The Modern Mainframe…
At the Heart of Your Business

Delivering Next Generation Solutions at the Lowest Cost

Key Points – Distributed Costs

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

- ▶ Labor is now the highest cost element in distributed environments
- ▶ Administrative staff costs increase in proportion to the number of servers
- ▶ New workload requires additional servers
- ▶ Cost of additional servers is linear
- ▶ Cost of software licenses is linear
- ▶ Electrical and air conditioning costs also increasing

■ **Result – scale out strategies do not reduce the cost per unit of work as the workload grows**

Owing to the nature of individual contracts, some details of this pricing discussion may be at variance with specific instances
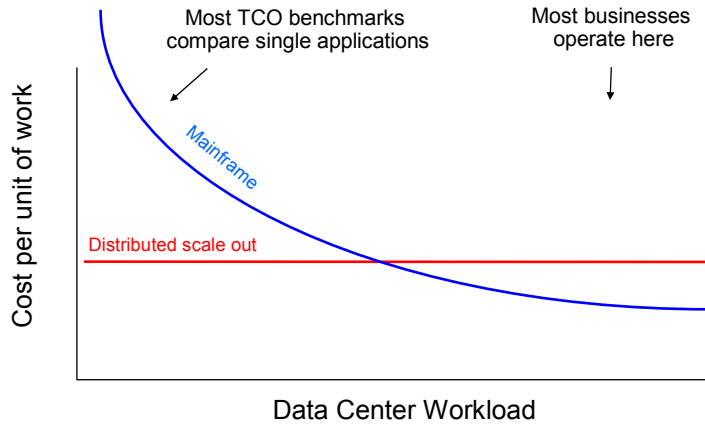
Key Points – Mainframe Costs

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

- ▶ Labor costs hold steady as workload grows
- ▶ IBM pricing policies designed to favor the addition of more workload
- ▶ Special hardware pricing for new workload types
- ▶ Lower software costs per transaction as workload grows
- ▶ Lower electrical and air conditioning consumption than server farms
- ▶ Trade-in value is recoverable for growth customers

■ **Customers have learned that mainframes running high workloads are the most cost efficient platform**

Owing to the nature of individual contracts, some details of this pricing discussion may be at variance with specific instances

Mainframe Cost Per Unit of Work Goes Down as Workload Increases

Most TCO benchmarks compare single applications

Most businesses operate here

Cost per unit of work

Mainframe

Distributed scale out

Data Center Workload

First National Bank of Omaha

First National Bank
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 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

Where is the Cross Over Point?

It depends on your environment …
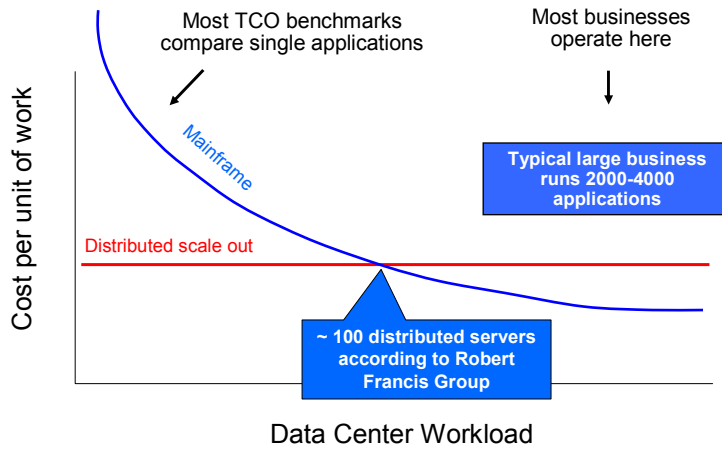
Most TCO benchmarks
compare single applications

Most businesses
operate here

Cost per unit of work

Mainframe

Typical large business
runs 2000-4000
applications

Distributed scale out

~ 100 distributed servers
according to Robert
Francis Group

Data Center Workload

Let's Break Down the Elements of Cost

Total Cost of Acquisition =

Cost of hardware +

Cost of software +

Let's Break Down the Elements of Cost

Total Cost of Ownership =

Cost of hardware +

Cost of software +

Environmentals +

Cost of labor +
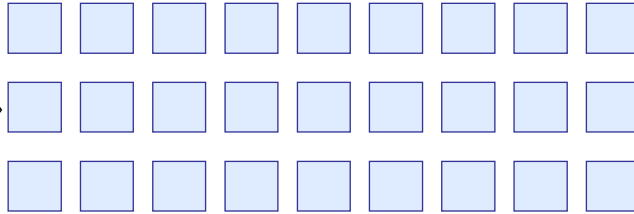
Financial terms

Mainframe Hardware Cost is Decreasing

IBM Hardware price per MIP over time*

Hardware prices are one time charge

Price per MIP in $K

* Memory and I/O capactiy are additional feature charges

Source: Gartner

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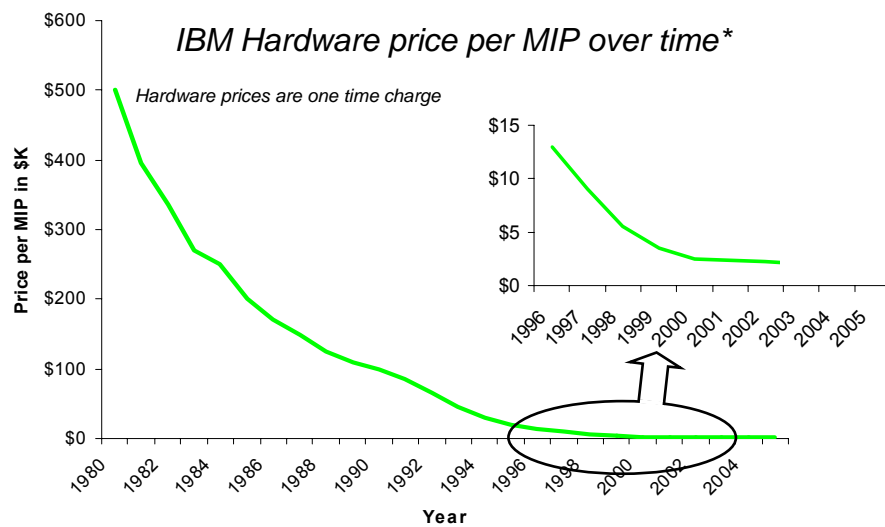
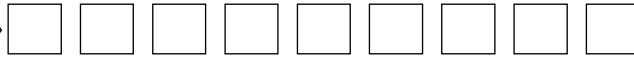## "Price Per MIP" Does Not Tell The Whole Story

54 way SMP

Pay for these general purpose processors "Price per MIP"

Pay for zAAP, zIIP, and IFL processors at a reduced rate (~9% of price per MIP)
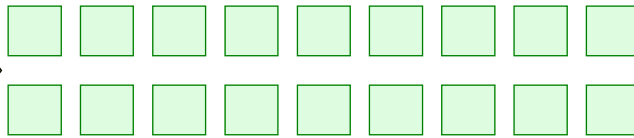
Do not pay for pre-installed capacity on demand processors until used

