



2007 System z Summit

DESTINATION z





The Mainframe: A Revolutionary Low-Cost Platform

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I Had a Dream Last Night...

- **I dreamed that IBM introduced a new computing platform for the 21st century that would help me beat my competitors**
 - Cuts the cost of computing in half
 - Green machine that uses less electricity
 - Requires half the operational labor to keep it running
 - Can run global business transactions while never going down
 - And it would be used at the core of the world's largest business

- **The name of this revolutionary platform was...IBM System z™**

An Inconvenient Truth!

Equivalent CO2 Emissions in one year



==

368 Chevy Tahoes



10,000 sq ft at 125
watts/ft² @ \$.09 per
kWh

==

9424 refrigerators



\$985K per year

**11,498 tons of CO2
per year**

==

10,549 round trips
NY to LA

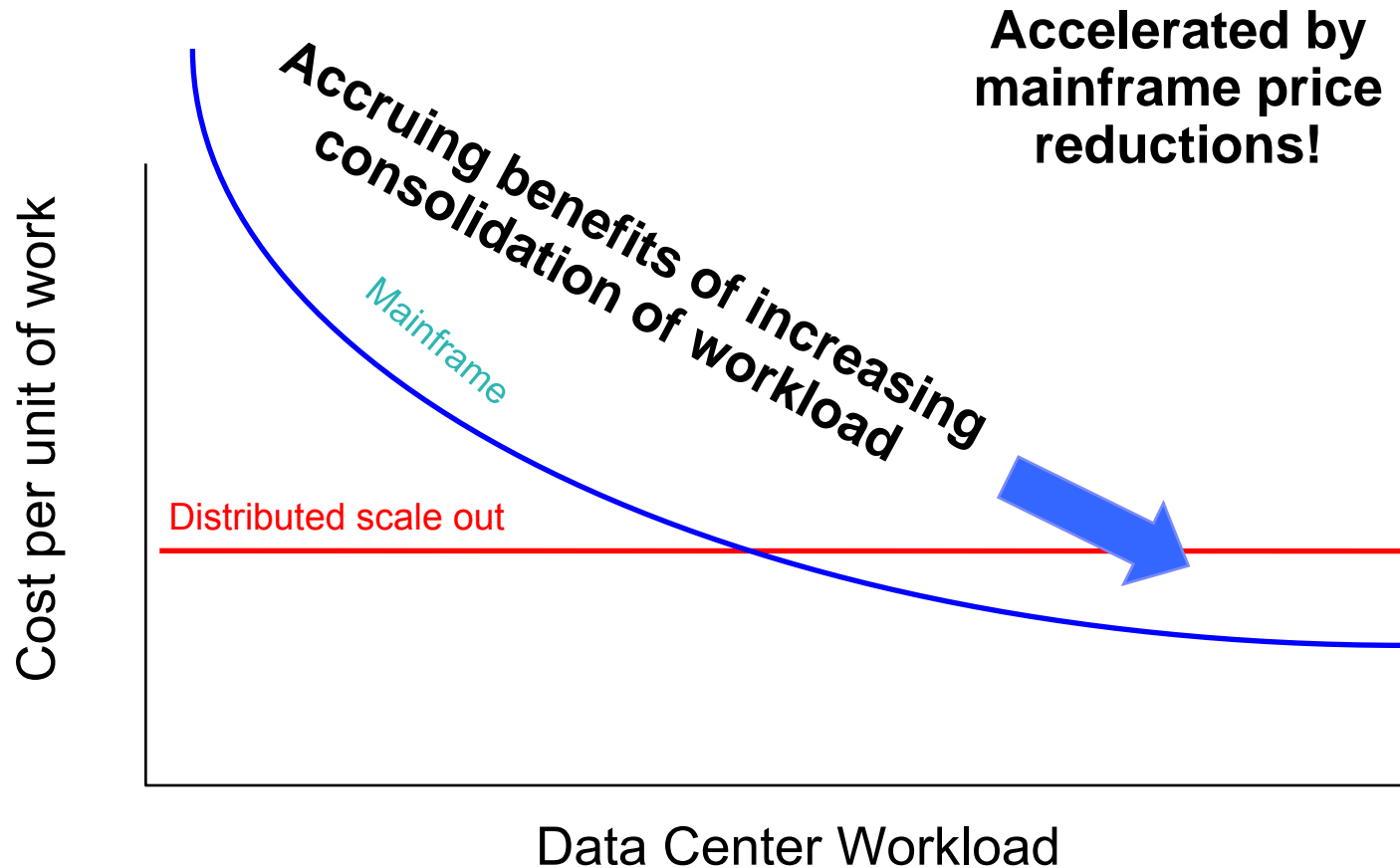


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78,753 75 watt light
bulbs running 8 hrs/day



Mainframe Cost Per Unit of Work Goes Down as Workload Increases



Mainframe Hardware and Software Cost Reduction Features

■ Hardware

- Capacity on demand processors (free until you use)
- Up to 336 I/O offload processors at feature prices
- Specialty processors Integrated Facility for Linux (IFL), IBM System z9™ Integrated Information Processor (zIIP) and System z Application Assist Processor (zAAP) discounted 91%
- Disaster recovery processors discounted 98%
- Growing customers may upgrade installed MIPS without cost
- IBM DS6000™ storage subsystems cost less than HP

■ Software

- MLC per incremental MIPS goes down as system gets larger
- No charge for software on zIIP and zAAP
- One time charges are per processor for IFL (at Intel rate)
- Sub-capacity pricing, sysplex aggregation, zNALC, technology dividend



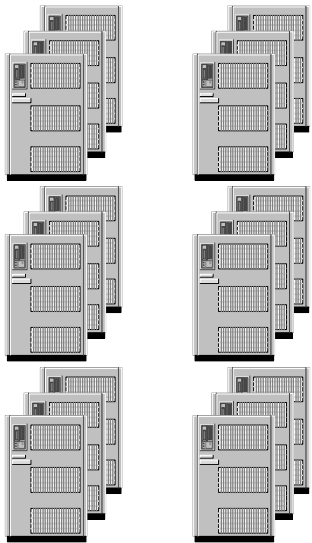
Economics of Consolidation

- Consolidating workload means running multiple workloads on the mainframe at the same time
- Consolidation achieves greater **utilization of assets** which minimizes **cost per unit of work**
- Same principal was applied by Henry Ford at the dawn of the industrial era
 - It still applies today



