



The future runs on System z

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

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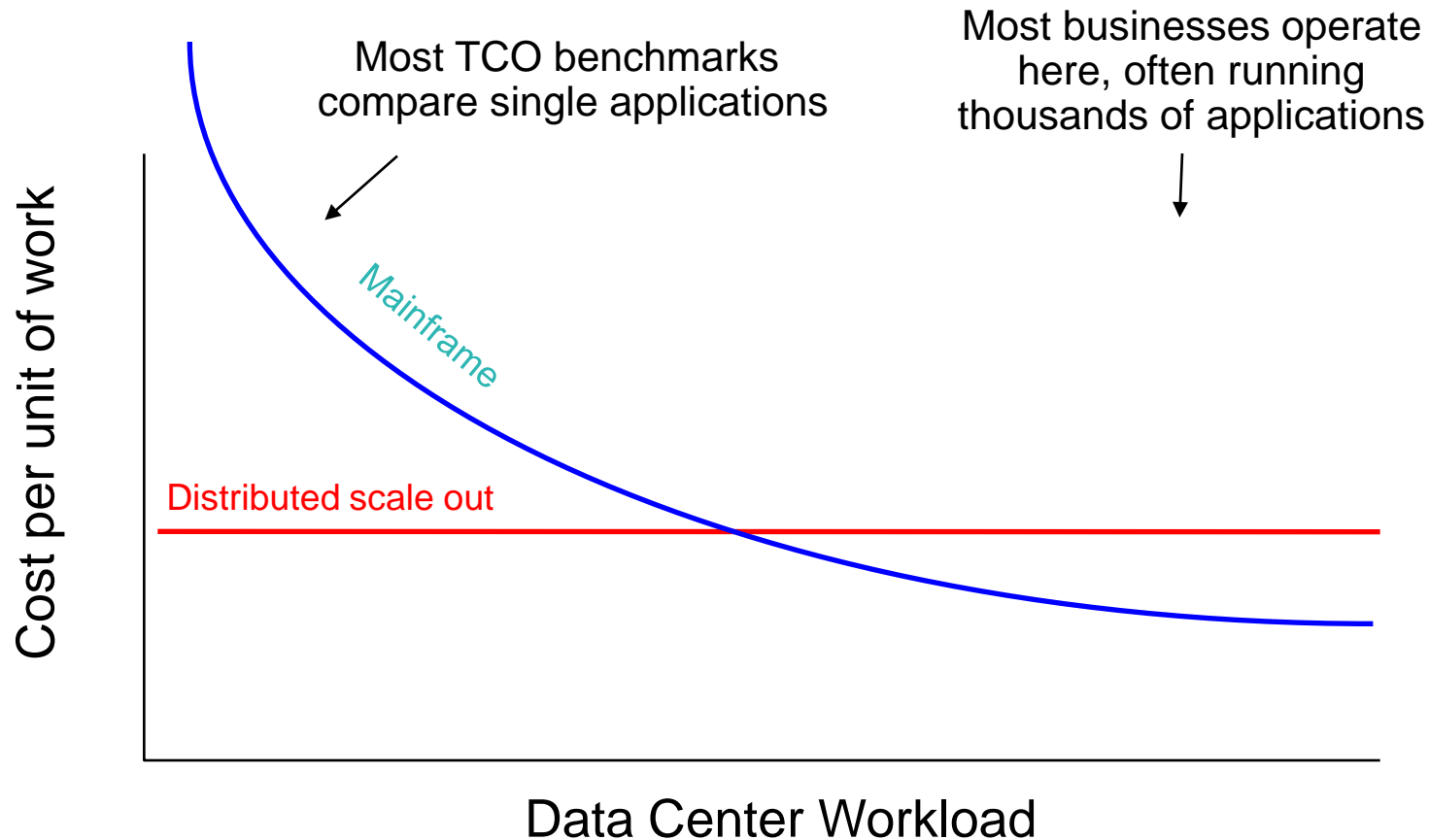
Let's Break Down the Elements of Cost

Total Cost of Ownership =

Hardware/Maintenance
+ IBM Software
+ Environmentals
+ Labor
+ required Quality-of-Service
(Availability, Security, Disaster/Recovery...)
+ other Elements
(Chargeback)

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

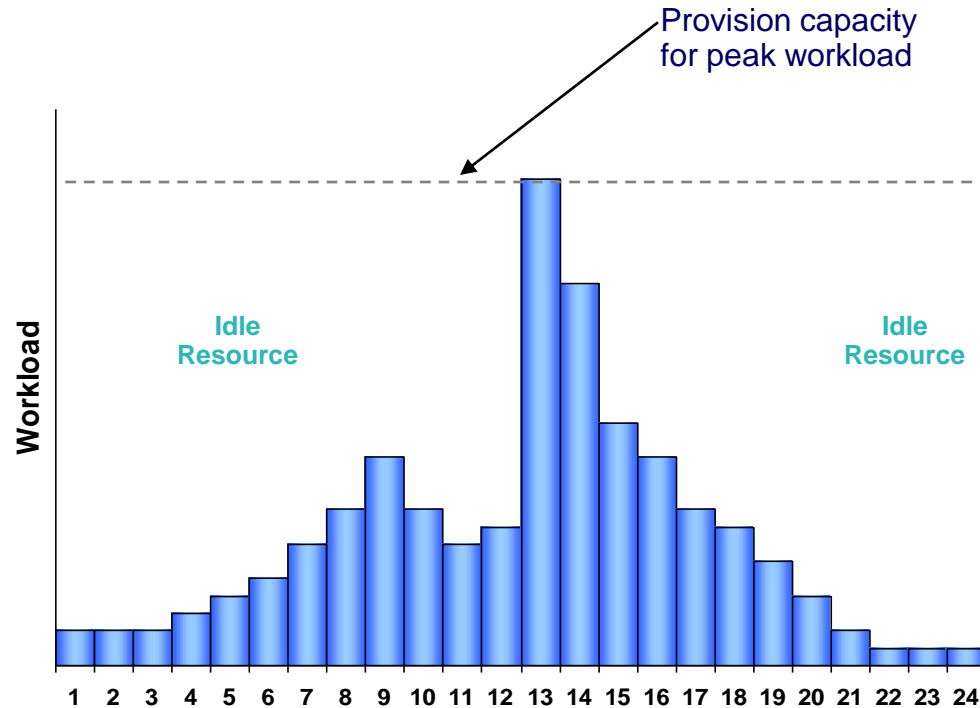
Typical utilization of:

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

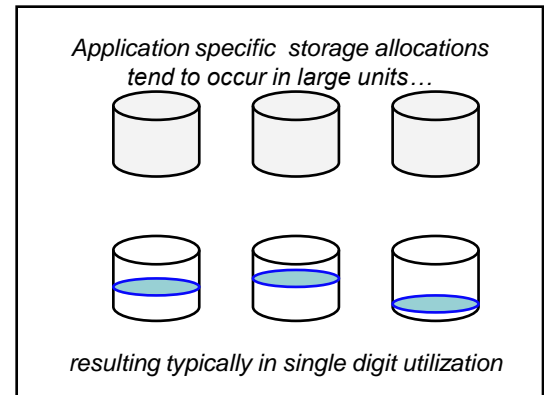
- Application-specific resulting in over-allocations
- Fine grained storage allocation mechanisms characteristic of mainframe storage are uncommon in distributed environments.