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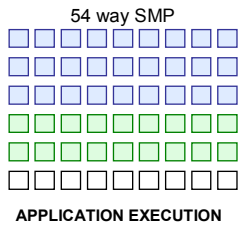## No Additional Charge For System Assist Processors and RAS Processors
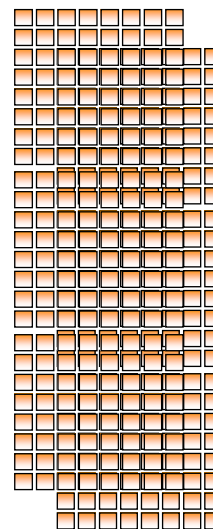
No additional charge for these processors

PLUS UP TO 336 I/O PROCESSORS at feature cost
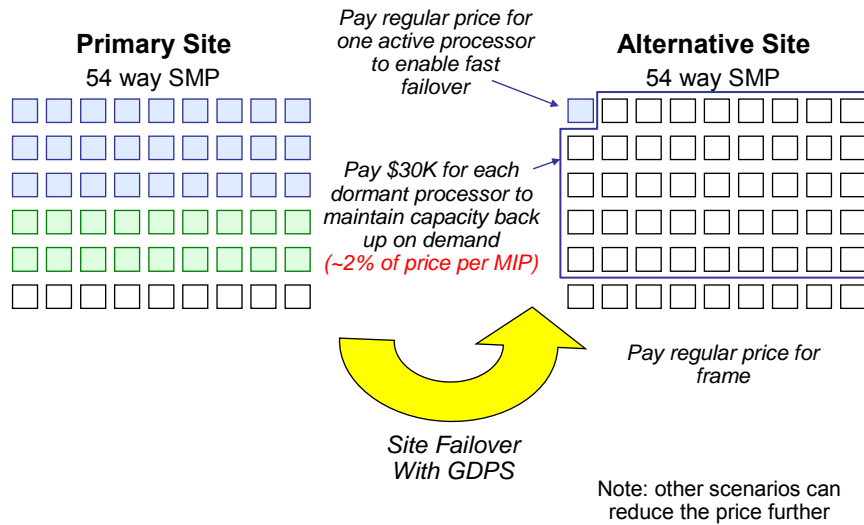
PLUS

8 MORE Dedicated System Assist and

2 MORE Spare PROCESSORS

54 way SMP

APPLICATION EXECUTION

And Service PROCESSORS to achieve "5 nines"

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Disaster Recovery – Fast Failover For Less

Primary Site
54 way SMP

Alternative Site
54 way SMP

Pay regular price for one active processor to enable fast failover

Pay $30K for each dormant processor to maintain capacity back up on demand
(~2% of price per MIP)

Pay regular price for frame

Site Failover With GDPS

Note: other scenarios can reduce the price further

Data Center in a Box

- A Pre-integrated data center in a box
- Hundreds of Processors
- Huge I/O bandwidth
- Built in networking
- Shared Everything Model with Micro Virtualization
- Billions in Engineering and Software Development

- Building your own datacenter is costly and complex
- Install and configure hundreds of devices
- Networking
- Data Silos and Synchronization
- Power consumption
- Linear Staffing Costs
- Frequent Outages

Resulting in tremendous efficiencies

No extra charge for this deep pre-integration!

Distributed Systems Storage Utilization

▶ **The Total Cost of Storage is Typically Three Times More in Distributed Environments**
  - Application specific data silos tend to over-allocate
  - Storage utilization of 25-30% or less is typical in distributed environments
  - Mainframe fine grained allocation and data sharing yield typical storage utilizations of 80% +
  - Data copies are often used to separate "batch" style workloads from online
  - Cheap disks cannot be used by high RAS workloads in distributed environments

▶ Management Headaches
  - Disaster recovery of separated data silos
  - Synchronization, and transfer requirements

"*Physically moving data*" ranked highest in IT's "pain index" In an IBM Storage study of over 200 companies

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IBM Software Price Per Transaction is Also Going Down
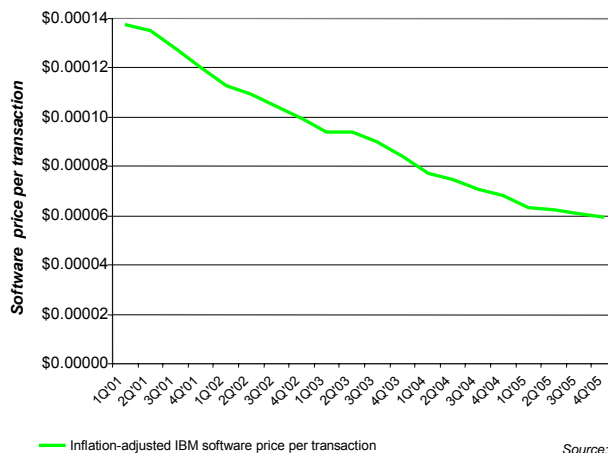
57% decrease in past 60 months

➢ *17% decrease per year*

What makes the price go down?

Pricing curves favor growth

Specialty processors (zAAPs, zIIPs, IFLs)

Technical pricing allowances

—— Inflation-adjusted IBM software price per transaction

Source: IBM SWG Finance
Data is WW customer revenue only (not IGS)
Data includes specialty engines
'Highway conditions .. mileage may vary'

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Software Pricing Curves Favor Growth

Incremental cost per MIP = $12

Incremental cost per MIP = $28

- DB2 V8
- z/OS V1
- CICS TS V3
- IMS/DB V9

Monthly License Charge (MLC)

MIPs of system
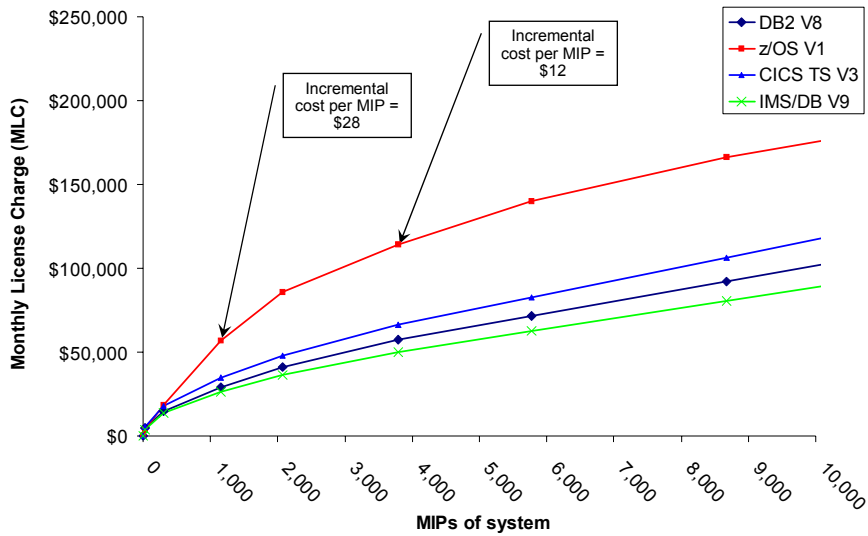
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Overall Software Price Per MIP Decreases as System Size Increases
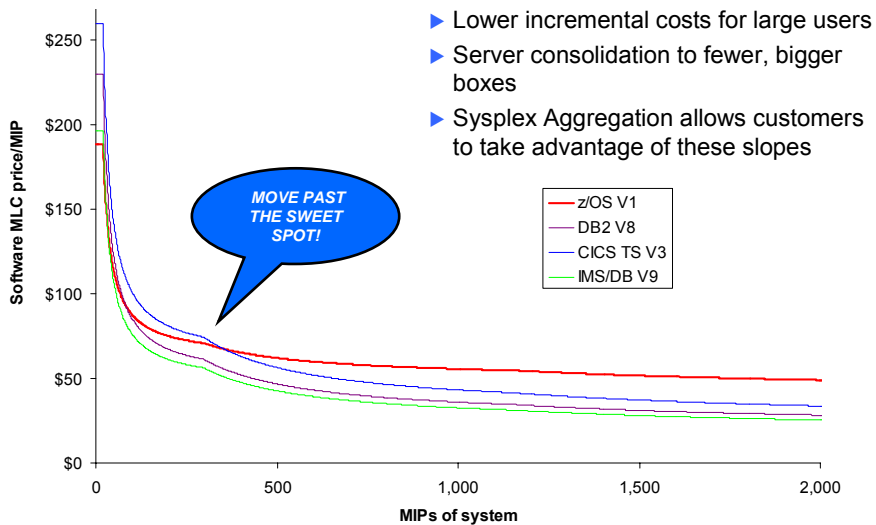
► Lower incremental costs for large users
► Server consolidation to fewer, bigger boxes
► Sysplex Aggregation allows customers to take advantage of these slopes