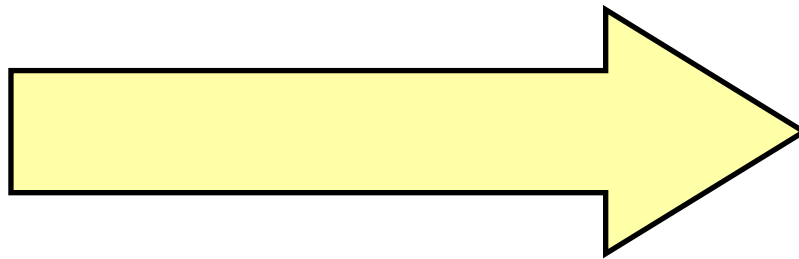
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Two Kinds of Workload Consolidation



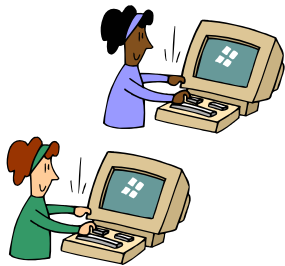
Roll-up

Migrate to achieve lower costs

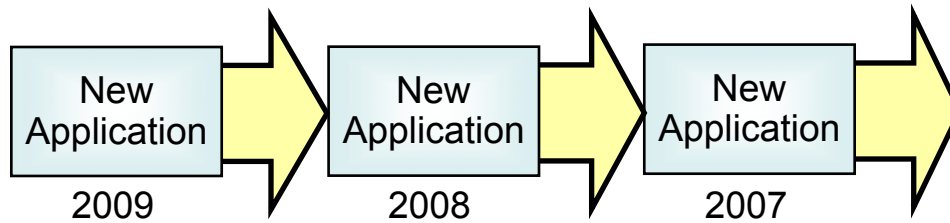


Strategic Hosting

Incremental growth on System z

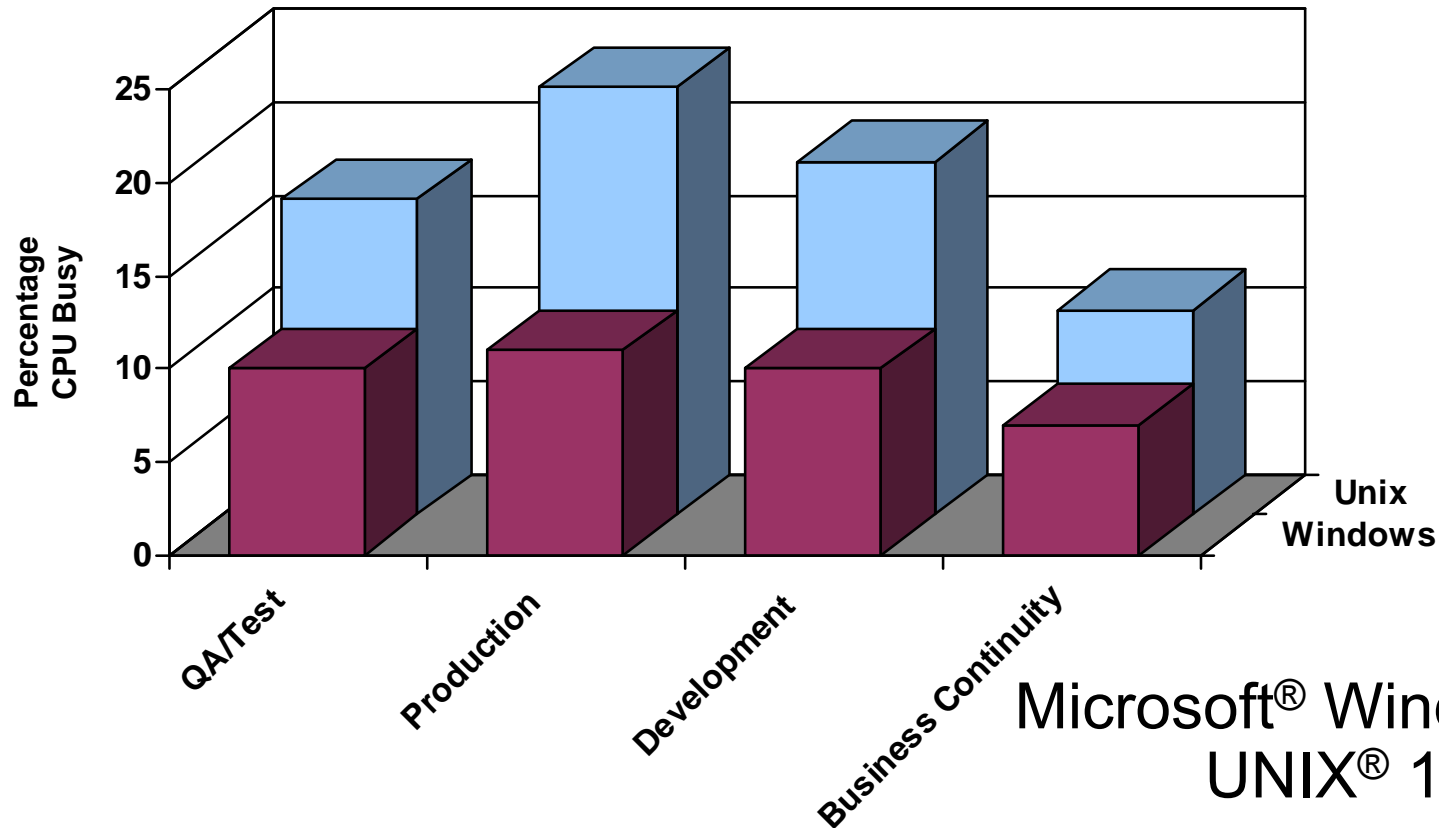


Programmers



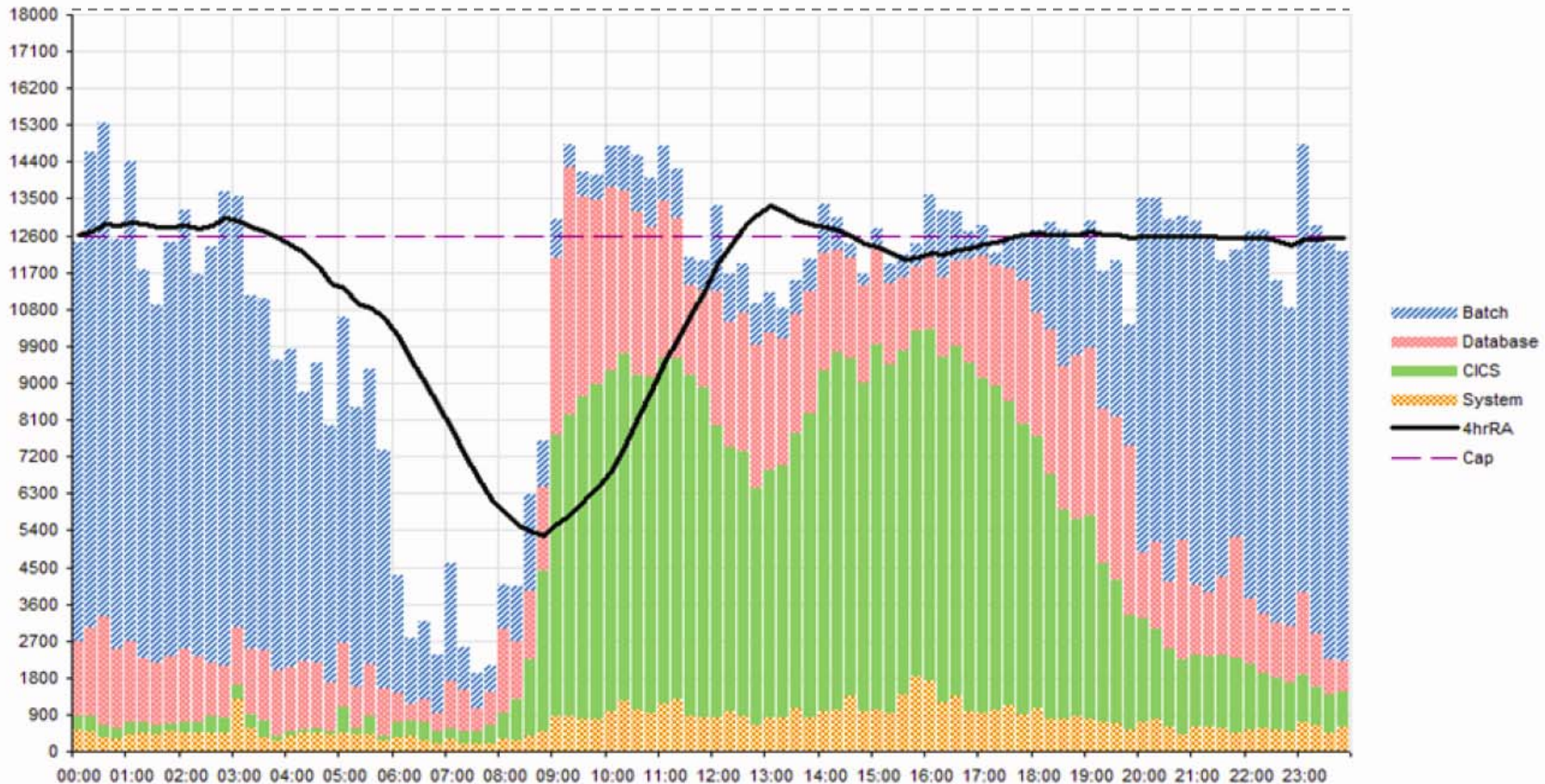
Server Utilization at a Large Financial Institution

Average Server Utilization by Class
Feb-06



System z Runs Many Workloads Simultaneously to Achieve High Levels of Utilization

CPU Seconds



Note:

- Each bar represents the amount of CPU seconds used in 15 minutes (= 900 seconds) with 2 10-way machines
- The way Workload Management controls the workload 4-hour rolling average to the Cap "high-water mark"

Workloads That Can be Consolidated on a Mainframe

What	Where	Specialty Processor	How
Growth of Existing Mainframe Workload	z/OS®	--	Capacity on Demand
New CICS® or IMS™ Applications	z/OS	--	Develop
Data Warehouse	z/OS	zIIP	Deploy
SAP Database Server	z/OS	zIIP	Deploy
WebSphere® Application Server	z/OS	zAAP	Deploy
WebSphere Portal Server	z/OS	zAAP	Deploy
WebSphere Process Server	z/OS	zAAP	Deploy
Lotus® Domino®	z/OS	--	Deploy

More Workloads That Can be Consolidated on a Mainframe

What	Where	Specialty Processor	How
Linux® Applications	Linux on z/VM®	IFL	Recompile
Linux Middleware <ul style="list-style-type: none"> - IBM Brands (DB2®, WebSphere, Lotus, Rational® Tivoli®) - Oracle Database - etc. 	Linux on z/VM	IFL	Rehost