Storage Utilization

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

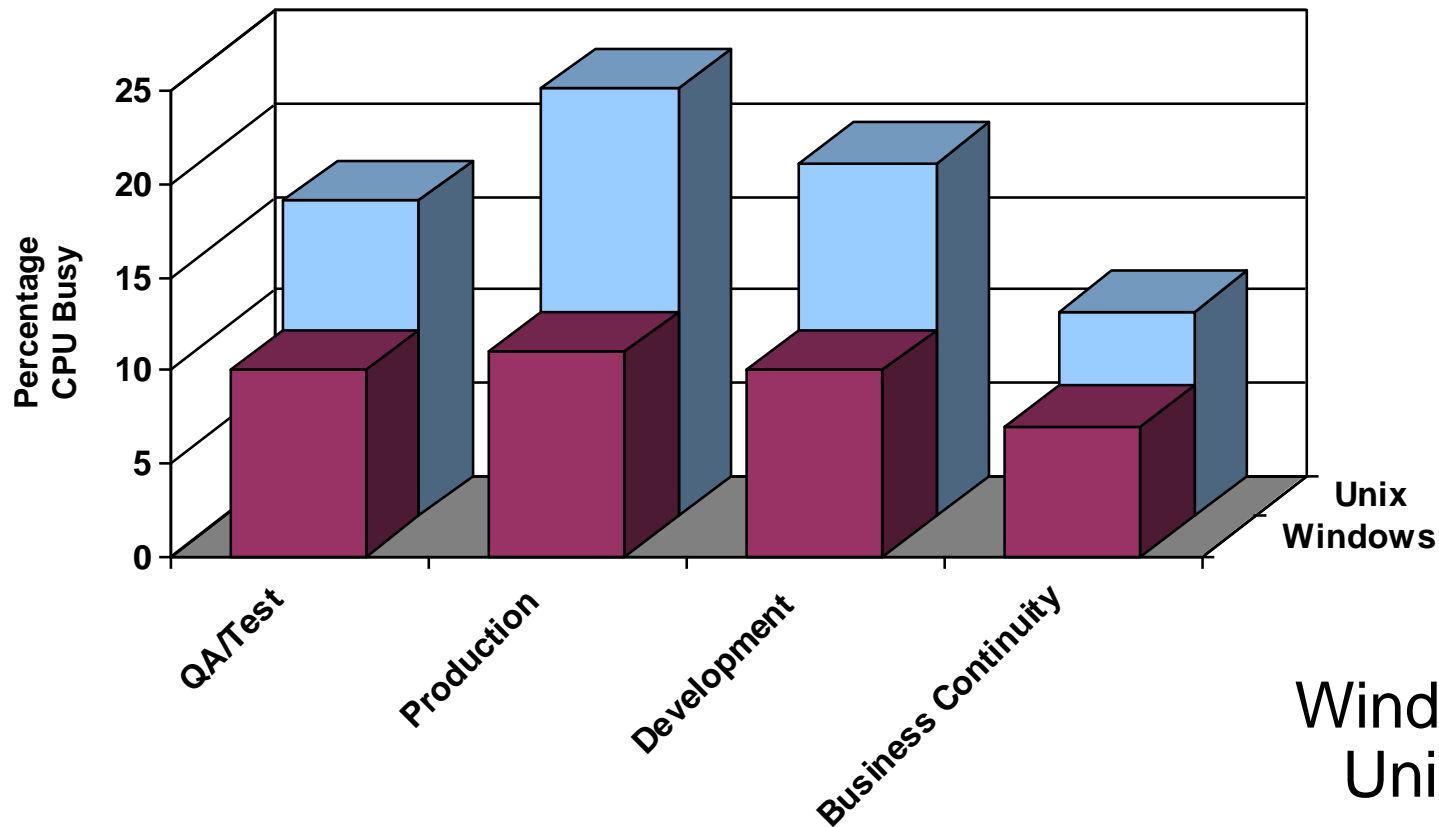
Storage Management

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



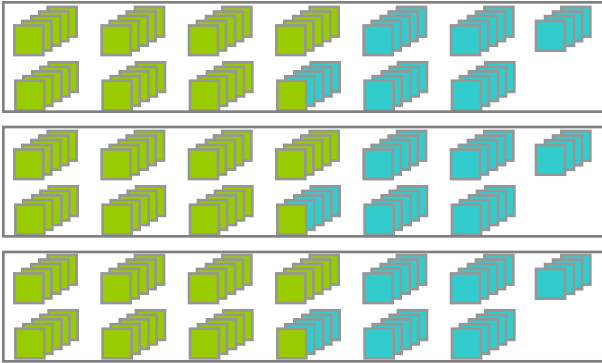
Server Utilization at a Large Financial Institution

Average Server Utilization by Class
Feb-06



This Was a Real Project – Why Couldn't The Same Workload Be Done With Faster Processors?

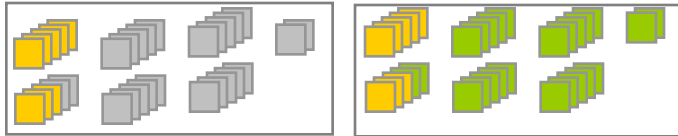
3x HP 64-way Production Application and DB



1x HP 64-way Dev&Test / Batch



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



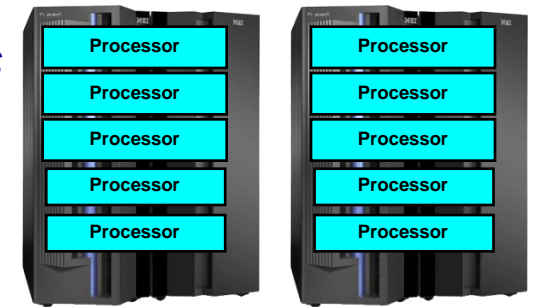
Plus:
 2x HP 16-way servers : external, HP rx8620
 3x IBM P570 servers : Web Appl server

**17 processors
(6,700 MIPS)**

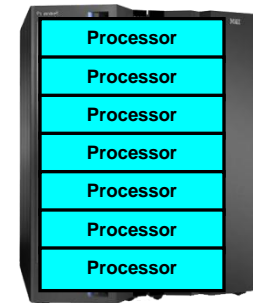


**320 Unix
processors
(816,002 RPE's)**

2x z990 5-way (production)



z990 7-way (production + test)



122 RPE's per MIP

Some disaster recovery

European Financial Services Offload

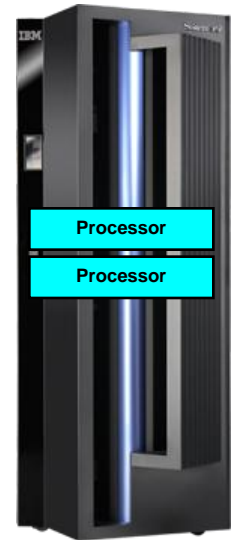
- 2x 24-way Production / Dev / Test / Education Application, DB, Security, Print and Monitoring
- 4x 1-way Admin / Provisioning / Batch Scheduling

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



\$ 17.9M TCO(4yr)

**2 processors
(332 MIPS)**



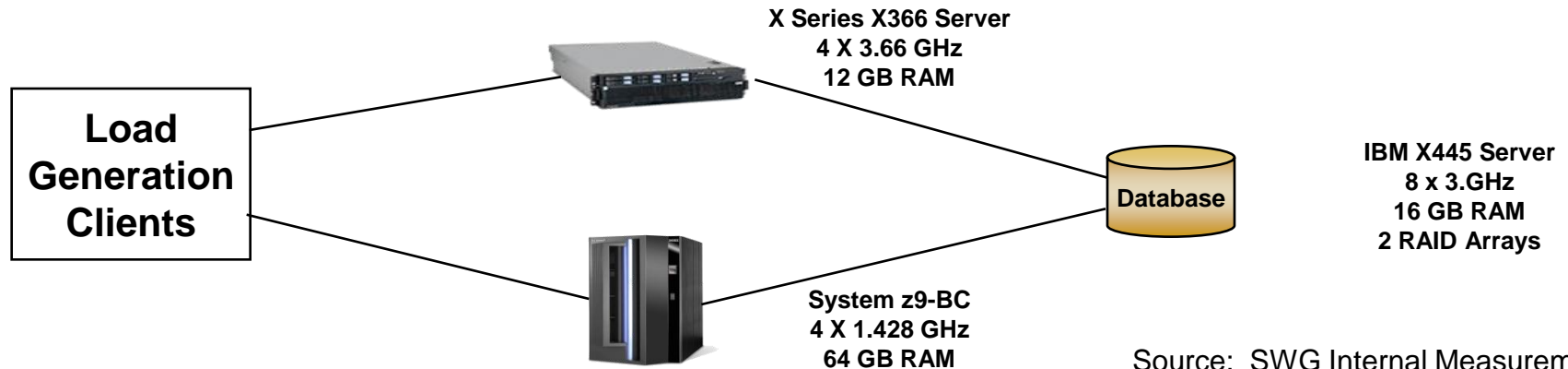
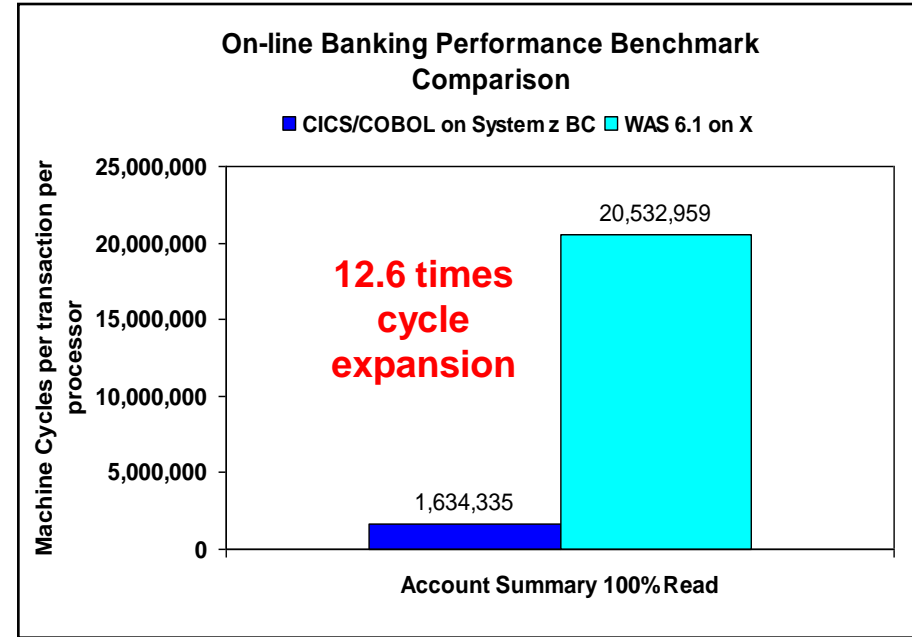
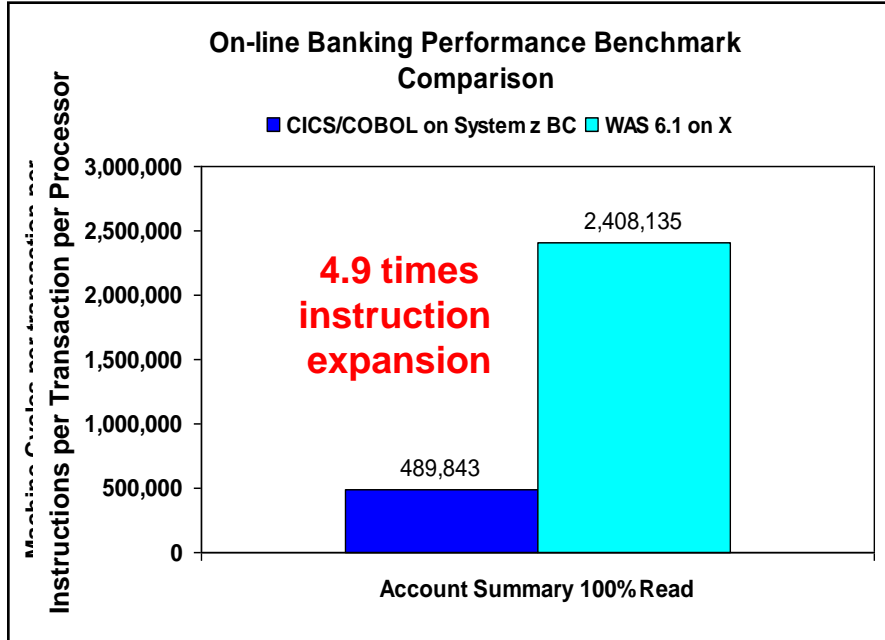
**52 Unix processors
(222,292 Performance Units)**