MOVE PAST THE SWEET SPOT!

- z/OS V1
- DB2 V8
- CICS TS V3
- IMS/DB V9

Software MLC price/MIP

MIPs of system

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IBM Actually Charges on the Basis of MSUs (Millions of Service Units Per Hour)

- 1 MSU currently is equal to about 7.3 MIPS (for a z9 EC)

  So…

- Software for a 580 MIPS machine will be charged at a rate of 81 MSU's

  Various ratings online at:
  MSUs http://ibm.com/zseries/library/swpriceinfo/hardware.html
  LSPR MIPS http://ibm.com/zseries/lspr
  Hardware SRM Constants http://ibm.com/zseries/srm

"Technology Dividend" = ~10% MSU Reduction Each Generation

Get to the latest hardware!

MSUs (y-axis): 0, 100, 200, 300, 400, 500, 600

3,000 MIPS
2,500 MIPS
2,000 MIPS
1,500 MIPS
1,000 MIPS
500 MIPS

Generation (x-axis): z900, z990, System z9

1 MSU ~ 5.9 MIPS
1 MSU ~ 6.6 MIPS
1 MSU ~ 7.3 MIPS
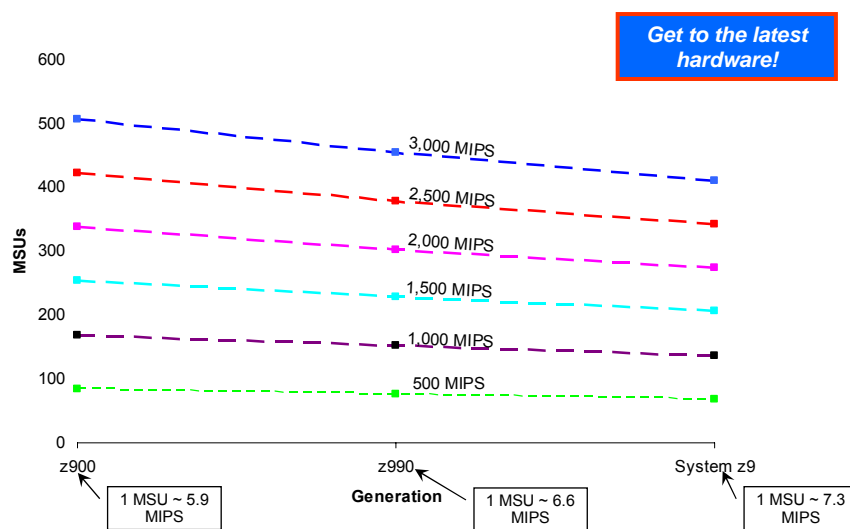
Example of Sub-Capacity Pricing, Saving ~ $16K MLC

FULL-CAPACITY PRICING

z900 Model 1C7

LPAR A	LPAR B	LPAR C

DB2
Use 139 MSUs
Pay 247 MSUs

z/OS
Use 219 MSUs
Pay 247 MSUs

247 MSUs
Total cost = $106,915/mo

88.7% utilization = 219 MSUs

LPARs A,B &C utilization — rolling avg A,B & C

one month

SUB-CAPACITY PRICING

z900 Model 1C7

LPAR A	LPAR B	LPAR C

DB2
Use 139 MSUs
Pay 139 MSUs

Pay only for LPAR B utilization

z/OS
Use 219 MSUs
Pay 219 MSUs

Pay only for LPARs A, B and C utilization

247 MSUs
Total cost = $91,011/mo

LPAR B utilization — rolling avg LPAR B

one month

> ✓ *System z and z/OS are prerequisites*
> ✓ *Only 30% of eligible customers take advantage of sub-capacity pricing*
> ✓ *Make sure you take advantage of this!*

Technology Dividend Helps Offset Software Upgrade Increases

G5 S/390 processor
9672-R56
Purchased in 3Q98
Back level 4 generations
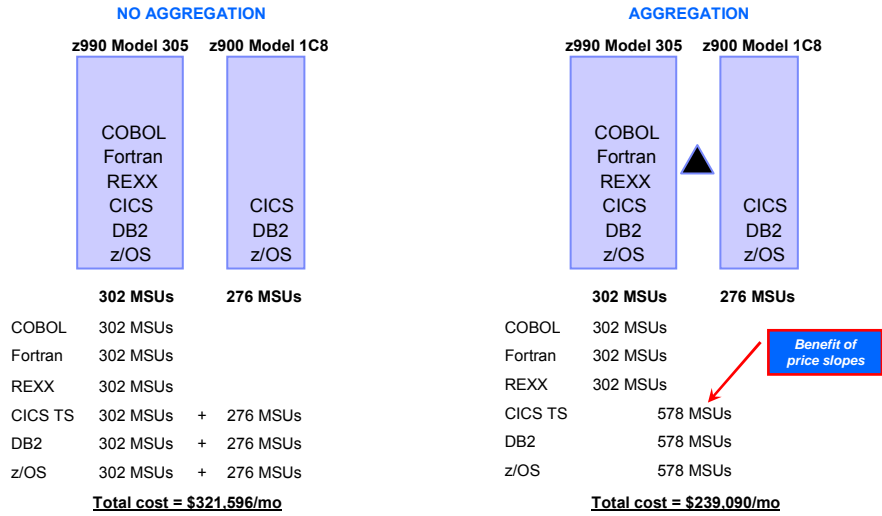540 MIPS (5 CPU's)
93 MSU's
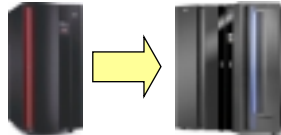
Upgrade to
current generation
z9 Enterprise Class
2094-701