Linux Packaged Applications <ul style="list-style-type: none"> - SAP - Oracle - etc. 	Linux on z/VM	IFL	Rehost
.NET Applications	WebSphere Linux on z/VM	IFL	Mainsoft

Saves \$16+ Million with Linux on System z



Nationwide®
On Your Side™

■ **Problems:**

- High TCO including data center power and floor space scarcity
 - New facility would cost \$10M+
- Long server provisioning process

■ **Solution:**

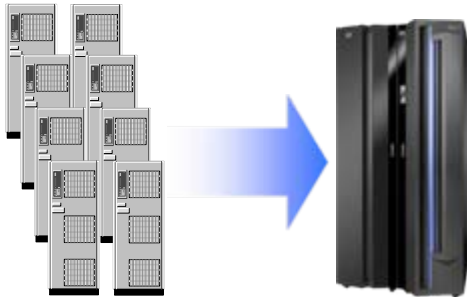
- **350** servers virtualized with **15** IBM eServer™ zSeries® 990 IFLs, supported by 3 staff
 - 12 mission critical applications with 100,000+ users/day
- 50% reduction in hardware & OS support efforts
 - Significant savings on middleware costs
- Significantly faster provisioning speed (months → days)
- 80% reduction in floor space & power conservation
- Fast implementation (4 months)
- Simple, robust mainframe high availability & disaster recovery

Improved TCO, Speed & Simplification

Case Study: Nexxar - Financial Services



**80 x86
Servers**



1 IFL

z/VM supports Nexxar's strategy of acquiring firms by providing secure workload isolation for each "private label" relationship

- **Operating cost savings are expected to be 30% per year**
- **Less staff is needed compared to previous x86 systems**
- **Capacity on Demand can handle activity spikes**
- **System z9 cryptography provided assurance required by Nexxar's customers**
- **Started with one IFL, will add more as needed**