\$ 4.9M TCO(4yr)

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

670 Performance Units per MIP
Disaster recovery not included

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



System z Batch Processing Performance

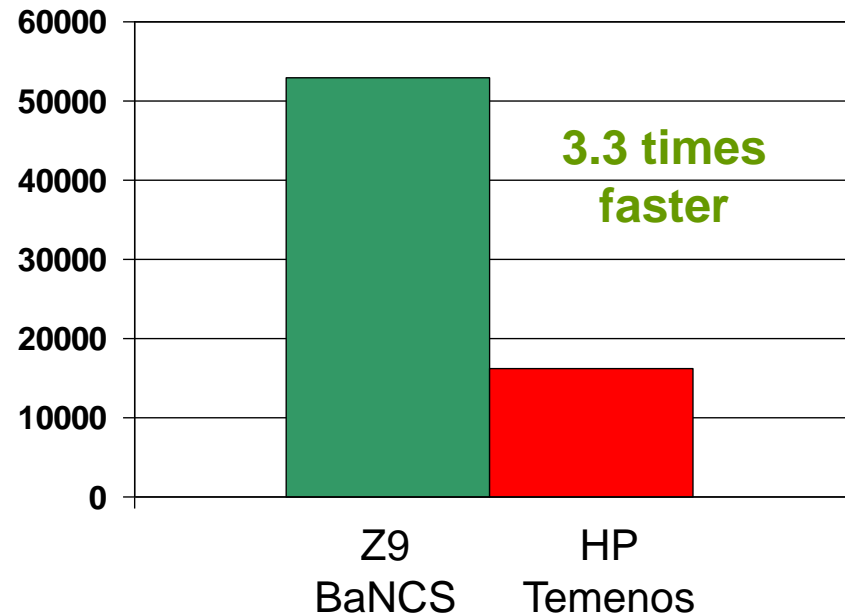
Bank of China BMT*

- IBM System z9
- TCS BaNCS (Cobol)
- 380 Million Accounts
- End of Day processing – 175M accounts finished in 55 minutes (52,970 accounts/second)

HP/Temenos BMT**

- HP Itanium
- Temenos T24 (Java)
- 13 Million Accounts
- End of Day processing finished in 13.33 minutes (16,250 accounts/second)

End of Day Batch Processing Accounts Per Second

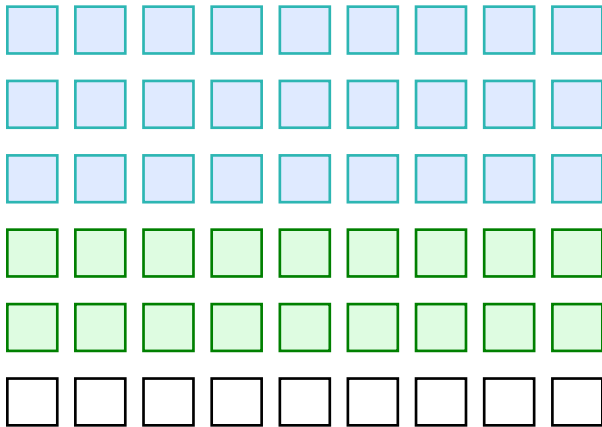


SOURCE:*<http://www.enterprisenetworksandservers.com/monthly/art.php?2976> Source: InfoSizing FNS BANCS Scalability on IBM System z – Report Date: September 20, 2006

SOURCE:**TEMENOS BENCHMARKS; <http://h71028.www7.hp.com/enterprise/downloads/TemenosBenchmark.pdf>

Disaster Recovery – Fast Failover For Less

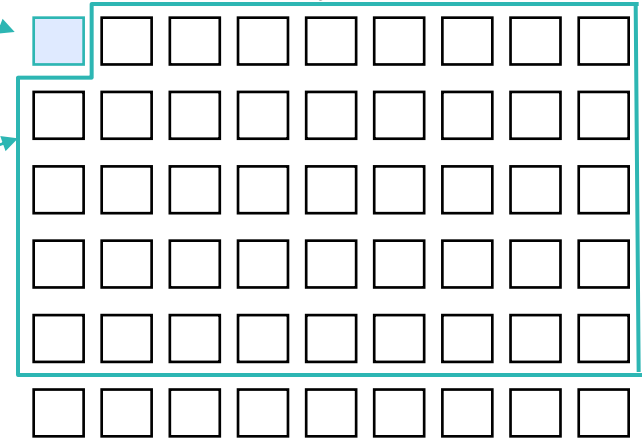
Primary Site 64 way SMP



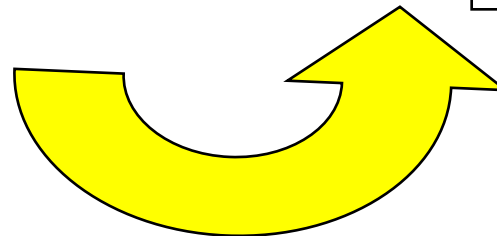
Pay regular price for one active processor to enable fast failover

Pay much less for each dormant processor to maintain capacity back up on demand

Alternative Site 64 way SMP



Pay regular price for frame



*Site Failover
With GDPS*

Note: other scenarios can reduce the price further

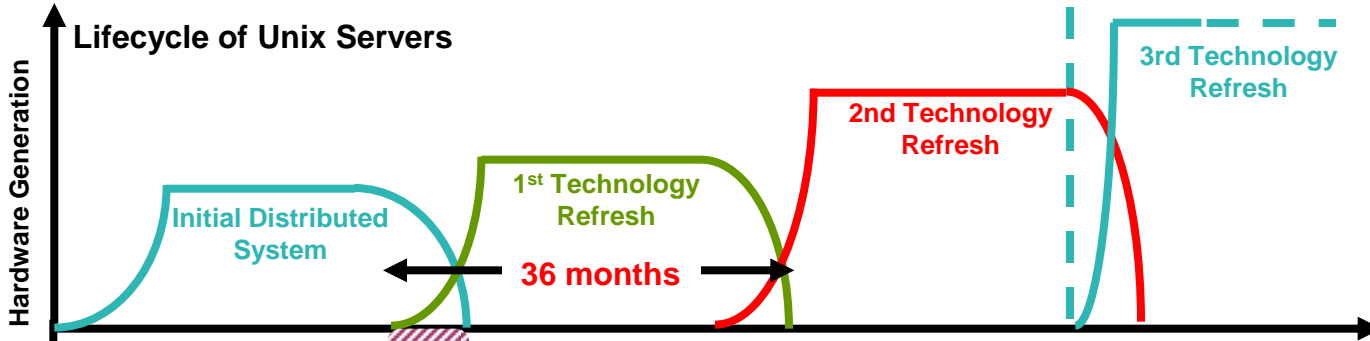
Trade-In Value Reduces Mainframe Net Present Value Costs