	MLC (PSLC)			Tech Div and sub capacity	If No Tech Div
				540 MIPS (<1CPU) 76 MSU's MLC (VWLC)	540 MIPS (<1CPU) 93 MSU's MLC (VWLC)
Database (-3 Generations)	$15,378	DB2 UDB V6 →	DB2 9	$19,868	$21,959
Transaction Processing (-3 Generations)	$14,733	CICS ESA V4 →	CICS TS V3.1	$22,061	$24,220
Operating System (-2 Generations)	$46,485	OS/390 Base →	z/OS VI Base	$27,633	$32,631
	$76,596			**$69,562**	**$78,810**

* PSLC – Parallel Sysplex Licensing Charge, VWLC – Variable Workload Licensing Charge

Example of Sysplex Aggregation, Saving >$82K MLC

NO AGGREGATION

z990 Model 305	z900 Model 1C8

COBOL
Fortran
REXX
CICS
DB2
z/OS

CICS
DB2
z/OS

302 MSUs   **276 MSUs**

COBOL	302 MSUs		
Fortran	302 MSUs		
REXX	302 MSUs		
CICS TS	302 MSUs	+	276 MSUs
DB2	302 MSUs	+	276 MSUs
z/OS	302 MSUs	+	276 MSUs

Total cost = $321,596/mo

AGGREGATION

z990 Model 305	z900 Model 1C8

COBOL
Fortran
REXX
CICS
DB2
z/OS

CICS
DB2
z/OS

302 MSUs   **276 MSUs**

COBOL	302 MSUs	
Fortran	302 MSUs	
REXX	302 MSUs	
CICS TS		578 MSUs
DB2		578 MSUs
z/OS		578 MSUs

Benefit of price slopes

Total cost = $239,090/mo

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TCO Comparisons

CONSOLIDATION

OFFLOAD

Distributed   *System Z*

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How Much Workload is zAAP or zIIP- able?

- **How much DB2 workload can typically be run on a zIIP?**
  - ► Queries received via DRDA Remote Access Protocol (Database Server scenarios)
    - – Up to 40%
  - ► Parallel queries (Data Warehouse scenario)
    - – Up to 80%
  - ► Some of index maintenance utilities

- **How much Java workload can typically be run on a zAAP?**
  - ► WebSphere scenario
    - – Up to 85% of a WebSphere workload (some customers report 97%)

- **How much Linux workload can typically be run on an IFL?**
    - – 100% of Linux workload

- **Offloads to specialty processors reduce software load and charges on general purpose processors**
  - ► For sub capacity pricing, the offload must occur at a time that will reduce billable rolling average

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TCO Comparisons

Earlier today we saw that strategic hosting of incremental growth on System z with zIIP costs less than HP/Oracle for
  ► Data Warehouse
  ► SAP Data Server

We also saw examples of Linux roll-up consolidation reducing cost
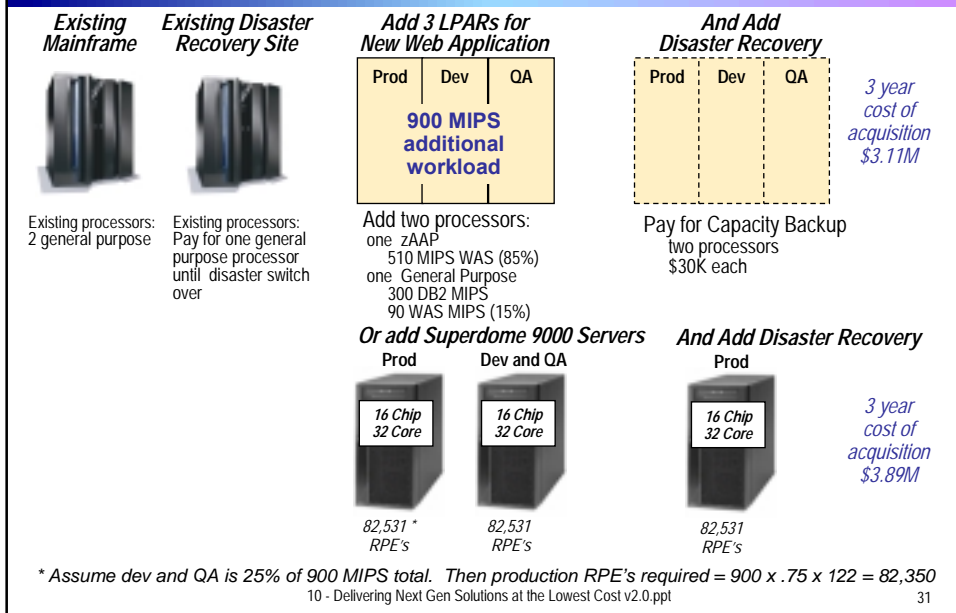
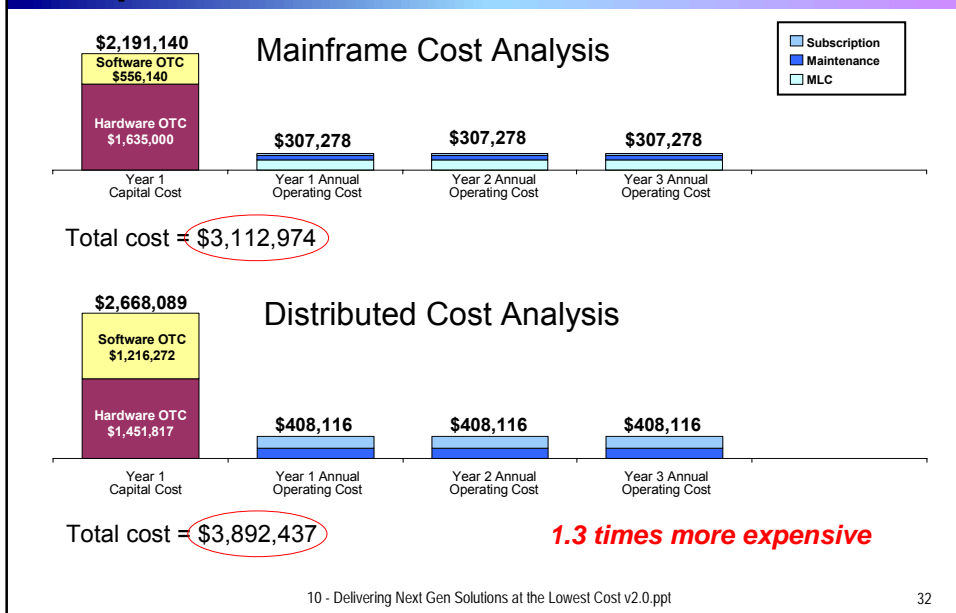Let's consider a web application that can exploit zAAP

IBM

Example: Consolidate New WebSphere Application on Mainframe

Existing Mainframe	Existing Disaster Recovery Site	Add 3 LPARs for New Web Application	And Add Disaster Recovery