Case Study: Québec Government Runs Oracle at IFL Prices

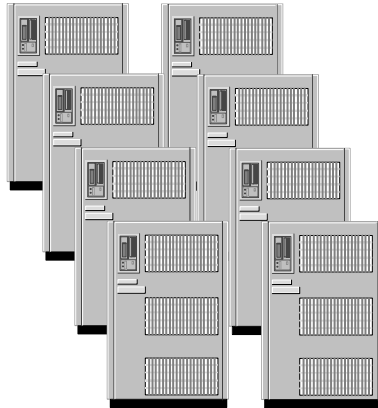
- **Consolidated 165 Oracle databases on to 125 Linux virtual machines on a System z9 Enterprise Class (z9 EC) with 5 IFL's**
 - Reduced cost of hardware and software by 30%
 - Saved \$800,000 in licensing cost in the first year
 - Used RACF® for consistent security
 - Each administrator can manage 100 Linux images
 - Easy migration
 - One migration per day
 - Create new Linux server in 30 minutes (vs 1 week – 3 months)
 - Clone Oracle DB instance in 30-45 minutes (vs 10 – 14 hours)
 - Inherited benefits of System z platform – workload management, availability, disaster recovery, I/O bandwidth
 - Expect to migrate at least 100 Oracle databases per year

Case Study: IBM Global Services Rolled up 62 Linux Servers onto one IFL

Up front migration cost \$299,136

Net \$780,000 savings over three years

62 Linux Servers



+1 IFL

62 Linux servers with low utilization

62 @ \$4,000 = \$248,000

Plus 62 middleware licenses

Plus 62 x \$6000 = \$372,000/yr labor

One IFL processor with high utilization

1 @ \$125,000 = \$125,000

Plus one middleware license

Plus \$120,000 x 1 = \$120,000/yr labor

Incremental Cost Breakdown

Mainframe One Time Charge

1 IFL Processor	\$125,000
Additional Memory	\$ 80,000
z/VM OTC	\$ 22,500
WAS OTC	\$ 4,000
Migration Cost	\$ 67,600
Total OTC (Cost of migration)	\$299,136

Mainframe Annual Cost

HW Maintenance	\$ 19,944
z/VM S&S	\$ 5,625
Linux S&S	\$ 14,000
WAS S&S	\$ 800
Labor 1 administrator	\$ 120,000
Power	negligible
Total Annual Costs	\$160,369

Distributed One Time Charge

Servers 62x\$4000	\$248,000
WAS OTC 62x\$4000	\$248,000
Total OTC cost (Sunk)	\$496,000

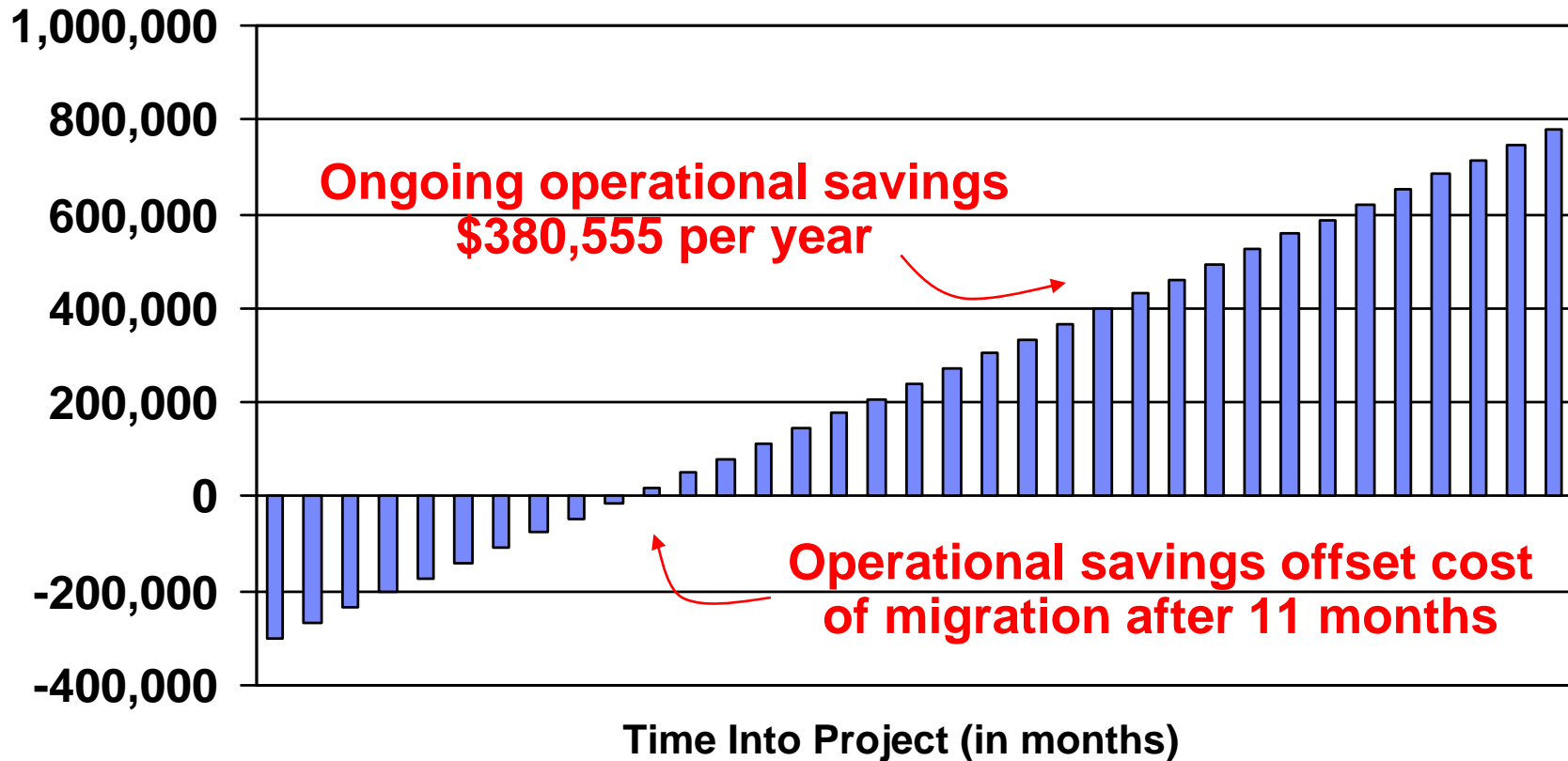
Distributed Annual Cost

Linux S&S 62x\$1000	\$62,000
WAS S&S 62x\$800	\$49,600
Labor 62x\$6,000	\$372,000
Power,space 62x\$925	\$57,324
Total Annual Costs	\$540,924