- **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**

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

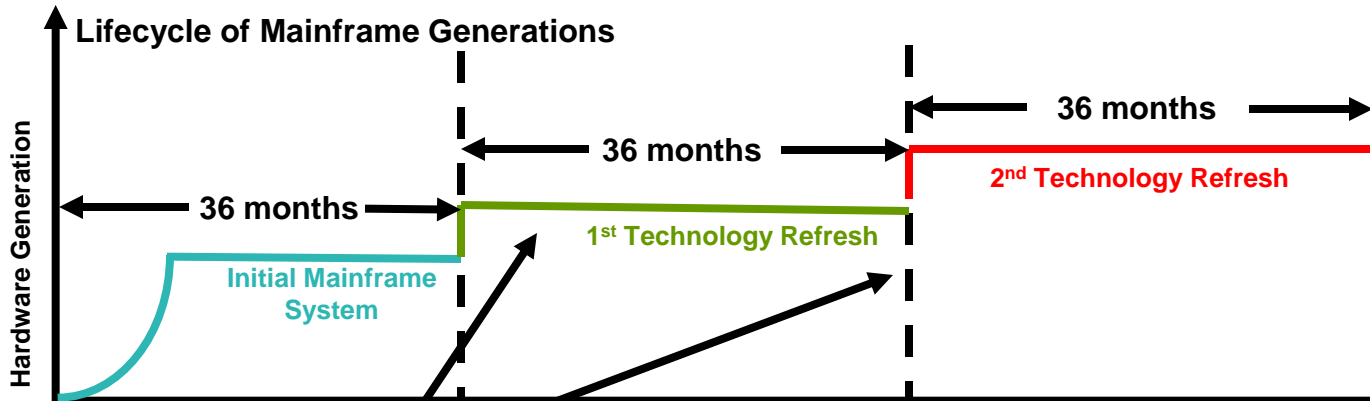


Observed at a large financial service customer

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

6 months provisioning
 30 months production
Setup and tear down 15 People, 5 full time

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

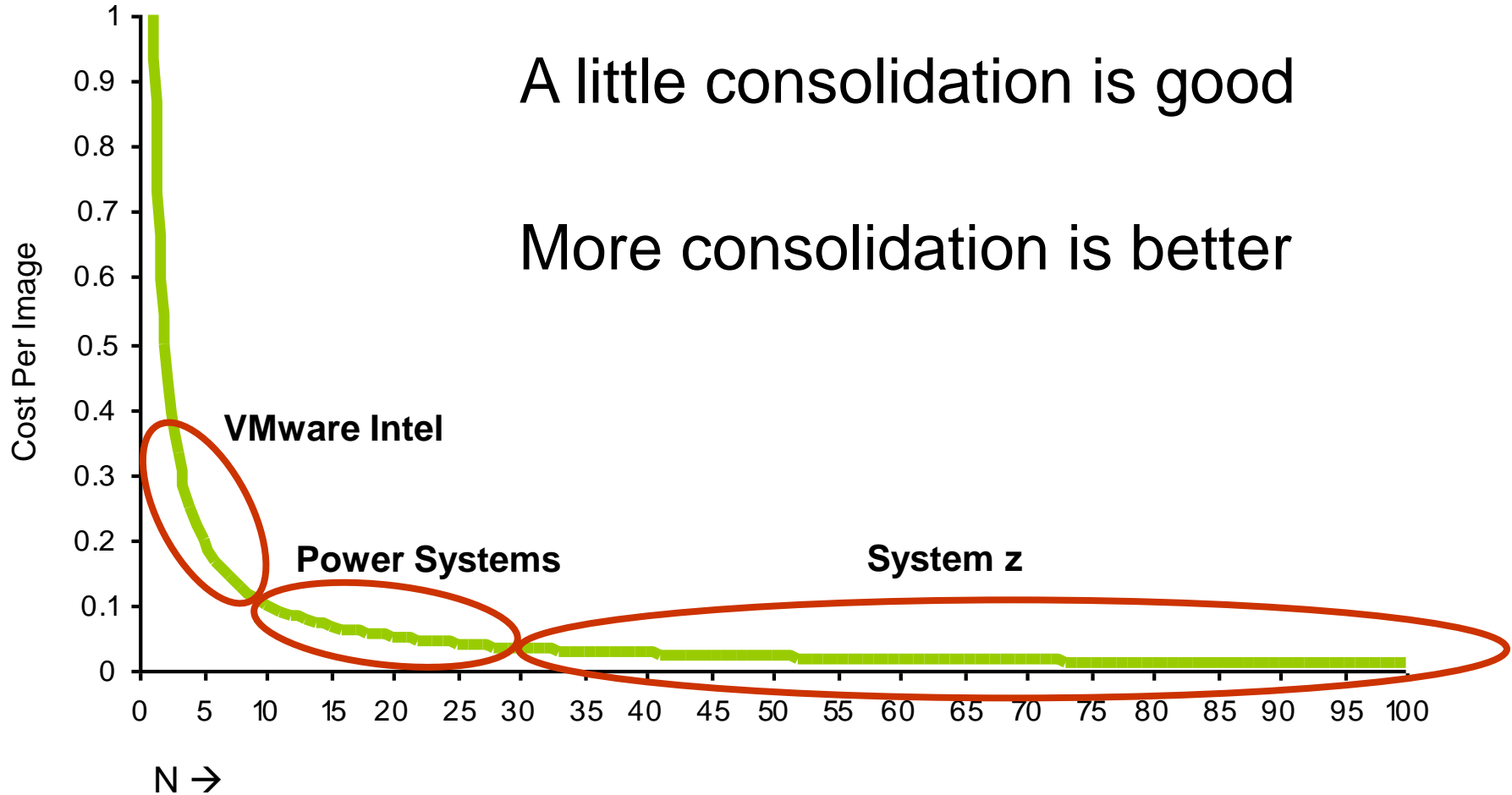


Weekend upgrades performed by IBM

Capacity on demand pricing

1 Weekend upgrading to new hardware and software levels
 36 months production
 No need to retire the server, upgrade in place

Observed Consolidation Ratios





Case Study: Government Runs Oracle At IFL Prices

- Running **292** server instances on **one** z9-EC with 5 IFLs
 - 200 Oracle, 80 WebSphere, 12 WebSphere messaging
 - Reduced cost of hardware and software by 30%
 - Saved \$800,000 in licensing cost in the first year
 - Used RACF for consistent security
 - Each administrator can manage 100 consolidated Linux images
 - Fast provisioning
 - Create new Linux server in 30 min (vs. 1 week – 3 months)
 - Clone Oracle DB instance in 30-45 min (vs. 10 – 14 hours)
 - Inherited benefits of z platform – workload management, availability, disaster recovery, I/O bandwidth