Prod | Dev | QA

900 MIPS additional workload

Prod | Dev | QA

3 year cost of acquisition $3.11M

Existing processors: 2 general purpose

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

Add two processors:
one zAAP
  510 MIPS WAS (85%)
one General Purpose
  300 DB2 MIPS
  90 WAS MIPS (15%)

Pay for Capacity Backup two processors $30K each

Or add Superdome 9000 Servers

Prod **Dev and QA**

And Add Disaster Recovery
Prod

16 Chip 32 Core | 16 Chip 32 Core | 16 Chip 32 Core

3 year cost of acquisition $3.89M

82,531 * RPE's | 82,531 RPE's | 82,531 RPE's

* Assume dev and QA is 25% of 900 MIPS total. Then production RPE's required = 900 x .75 x 122 = 82,350

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zAAP Processor Lowers the Cost of Acquisition

Mainframe Cost Analysis

- Subscription
- Maintenance
- MLC

$2,191,140
Software OTC $556,140
Hardware OTC $1,635,000

$307,278 | $307,278 | $307,278

Year 1 Capital Cost | Year 1 Annual Operating Cost | Year 2 Annual Operating Cost | Year 3 Annual Operating Cost

Total cost = $3,112,974

Distributed Cost Analysis

$2,668,089
Software OTC $1,216,272
Hardware OTC $1,451,817

$408,116 | $408,116 | $408,116

Year 1 Capital Cost | Year 1 Annual Operating Cost | Year 2 Annual Operating Cost | Year 3 Annual Operating Cost

Total cost = $3,892,437

1.3 times more expensive

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WebSphere Application Server Incremental Cost Breakdown

Mainframe Hardware

OTC		ANNUAL	
1 GP Processor	$1,450,000	Processor Maintenance	
zAAP	$125,000	Processor Maintenance	$88,500
2 DR Processors	$60,000		
TOTAL	**$1,635,000**	**TOTAL**	**$88,500**

Mainframe Software

OTC		ANNUAL	
Utilities + WAS	$556,140	Utilities S&S	$44,454
		DB2 MLC	$72,240
		QMF MLC	$34,716
		zOS MLC	$67,368
		SubTotal MLC	$174,324
TOTAL	**$556,140**	**TOTAL**	**$218,778**

Distributed Hardware

OTC		ANNUAL	
3 16x32 Itanium Superdome Servers	$1,451,817	Servers Maintenance	$123,139
TOTAL	**$1,451,817**	**TOTAL**	**$123,139**

Distributed Software

OTC		ANNUAL	
Oracle EE & Utilities	$858,000	Oracle S&S	$188,760
WebSphere	$259,875	WS Maint	$51,975
Unix	$98,397	Unix S&S	$44,242
TOTAL	**$1,216,272**	**TOTAL**	**$284,977**

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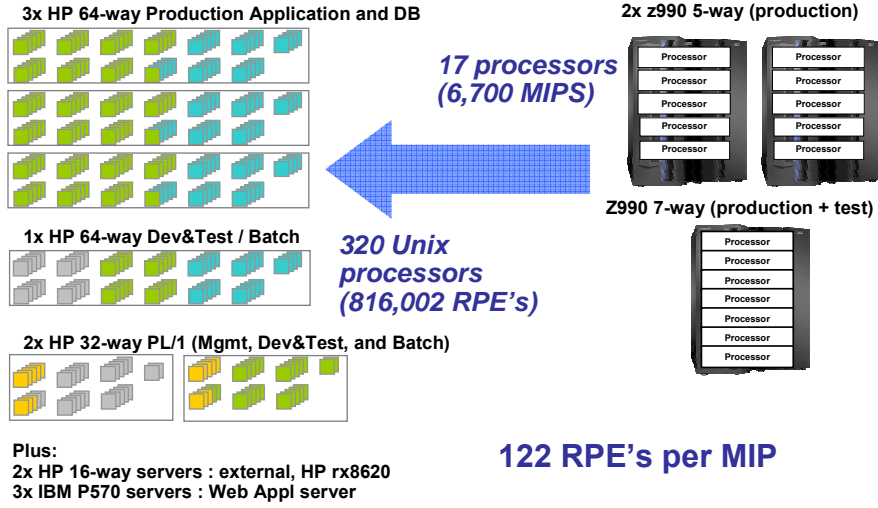# TCO Comparisons

CONSOLIDATION

OFFLOAD

Distributed

System Z
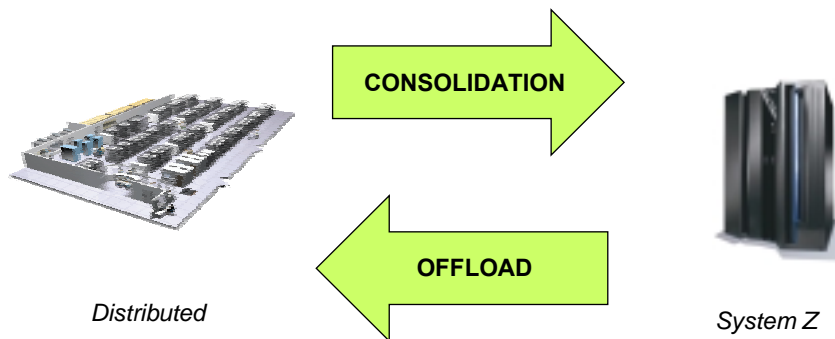
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Asian Financial Services Customer Offload Project - Overall

3x HP 64-way Production Application and DB

2x z990 5-way (production)

| Processor |
| Processor |
| Processor |
| Processor |
| Processor |

| Processor |
| Processor |
| Processor |
| Processor |
| Processor |

17 processors (6,700 MIPS)

Z990 7-way (production + test)

| Processor |
| Processor |
| Processor |
| Processor |
| Processor |
| Processor |
| Processor |

1x HP 64-way Dev&Test / Batch

320 Unix processors (816,002 RPE's)

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

Plus:
2x HP 16-way servers : external, HP rx8620
3x IBM P570 servers : Web Appl server

122 RPE's per MIP

No disaster recovery

Asia Pacific Financial Services Customer Offload Project – Database

Production Oracle RAC cluster of 3 HP Superdome nodes (28 processors per node)

z990 Processors for DB2 (production and development)

7 processors (2,680 MIPS)*

| Processor |
| Processor |
| Processor |
| Processor |
| Processor |
| Processor |
| Processor |

Batch (16 processors)

100 Unix processors Oracle RAC (233,510 RPE's)

87 RPE's per MIP
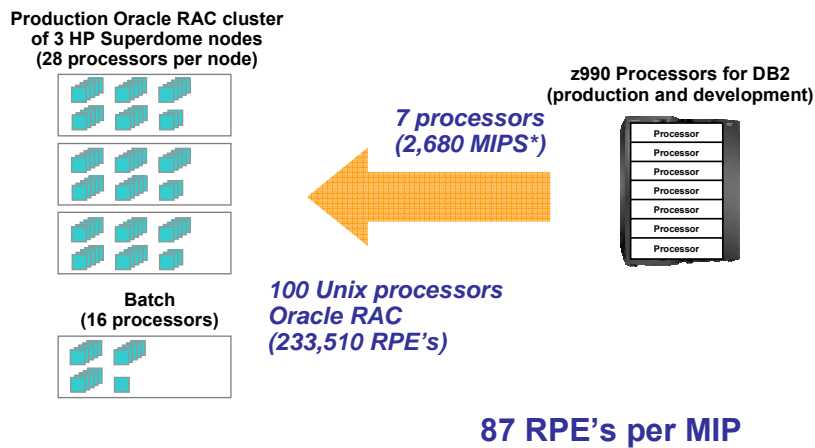
No disaster recovery
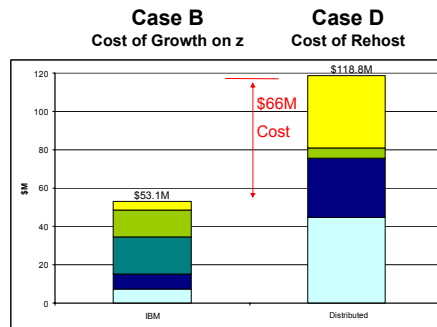
* DB2 is estimated to be 40% of total workload

Did They Save Money by Offloading?