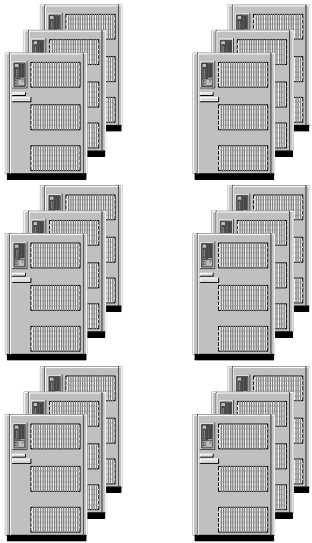
Operational cost savings = \$380,555 per year

Cash Flow Analysis

Savings Cash Flow When Consolidating 62 Lintel Servers to Linux on z/VM with One IFL

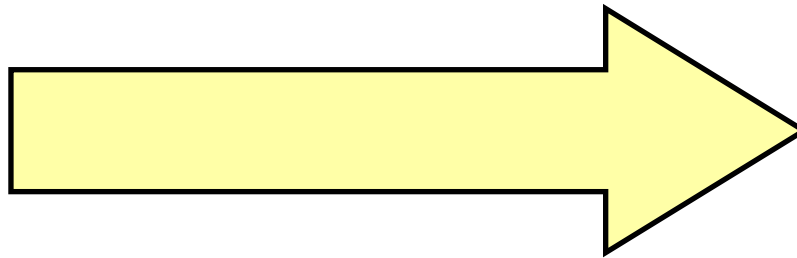


Two Kinds of Workload Consolidation



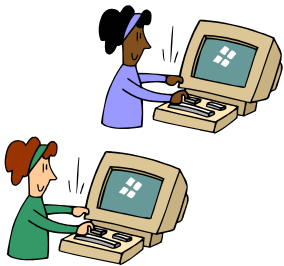
Roll-up

Migrate to achieve lower costs

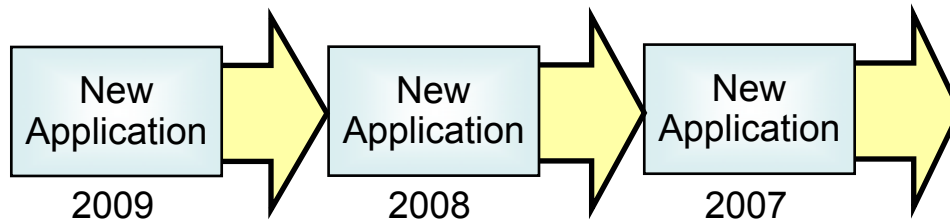


Strategic Hosting

Incremental growth on System z



Programmers



Case Study: Consolidate Data Server For SAP On Mainframe

Existing Mainframe



Existing processors:
9 general purpose
4000 MIPS of
existing DB2
workload

Add 1 LPAR for New SAP Data Server w 42 TB Storage



**966 MIPS
additional
workload**

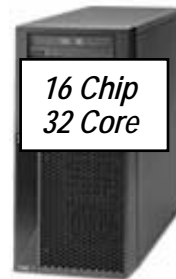
*3 year
cost of
acquisition
\$3.54 M*

Add two processors:

- 1 zIIP
386 MIPS (40%)
- 1 General purpose
580 MIPS (60%)

Or add HP Integrity rx8640 Server w 75 TB storage

Prod



84,042 *
RPE's

*3 year
cost of
acquisition
\$5.45 M*

* Production RPE's required = 966 x 87 = 84,042

Storage Costs: DB2 Provides More Storage Savings than Oracle

- **DB2 for z/OS lowers TCO by reducing storage needed**
 - TPC-H Benchmark: DB2 compression of 59% vs 29% for Oracle RAC
- **Storage savings with DB2 vs. Oracle for a 100TB data base**

	Oracle	DB2 for z/OS*
Storage System	HP XP12000 Storage	IBM System Storage DS8100
Overall database compression ratio (using TPC-H benchmark results)	29%	59%
For 100 TB uncompressed data storage needed	75 TB of HP Storage	42 TB of IBM Storage
Cost of storage	\$3.34M (\$3.1M + \$0.225M**)	\$1.45M
With compression, storage for DB2 costs <u>56% less</u> than for Oracle		

* DB2 for z/OS achieves similar compression ratios to those of DB2 for LUW

** HP Storage Software charge

SAP Data Server Incremental Cost Breakdown

Mainframe Incremental Hardware

OTC		ANNUAL	
1 General Processor	\$1,452,500	Processor Maintenance * (For year 2, 3)	\$80,868
1 zIIP Processor	\$125,000		
IBM Storage (42TB)	\$1,449,801	Storage Maintenance	0
TOTAL	\$3,027,301	TOTAL	\$80,868 (year 2, 3)

Mainframe Incremental Software

OTC		ANNUAL	
Storage SW	\$140,794	DB2 MLC x12	\$33,840
		z/OS MLC x12	\$34,944
TOTAL	\$140,794	TOTAL	\$68,784

Distributed Incremental Hardware

OTC		ANNUAL	
HP Processors	\$603,939	Processor Maintenance (Prepaid in year 1 for 3 years)	\$123,139
HP storage (75TB)	\$3,107,469	Storage Maintenance	\$30,951
TOTAL	\$3,711,408	TOTAL	\$154,090 (year 1) \$30,951 (year 2, 3)