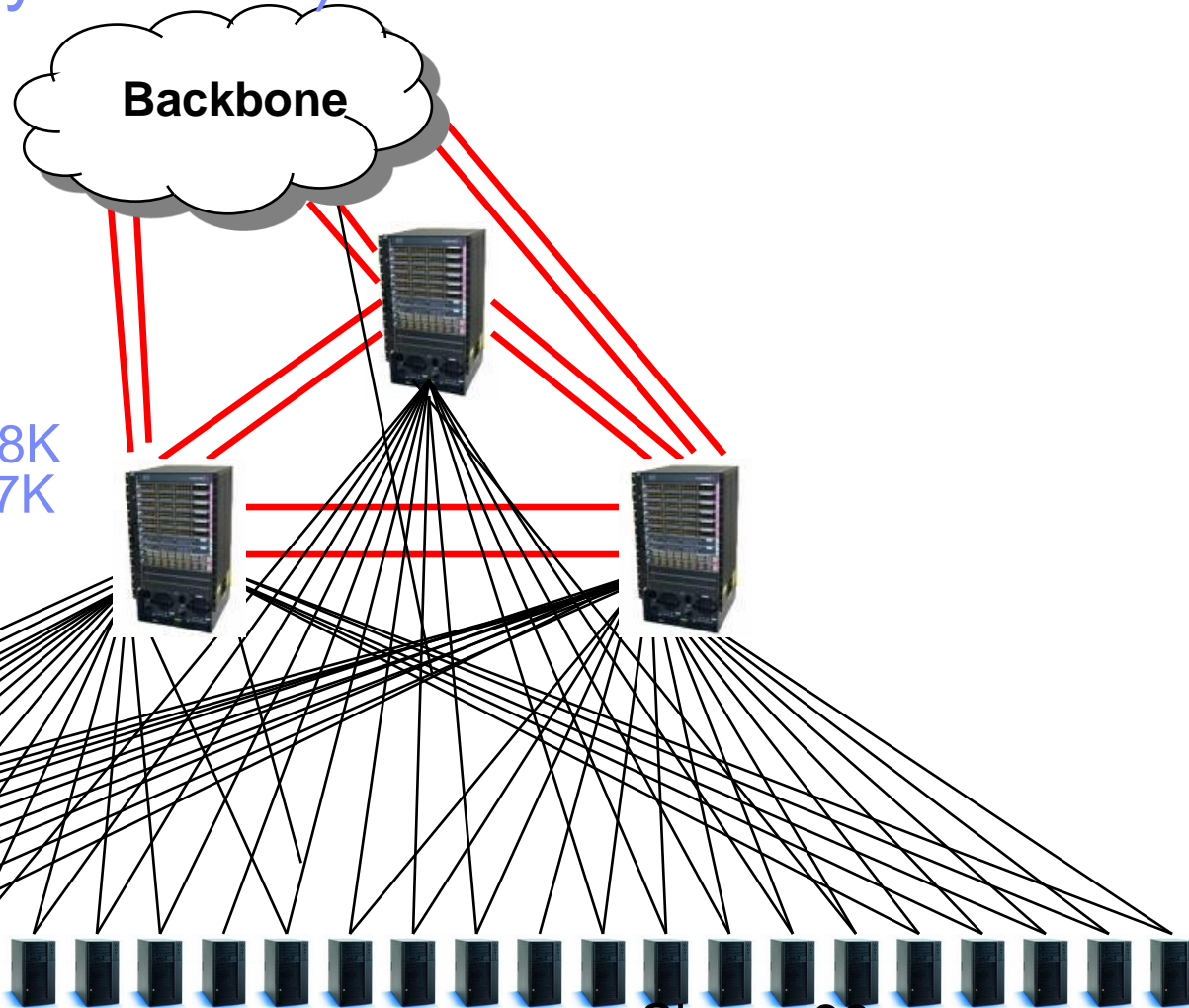
Other Benefits Of Virtualization

- **Fast provisioning of pre-installed and configured images**
 - Minutes instead of days or weeks
 - No additional space, electric connections or network cables
- **Compatible with the data center practice of standardizing on strategic software stacks**
 - Pre-tested stacks
 - Consistent release levels and maintenance approach
 - A management approach to achieve better stability
 - Jukebox selection of standard enterprise images

Case Study: Network Costs –Before Consolidation (483 Servers to 2 System z's)

High Utilization Switch Module	14
Low Utilization Switch Module	12
Switch Interconnect Module	6
50 Ft UTP Cable	966
10GB Eth Fiber Cable	12
Switch Chassis	3

Hardware Acquisition \$748K
Network Annual Costs \$597K



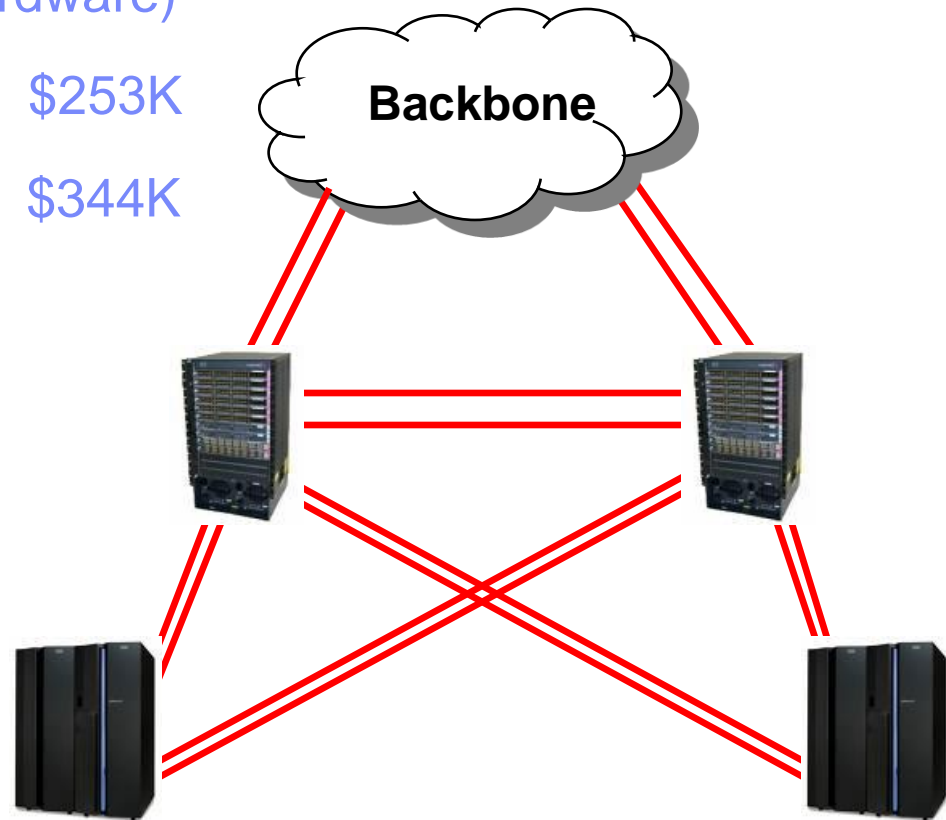
Shows 30
of the 483 Servers

Case Study: Network Costs – After Consolidation (483 Servers to 2 System z's)

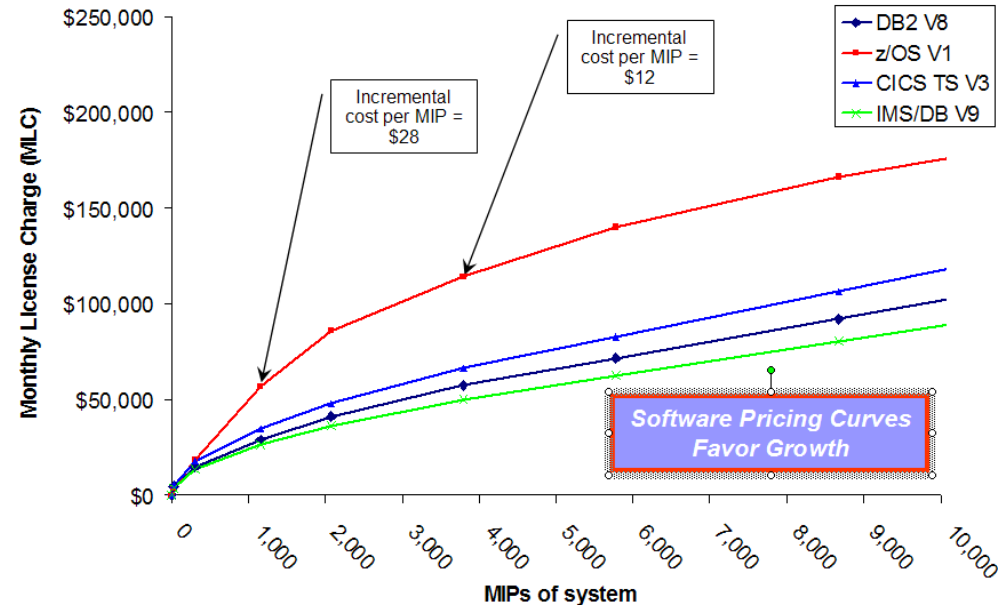
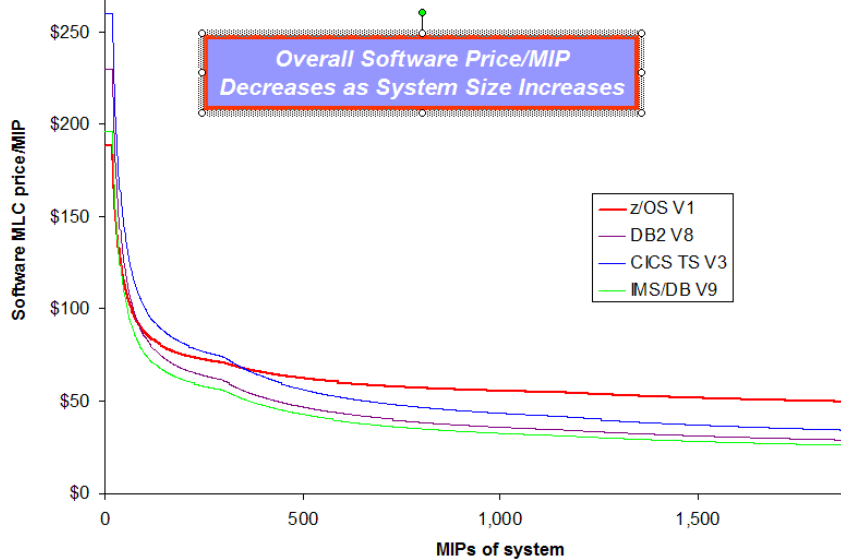
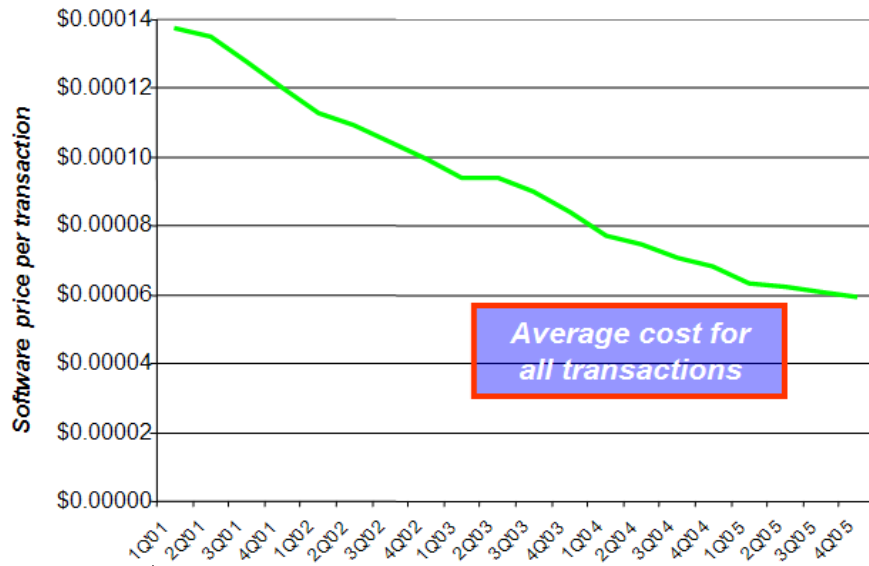
New Hardware Acquisition \$0
(reuse some of old network hardware)

