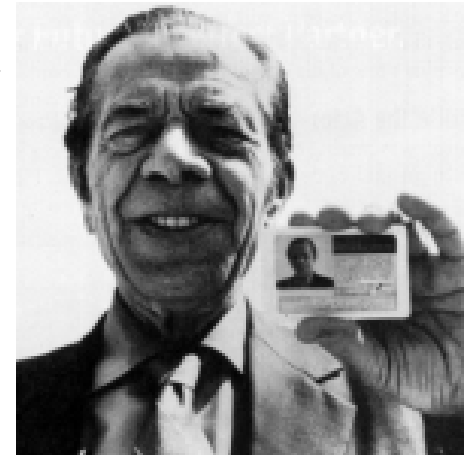
# Typical Promises Made By Mainframe Competitors

I think I need some help to get the true story



**CIO**

Lower cost...  
just as good...



**Mainframe Competitor**

# Need Help With TCO Issues?

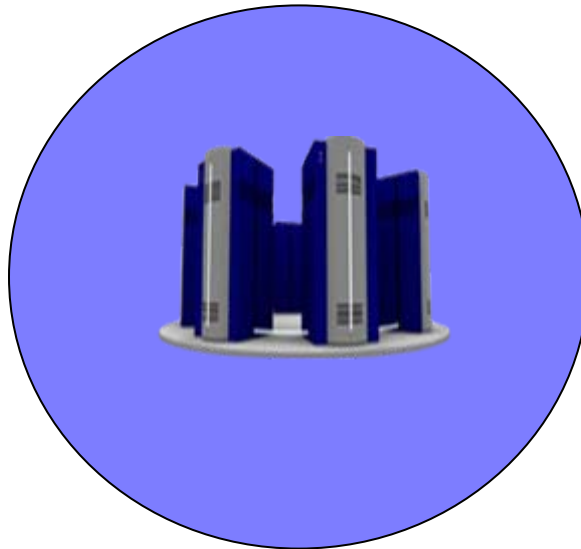
<p>Craig Bender Manager IBM Mainframe Total Cost of Ownership Services</p>	<p>518-929-2290 csbender@us.ibm.com</p>
<p>Stephanie Schmader Program Manager IBM Software Group Competitive Project Office</p>	<p>724-293-4098 schmader@us.ibm.com</p>



# How To Extend Your Mainframe For More Value (Step 1)

Some Large Core Processing Workloads Can Only Run Efficiently On The Mainframe

**Preserve And Grow This!**  
**Analyze Offload Promises**



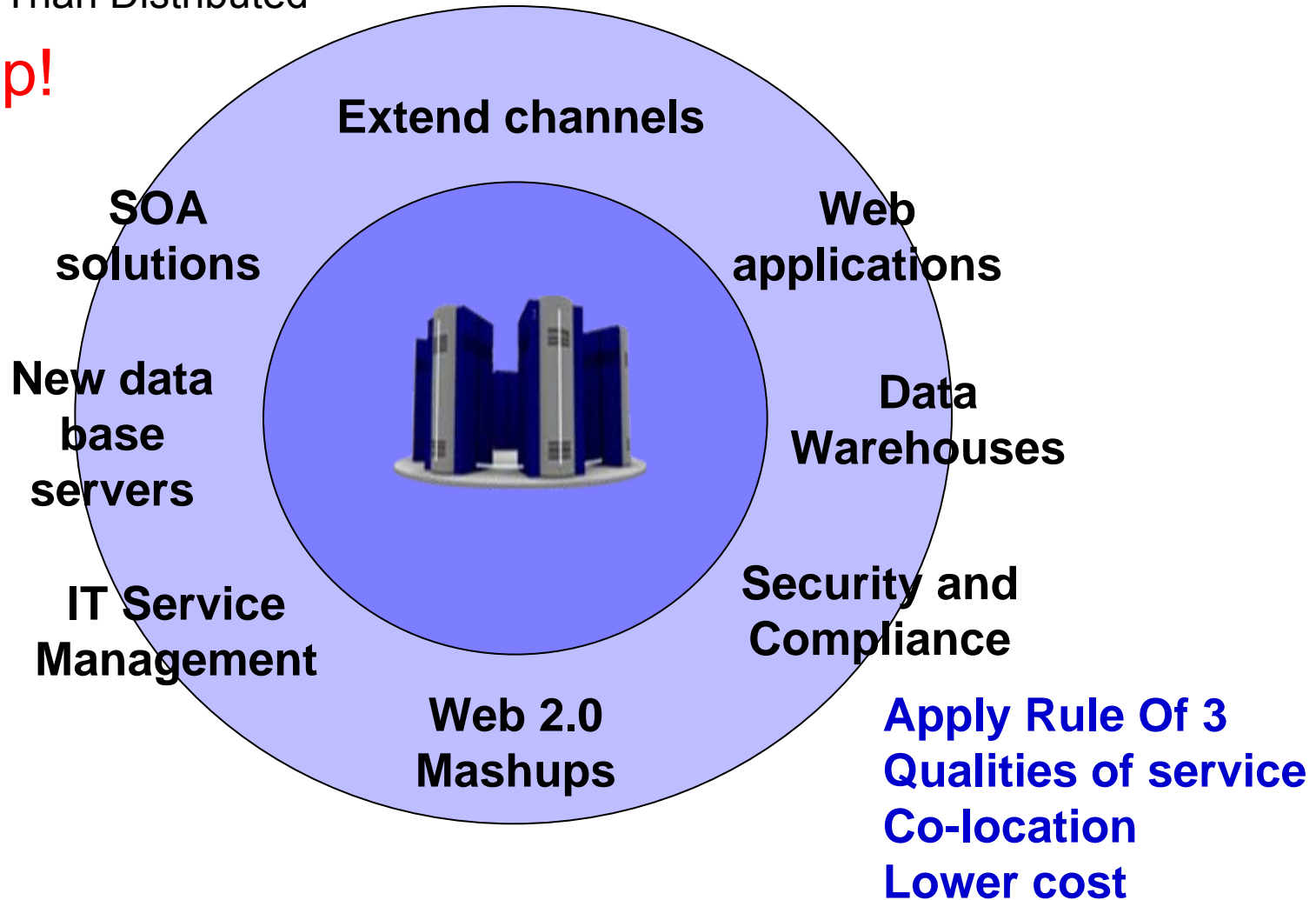
**Banks**  
**Financial Services**  
**Reservations**  
**Transaction Accounts**  
**Batch Workloads...**