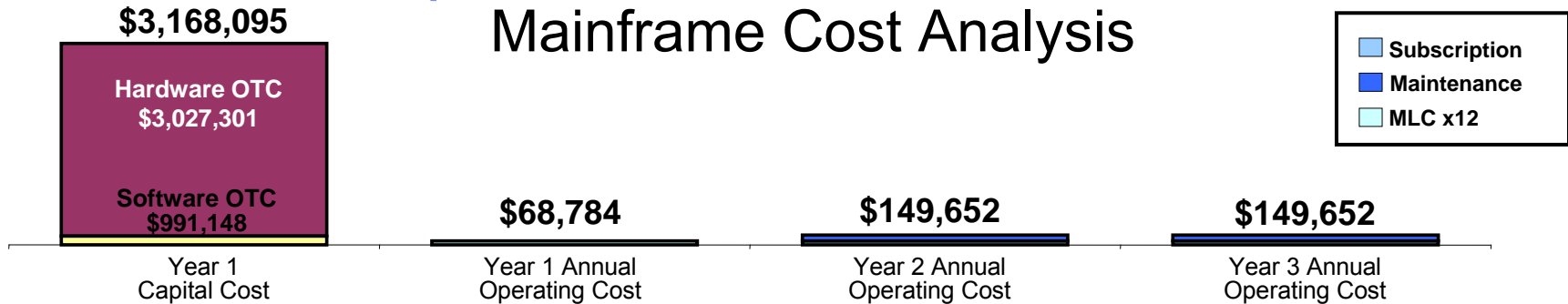
Distributed Incremental Software

OTC		ANNUAL	
Oracle EE	\$640,000	Oracle S&S	\$140,800
UNIX	\$126,048	UNIX S&S	\$107,456
Storage Software	\$225,100		
TOTAL	\$991,148	TOTAL	\$248,256 (year 1) \$140,800 (year 2, 3)

* Mainframe Processor Maintenance includes the maintenance for general purpose processors and specialty engines

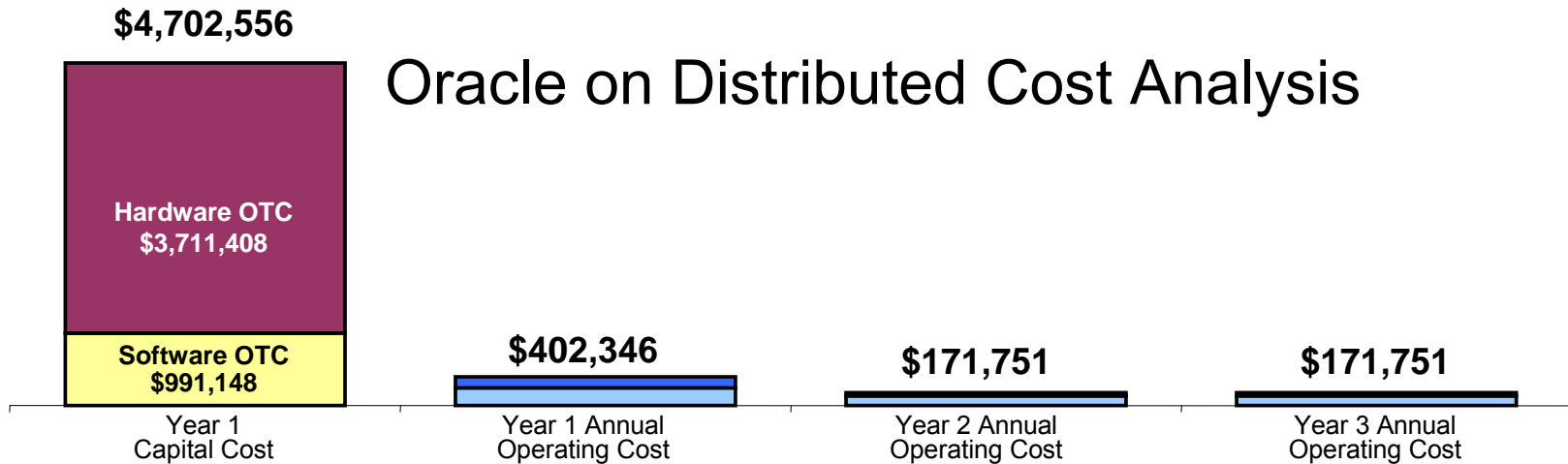
zIIP Processor and Storage Compression Lowers the Cost of Acquisition

Mainframe Cost Analysis



Total cost = **\$3,536,168**

Oracle on Distributed Cost Analysis



Total cost = **\$5,448,404**

1.5 times more expensive

Case Study: Consolidate Data Server For SAP On Mainframe With Disaster Recovery

Existing Mainframe



Existing Disaster Recovery Site



Add 1 LPAR for New SAP Data Server w 42 TB Storage



966 MIPS additional workload

And Add Disaster Recovery



3 year cost of acquisition \$5.19 M

Existing processors:
9 general purpose
4000 MIPS of existing DB2 workload

\$134/MIPS/Month

Existing processors:
Pay for one general purpose processor for hot disaster switch over and one "dark" DR processor at \$30K

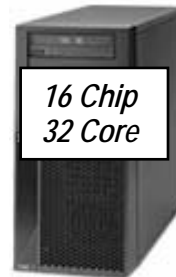
Add two processors:

- 1 zIIP
386 MIPS (40%)
- 1 General purpose
580 MIPS (60%)

Pay for Capacity Backup
2 processors
\$30K each

Or add HP Integrity rx8640 Server w 75 TB storage

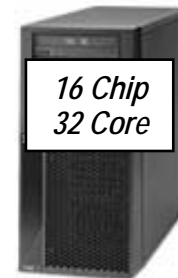
Prod



84,042 RPE's

And Add Disaster Recovery

Prod



84,042 RPE's

3 year cost of acquisition \$10.90 M

* Production RPE's required = 966 x 87 = 84,042

SAP Data Server With Disaster Recovery Incremental Cost Breakdown

Mainframe Incremental Hardware

OTC		ANNUAL	
1 General Processor	\$1,452,500	Processor Maintenance * (For year 2, 3)	\$80,868
1 zIIP Processor	\$125,000		
2 DR Processors	\$60,000		
IBM Storage (42TBx2)	\$2,899,602	Storage Maintenance	0
TOTAL	\$4,537,102	TOTAL	\$80,868 (year 2, 3)

Mainframe Incremental Software

OTC		ANNUAL	
Storage SW	\$281,588	DB2 MLC x12	\$33,840
		z/OS MLC x12	\$34,944
TOTAL	\$281,588	TOTAL	\$68,784