- Competitors told the customer they would save $22M over 4 years

- IBM analysis determined that the offload solution would actually cost $66M more than growing on z

Competitor's 4 Year Cost / Savings Prediction

Case A	Case C
Cost of Growth on z	**Cost of Rehost**

IBM Analysis

Case B	Case D
Cost of Growth on z	**Cost of Rehost**
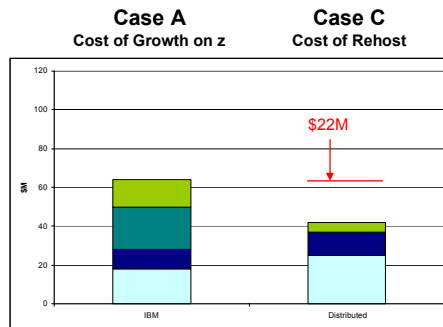
Legend: Investment | Maint | MLC | Operations | Disaster Recovery

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Lessons Learned About the Promises Made by the Competitors

- They *over-estimated* the mainframe costs
  - ▶ Over-provisioned too early — Δ$3.6M
  - ▶ Used highest hardware purchase & maintenance list prices — Δ$9.4M
  - ▶ Continued using older software; no sub-cap pricing — Δ$2.7M
  - **OVERESTIMATED BY Δ$15.7M**

- They *under-estimated* the offload costs
  - ▶ Forgot about mainframe coexistence during migration — Δ$9.5M
  - ▶ Forgot about high cost of power & cooling — Δ$1.1M
  - ▶ Forgot about the financing charges — Δ$2.5M
  - ▶ Added a test server — Δ$2.1M
  - ▶ Under-provisioned batch processing (15 % growth case) — Δ$6.3M
  - ▶ Failed to take into account technology updates — Δ$14.6M
  - ▶ Did not provide Disaster Recovery — Δ$40.6M
  - **UNDERESTIMATED BY Δ$76.7M**

Why Do Servers Proliferate in Offload Scenarios?

■ The following considerations contribute to server proliferation

  ► De-multiplexing of applications to dedicated servers
    – One application workload per server group
    – Peak-to-average provisioning yields low utilization
    – Additional provision for expected growth in out years (no capacity on demand)
    – Batch workload may stress I/O capabilities
    – Separate servers for production, failover, development/test, disaster recovery
    – Infrastructure servers for systems management
  ► Processing comparisons
    – Language expansion (CICS/COBOL path lengths are highly optimized)
    – Conversion factor (MIPS to TPM-C or RPE) worsens as I/O rates increase
    – Oracle RAC inefficiencies compared to DB2

■ Other TCO considerations
  ► 3 to 5 year lifetime for distributed servers requires repurchase
  ► Dual environments during migration
  ► Partial offloads eliminate the lowest cost MIPS first

Let's Consider The Other Elements of Cost

Total Cost of Ownership =
Cost of hardware +
Cost of software +
Environmentals +
Cost of labor +
Financial terms

Distributed Power Costs Have Become a Major Issue

- According to the Wall Street Journal, distributed server farms can generate as much as **3,800** watts per square foot (up from 250 in 1992)
  - ▶ By comparison, a System z9 consumes **107-312** watts per square foot – *one tenth or less the amount*
  - ▶ Turning on an IFL processor consumes **75** additional watts
  - ▶ Cooling cost is roughly an additional 60% of the power cost

- More than half of all serious outages are now caused by power problems*
  - ▶ Room temperatures averaging 92ºF lead to erratic machine behavior

- Aside from cost, some data centers can't obtain additional power from their providers

*Source: recent AFCOM survey of 200

Mainframe Power and Scale Efficiency
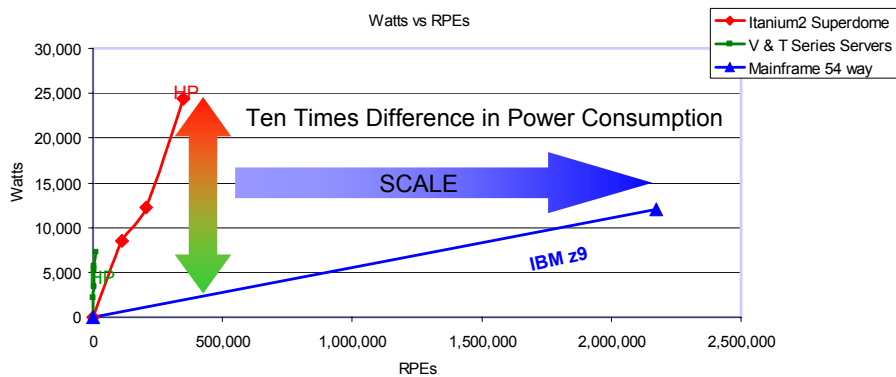
Source for HP Servers: Ideas International, Nov 06
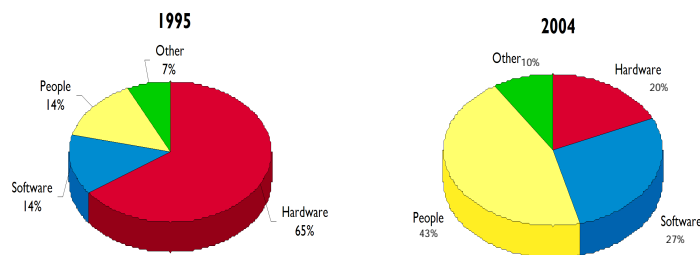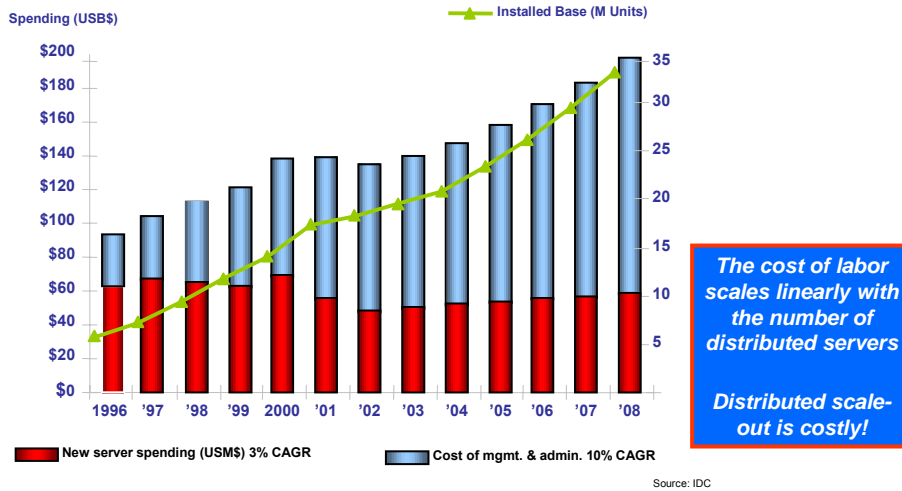Note: Uses equivalence ratio of 122 RPE's per MIP