“After” Network Annual Cost \$253K

Network Annual Cost Savings \$344K



IBM Software Price Per Transaction is Going Down



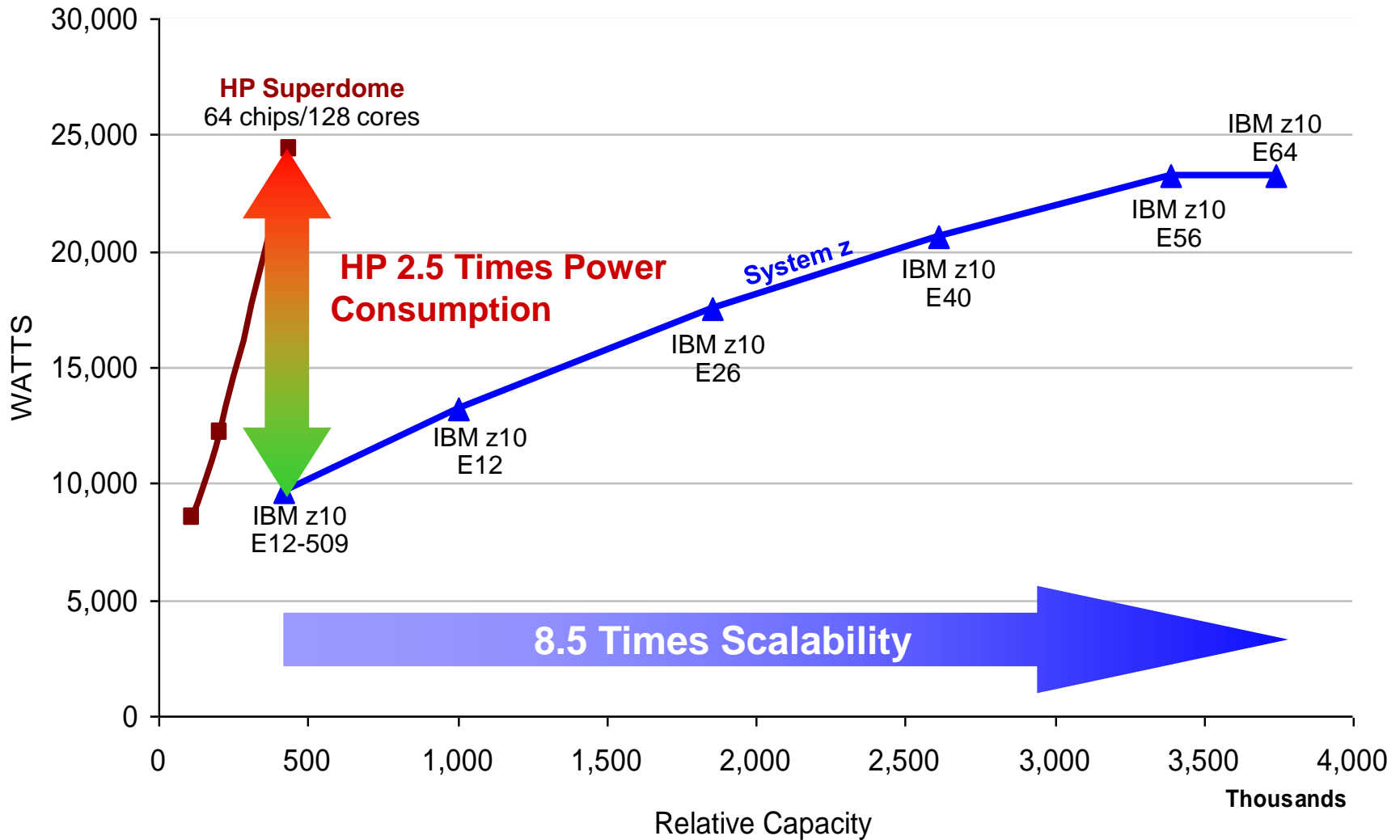
Putting This in Perspective

- 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

International Restaurant Chain Avoids High Cost Software

- **Existing environment of 1600 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 Stream per year (48 products, mostly third party)
 - Distributed systems management
 - \$2.6M Yearly Maintenance (26 products)
 - \$13.3M One Time Charge
- **Better: Replace higher cost System z ISV software with lower cost IBM Software**

z10 Consumes Less Power Than Superdome



Do The Math

- **HP Itanium 2 Superdome 9050 (64ch/128co)* consumes a maximum of 24,392 watts**
 - $[24,392 \times \$0.10 \times (24 \times 365)]/1000 = \text{\$21,367}$ per year for electricity