Distributed Incremental Hardware

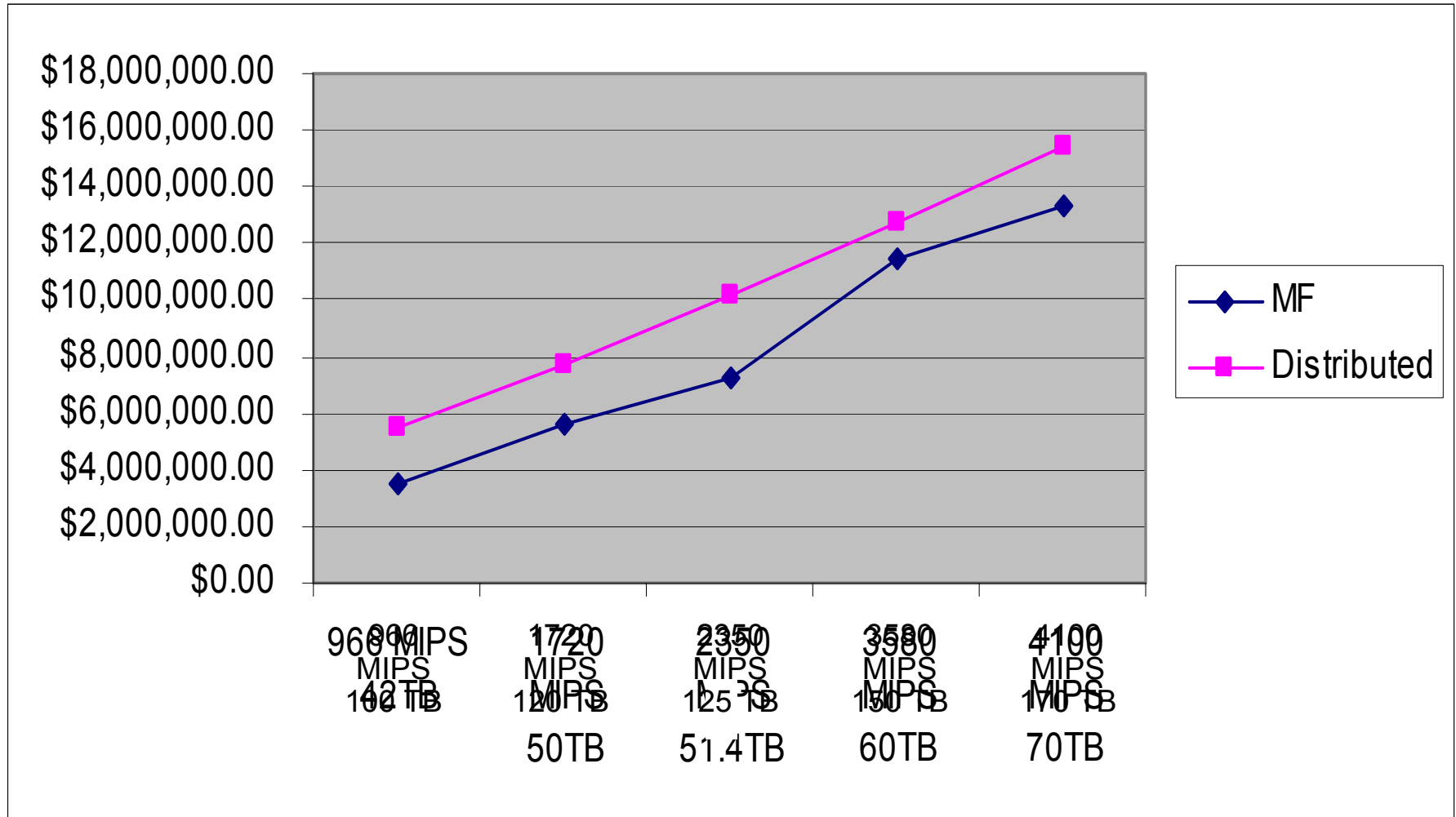
OTC		ANNUAL	
HP Processors	\$1,207,878	Processor Maintenance (prepaid in year 1 for 3 years)	\$246,278
HP storage (75TBx2)	\$6,214,938	Storage Maintenance	\$61,902
TOTAL	\$7,422,816	TOTAL	\$308,180(year 1) \$61902(year 2, 3)

Distributed Incremental Software

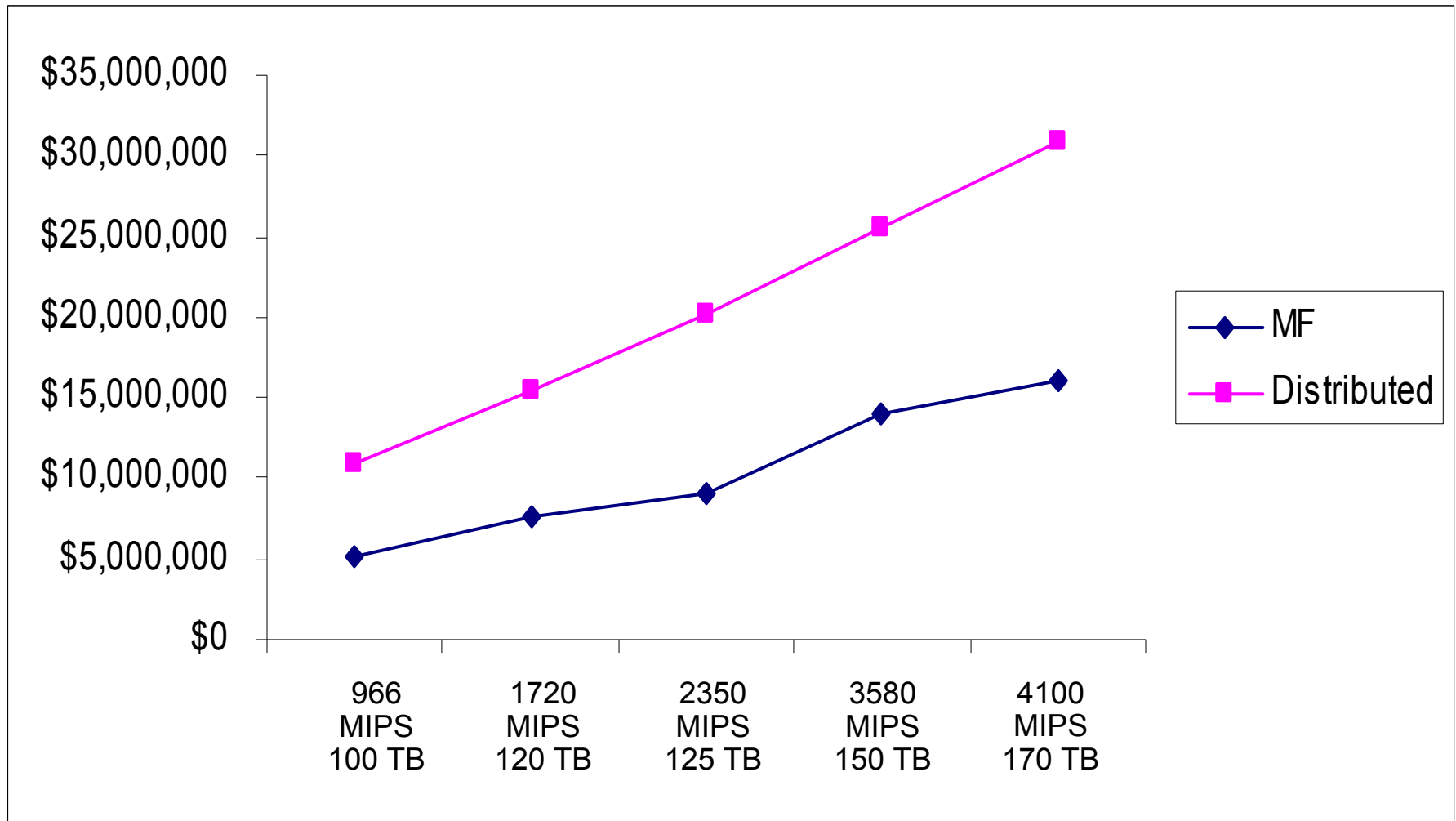
OTC		ANNUAL	
Oracle EE	\$1,280,000	Oracle S&S	\$281,600
UNIX	\$252,096	UNIX S&S	\$214,912
Storage SW	\$450,200	(Prepaid in year 1 for 3 years)	
TOTAL	\$1,982,296	TOTAL	\$496,512 (year 1) \$281,600 (year 2, 3)