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Do the Math

- HP Itanium 2 Superdome 9050 (64ch/128co) consumes a maximum of 24,382 watts
  - ▶ 24.382 X .08 X 24 X 365 = $17,087 per year for electricity

- Mainframe with similar computing capacity consumes 2,500 watts
  - ▶ $1,752 per year for electricity

- Similar savings on cooling capacity
  - ▶ Cost of cooling is roughly 60% the cost of power
  - ▶ Superdome total $27,339 per year vs Mainframe $2,803

People Expense has Become the Dominant Component of TCO

1995

Other 7%
People 14%
Software 14%
Hardware 65%

2004

Other 10%
Hardware 20%
Software 27%
People 43%

Based on IBM Scorpion customer analyses

Since 2000, Labor Costs Have Exceeded the Cost of All Servers … and are *Still* Growing

Spending (USB$)

Installed Base (M Units)

The cost of labor scales linearly with the number of distributed servers

Distributed scale-out is costly!

■ New server spending (USM$) 3% CAGR   ■ Cost of mgmt. & admin. 10% CAGR

Source: IDC

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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
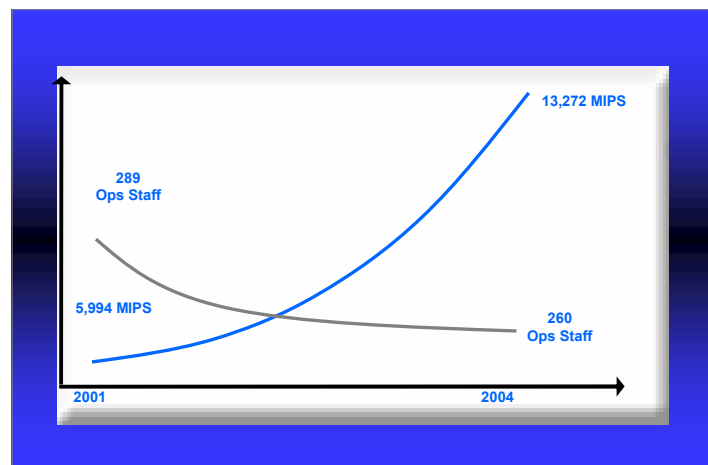
$\frac{5,994}{289}$ = 21 MIPs/HC

$\frac{13,272}{260}$ = 51 MIPs/HC

Source: Gartner

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A Comparison of Labor Costs for Two Environments That Execute Roughly Equivalent Workloads

Topic	System z- 3,192 MIPS	900 Distributed Servers
Operations	$105K ……10% of 6 FTEs	none
Customer Engineers	$52K……. 0.3 FTEs $50K LAN charges $35K z- charges	$400K SUN charges $300K LAN charges $40K p- charges $100K HP charges
Systems Engineers	$551K ….. 3.15 FTEs	$5,250K…..30 FTEs (Operations in the Systems charge)
Security Admin	None	$600K
Total	$793K	$6,690K

In this case, System z requires 1/8 the labor costs of the distributed environment

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Trade-In Value Reduces Mainframe Net Present Value Costs

- Upgrade to next generation mainframe
  - ▶ Specialty processors are upgraded to next generation free of charge
  - ▶ Growing customers typically receive credit for existing MIPS investment when upgrading to new generation
  - ▶ Full trade-in value applied to upgrade and growth MIPS
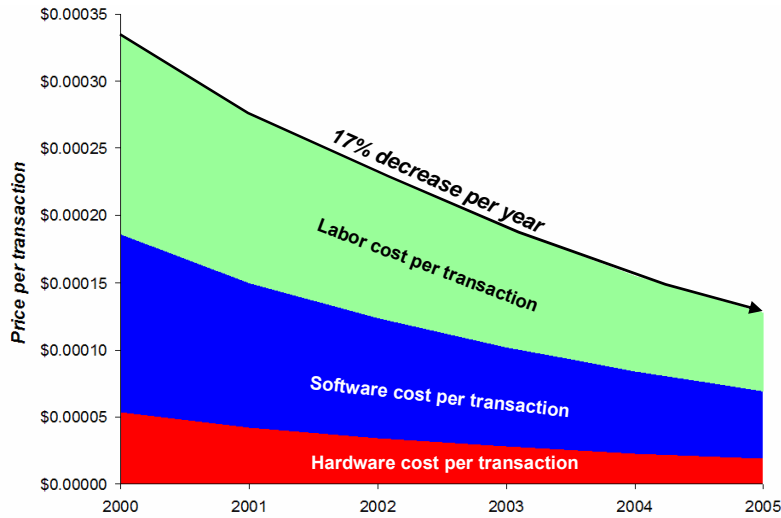
- Upgrade to next generation distributed systems
  - ▶ Life time of 3 to 5 years
  - ▶ Must repurchase existing processor capacity plus any growth

- Long term TCO implications can be important

Conclusion: Total Mainframe Hardware, Software & Labor Costs Reduced by 62% in 5 Years

Chart showing Price per transaction from 2000 to 2005 with areas for Hardware cost per transaction, Software cost per transaction, and Labor cost per transaction. Labeled "17% decrease per year". Y-axis ranges from $0.00000 to $0.00035.