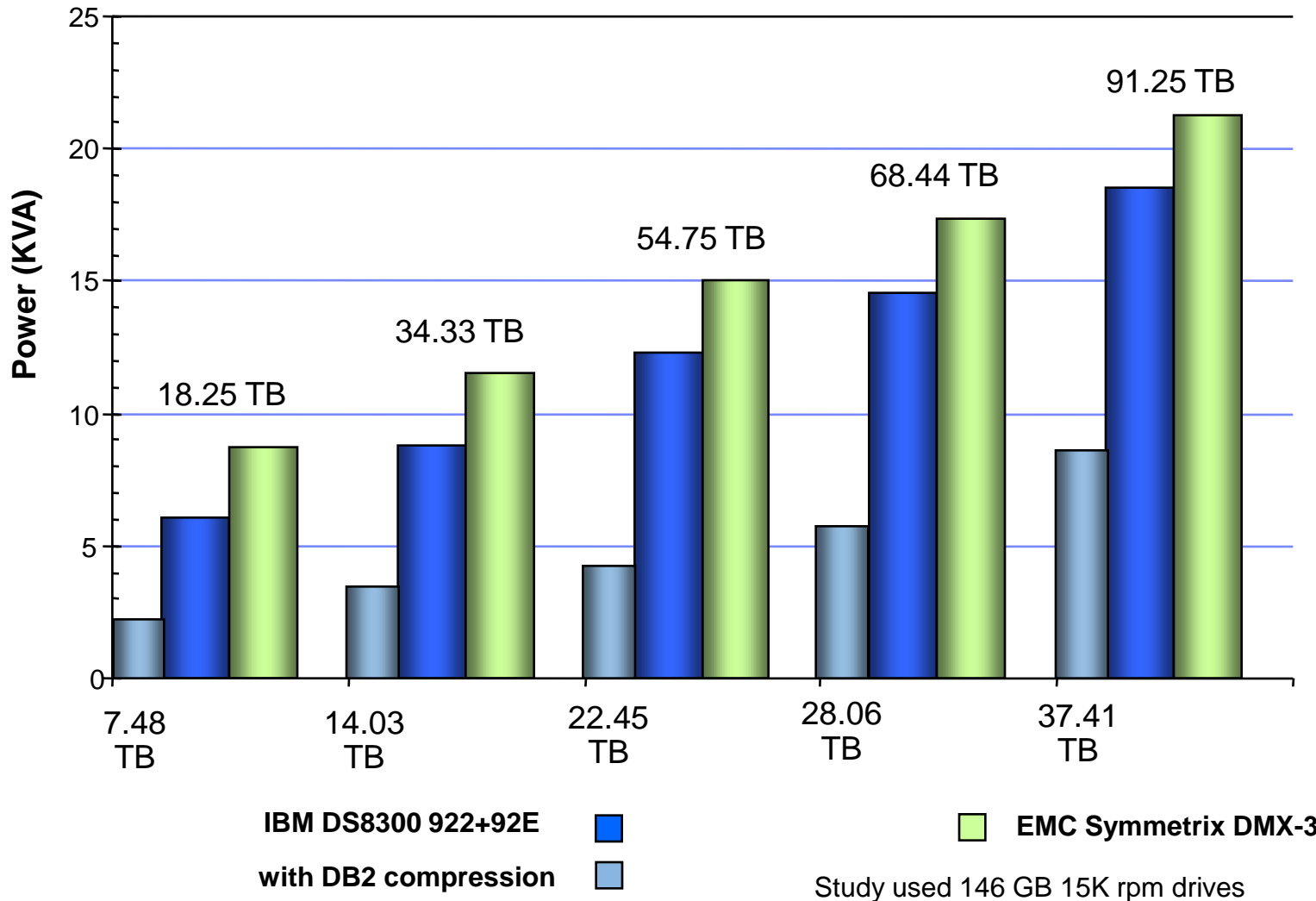
- **Mainframe with similar computing capacity - a System z10 704 machine with 2 I/O cages using 13.26 kW (rated)***
 - **\\$11,615** per year for electricity

- **Similar savings on cooling capacity**
 - Cost of cooling is about 60% additional
 - Superdome total **\\$34,187** per year vs. Mainframe **\\$18,585**
 - Savings of mainframe power and cooling is **\\$15,602** per year

*Performance equivalence determined by IBM TCO study

IBM Storage Also Saves Energy Costs

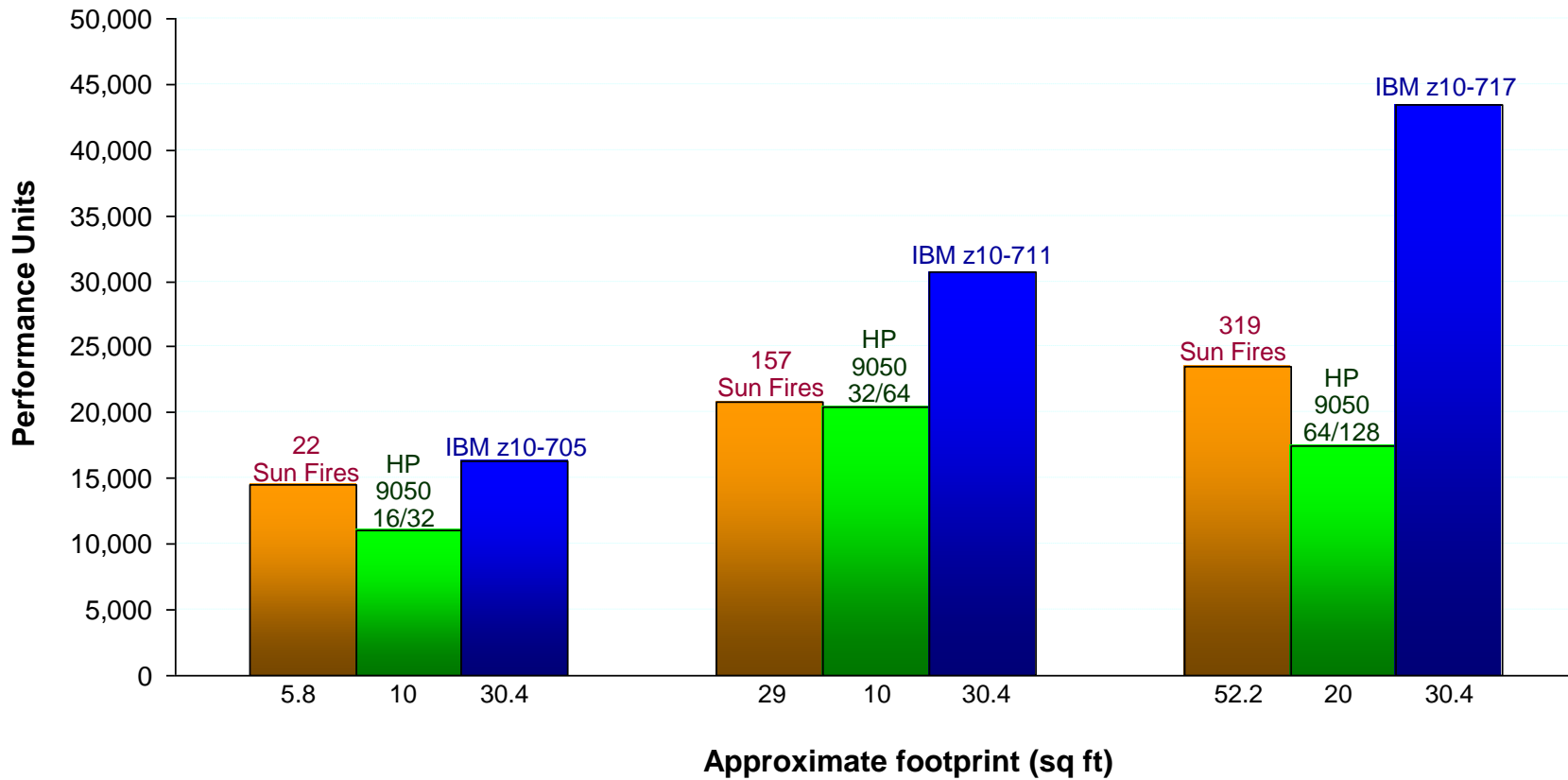
IBM DS8300 Power Consumption vs. EMC DMX-3 by Size



The Mainframe Also Delivers More Compute Power Per Footprint Unit

Performance Units per Square Foot

■ SUN ■ HP ■ IBM



Based on 122 performance units per MIP
Mainframe footprint remains constant

Customer Survey – How Many People to Manage Servers?