**No effective alternative on distributed**

# How To Extend Your Mainframe For More Value (Step 2)

An Existing Mainframe Can Be Incrementally Extended To Run New Workloads At A Lower Cost Than Distributed

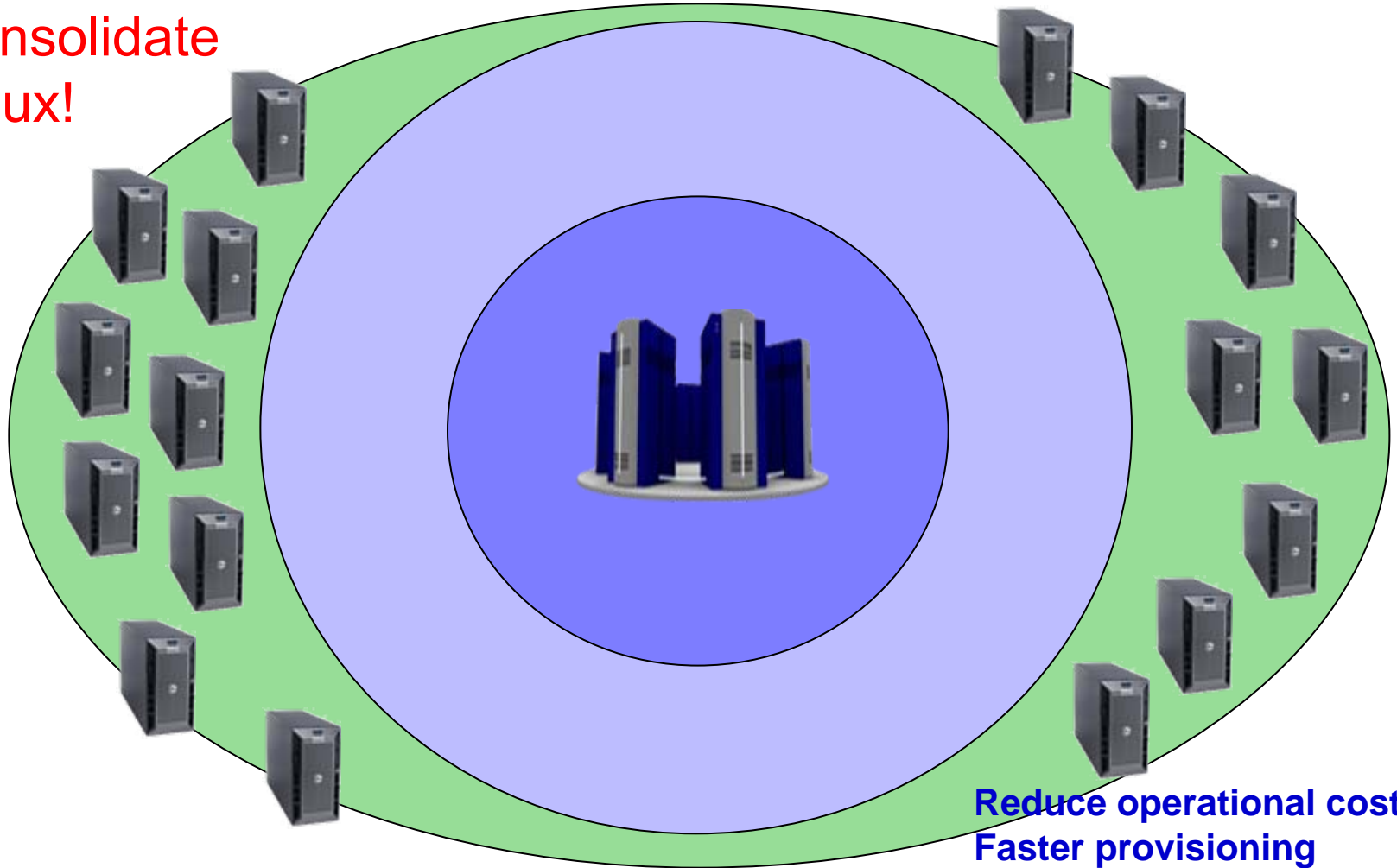
**Build It Up!**



# How To Extend Your Mainframe For More Value (Step 3)

Distributed Linux Workloads Can Be Consolidated To Cut Operating Costs

**Consolidate  
Linux!**



**Reduce operational costs  
Faster provisioning  
Biggest leverage to cut power**

# A Fully Leveraged System $z$ = Lowest Cost Per Unit Of Work