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"
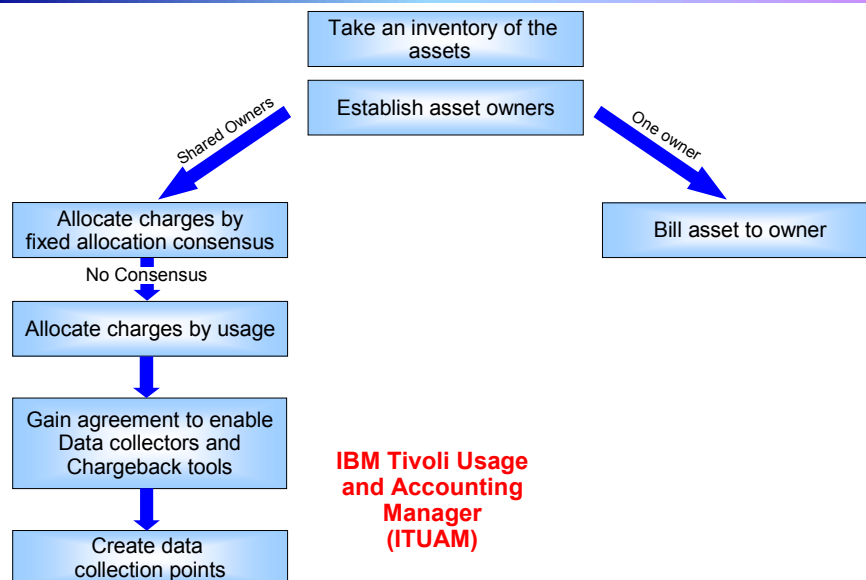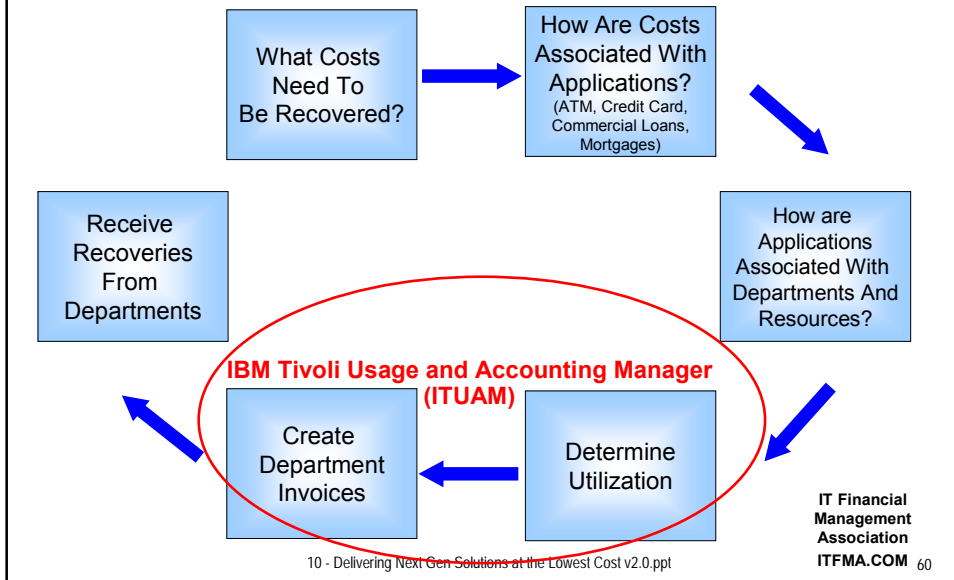
Summary

- The proper comparison between mainframe and distributed is not a single application benchmark

- The proper comparison is a distributed data center versus a mainframe, running high volume mixed workloads

- Under this comparison, mainframes have significant cost advantages

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Chargeback Governance - Make Sure Your Chargeback Policies Reflect The Actual Costs

Take an inventory of the assets

Establish asset owners

Shared Owners

One owner

Allocate charges by fixed allocation consensus

Bill asset to owner

No Consensus

Allocate charges by usage

Gain agreement to enable Data collectors and Chargeback tools

IBM Tivoli Usage and Accounting Manager (ITUAM)

Create data collection points

Data Center Cost Recovery Model

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IT Financial Management Association
ITFMA.COM 60

Best Practices to Allocate Cost

Bad	Better	Good
All Costs Allocated to the Mainframe	Fixed Allocation by Consensus (mainframe vs distributed)	Actual Usage of Each Resource (mainframe or distributed)
Incremental Mainframe Application Costs Calculated as if Standalone (e g. New Footprint)	All Incremental Mainframe Costs Extrapolated from Current Costs	Calculate Actual Incremental Mainframe Costs Considering Specialty Engines, Pricing Curves, On Demand Capacity, Disaster Recovery, Environmentals ,and Labor
Incremental Distributed Application Costs Include Only Production Hardware and Software	Calculations Also Include Development, Test, and Disaster Recovery Hardware and Software	Calculations Also Include Incremental Environmentals and Labor

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Example: Typical Data Center- A Mix of Mainframe and Distributed Servers

105 *HP Integrity rx4640 (4U) Itanium2 servers*
- *70 servers are running WebSphere*
- *35 servers are running Oracle EE*

Two (2) Mainframes (7000 MIPS)
- *8 general processors*
- *5 zAAP*
- *1 zIIP*
- *WAS and DB2*
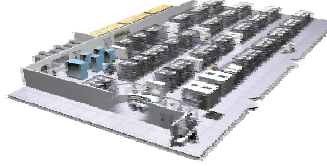
What are the recoverable costs?

	OTC – Distributed (Annual Depreciation – 3 Year Straight Line)	OTC – Mainframe (Annual Depreciation 5 Year Straight Line)	Annual Distributed	Annual Mainframe
Hardware	$2,213,219	$2,763,960	$445,806	$527,448
Software	$2,594,333	$78,210	$2,174,900	$1,875,902
Labor			$2,520,000	$1,680,000
Floor space			$75,600	$63,840
Power			$143,000	$38,000
Network	$57,100			
Total	**$4,864,652**	**$2,842,170**	**$5,359,306**	**$4,185,190**

Total Recoverable Costs   Annual: $17,251,318   Monthly: $1,437,610

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Allocation of Monthly Recoverable Costs

	Old Allocation - Consensus				New Allocation - Actual			
	Distributed	%	MF	%	Distributed	%	MF	%
Power Cost	0	0	$15,084	100	$11,917	79	$3,167	21
Labor Cost	0	0	$350,000	100	$210,000	60	$140,000	40
Floor space	0	0	$11,620	100	$6,300	54	$5,320	46
Software OTC depreciation	$120,240	60	$102,472	40	$216,194	97	$6518	3
Software S&S and MLC	$168,783	50	$168,783	50	$181,242	54	$156,325	46
Hardware OTC depreciation	$103,691	25	$311,074	75	$184,435	44	$230,330	56
Hardware Maintenance	$20,276	25	$60,829	75	$37,151	46	$43,953	54
Network	0	0	$4,758	100	$4,758	100	$0	0
Total	$412,990	29	$1,024,620	71	$851,997	60	$585,613	40

Total $1,437,610   **Total $1,437,610**

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TCO – What Have We Seen Today?

- Incremental Data Warehouse workload on System z cost less than Oracle RAC on HP Superdome

- Incremental Data Server on System z cost less than Oracle HP Superdome

- Incremental WebSphere workload on System z costs less than distributed deployment

- Consolidation of Linux servers onto System z saves big money

- System z uses less power and requires fewer operational staff

How Customers Can Get the Lowest TCO on the Mainframe

1. Move past the "sweet-spot" to realize lower prices
   - ▶ Grow core-business MIPS

2. Use the latest technology and pricing models
   - ▶ Upgrade to System z
   - ▶ Utilize specialty processors
   - ▶ Utilize sysplex aggregation
   - ▶ Exploit sub-capacity pricing
   - ▶ Execute an ELA

3. Maximize utilization
   - ▶ Drive mainframes at 90+% utilization, 24 hours by 7 days
   - ▶ Consolidate workload onto System z

4. Minimize other costs
   - ▶ Minimize software tool costs
   - ▶ Minimize outages and security breaches…

5. Stop spiraling labor costs
6. Establish accurate chargeback policies