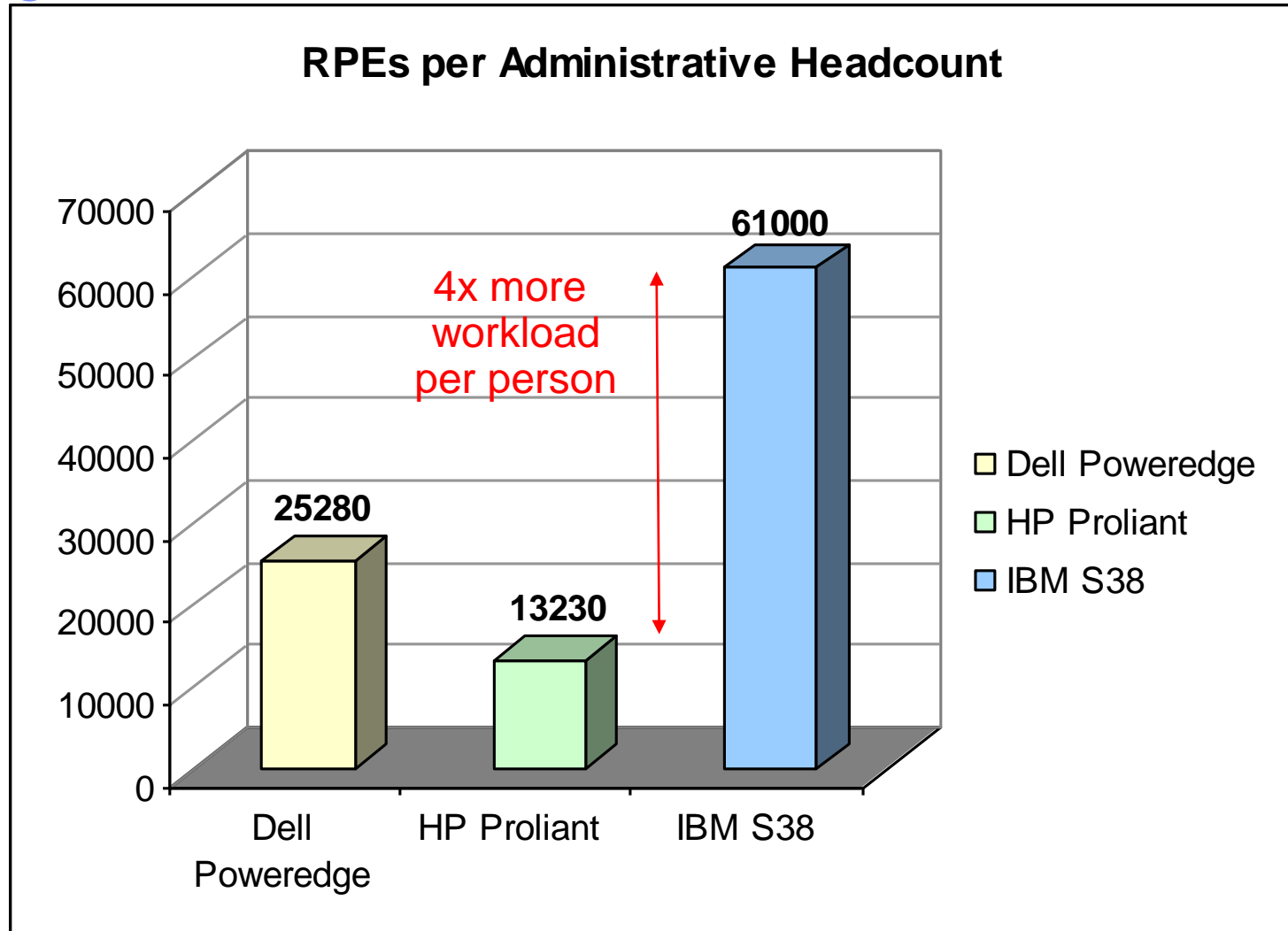
# NT Servers	# People	Ratio (s/p)
1123	68	16.5
228	20	14.4
671	51	13.1
700	65	11.5
154	18	8.5
431	61	7.1
1460	304	4.8
293	79	3.7
132	54	2.0

# UNIX Servers	# People	Ratio (s/p)
706	99	7.1
273	52	5.2
69	15	4.6
187	56	3.3
170	51	3.3
85	28	3.0
82	32	2.6
349	134	2.6
117	50	2.3
52	52	1.0

Mainframe administration productivity surveys range 167-625 MIPS per headcount (500 is typical), so...

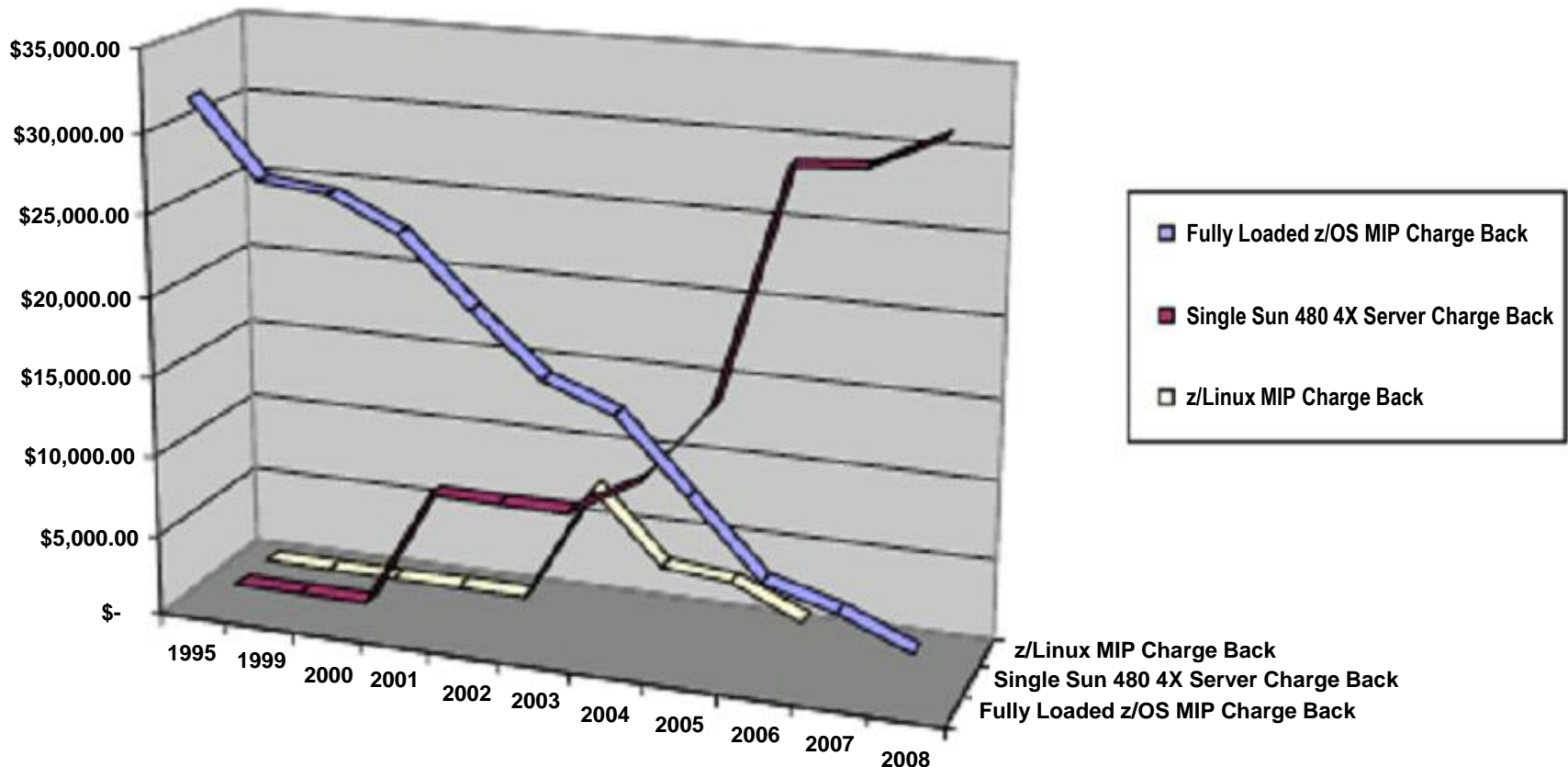
Source: IBM Scorpion Customer Studies NOTE: Figures for total administration cost

Manage More Workload Per Headcount



Compared at 122 RPE's = 1 MIP

Charge Back Practices Were Improved Over Time at a Large Financial Institution



More Accurate Charge Back Can Correct Perceptions of Relative Costs

Understand The Cost Components

Annual Operations Cost Per Server (Averaged over 3917 Distributed Servers)

Power	\$731
Floor Space	\$987
Annual Server Maintenance	\$777
Annual connectivity Maintenance	\$213
Annual Disk Maintenance	\$203
Annual Software support	\$10,153
Annual Enterprise Network	\$1,024
Annual Sysadmin	\$20,359
Total Annual Costs	\$34,447

The largest cost component was labor for administration
7.8 servers per headcount @ \$159,800/yr/headcount

Source: IBM internal study

The Rule Of Three

- **The cost of deploying a new application will usually be less on a mainframe if:**

- 1. It is an incremental workload on an existing mainframe**

- 2. It can make use of a specialty processor**

- 3. Disaster recovery is required**

Make sure your comparison identifies the core proliferation in the distributed case!

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"> – 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
Customers have learned that mainframes deliver economies of scale, especially as the workload grows	Result – scale out strategies do not deliver equivalent economies of scale as the workload grows

This pricing discussion uses published list prices

Financial Services Offload – Analysis

Mainframe Cost

Distributed Cost

	OTC	Annual
Hardware		
2 GP Growth MIPS	SUNK COST \$280,000	\$3,505 (average, Includes growth)
Software		
z/OS, CICS, COBOL, HLASM		\$552,048 (average, includes growth)
IDMS		\$552,048
Migration Labor		\$0
Power and facilities		\$43,014
TOTAL	\$280,000	\$1,150,615

	OTC	Annual
Hardware		
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		Not paid Y1
Transaction Processing	\$389,640	\$66,300
Oracle	\$816,000	\$149,600
Monitoring	\$475,326	\$89,400
Messaging, security, print etc. software	\$963,360	\$162,000
Migration Labor		\$1,170,000 (average)
Power and facilities		\$145,764
Parallel Running Y1-3	\$160,460	\$1,109,166
TOTAL	\$7,718,494	\$1,315,764 (Y1) \$1,783,064 (Y2+)