* Mainframe Processor Maintenance includes the maintenance for general purpose processors and specialty engines

SAP Data Server – Mainframe Costs Are Lower Regardless of Data Server Size



SAP Data Server With Disaster Recovery– Mainframe Costs Are Lower Regardless of Data Server Size



Case Study: Consolidate New Data Warehouse Application on Mainframe

Existing Mainframe



Existing Disaster Recovery Site



Existing processors:
2 general purpose

Existing processors:
Pay for one general purpose processor for hot disaster switch over and one "dark" DR processor at \$30K

Add 1 LPAR for New Data Warehouse w 42 TB Storage



Prod

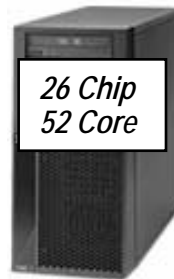
1954 MIPS additional workload

Add four processors:

- 3 zIIP's
1464 MIPS (75%)
- 1 General purpose
489 MIPS (25%)

Or add Superdome 9000 Server w 75 TB storage

Prod



26 Chip
52 Core

169,998 *
RPE's

And Add Disaster Recovery



Prod

Pay for Capacity Backup

- 4 processors
\$30K each

Disaster Recovery typically not considered

3 year cost of acquisition \$4.77M

3 year cost of acquisition \$8.24M

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

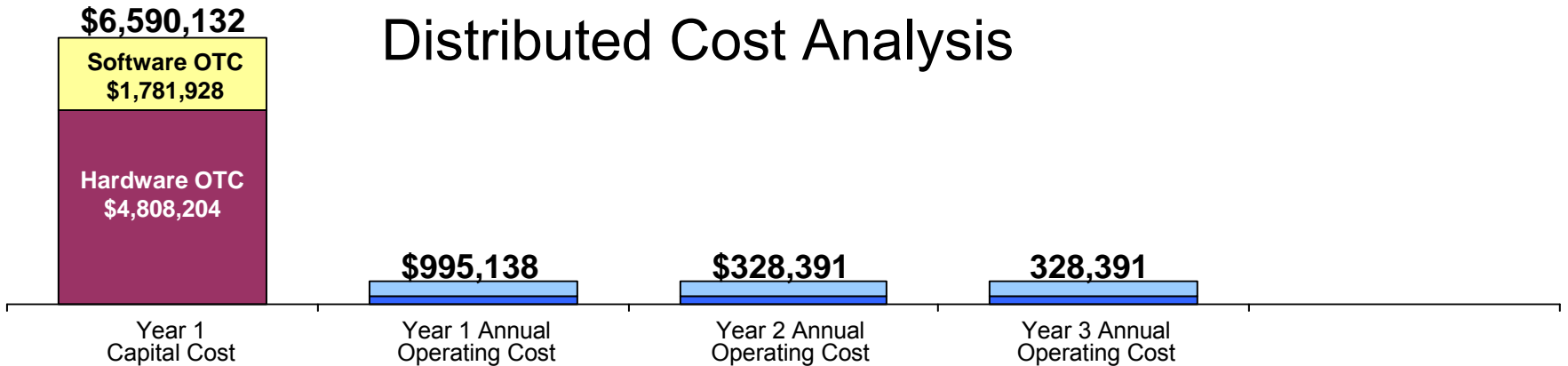
zIIP Processors and Storage Compression Lower the Cost of Acquisition

Mainframe Cost Analysis



Total cost = **\$4,773,308**

Distributed Cost Analysis



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

1.7 times more expensive

Case Study: Consolidate New WebSphere Application on Mainframe

Existing Mainframe



Existing Disaster Recovery Site



Existing processors:
2 general purpose



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

Add 3 LPARs for New Web Application

Prod	Dev	QA
900 MIPS additional workload		

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

Or add Superdome 9000 Servers

Prod	Dev and QA
	
16 Chip 32 Core	16 Chip 32 Core
82,531 * RPE's	82,531 RPE's

And Add Disaster Recovery

Prod	Dev	QA
------	-----	----

Pay for Capacity Backup
two processors
\$30K each

3 year cost of acquisition \$3.02M

And Add Disaster Recovery

Prod

16 Chip 32 Core
82,531 RPE's

3 year cost of acquisition \$3.89M

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

WebSphere Application Server Incremental Cost Breakdown

Mainframe Incremental Hardware

OTC		ANNUAL	
1 GP Processor	\$1,450,000	Processor Maintenance * (For year 2, 3)	\$88,500
zAAP	\$125,000		
2 DR Processors	\$60,000		
TOTAL	\$1,635,000	TOTAL	\$88,500 (year 2, 3)

Mainframe Incremental Software

OTC		ANNUAL	
Utilities + WAS	\$556,140	Utilities S&S	\$44,454
		DB2 MLC x12	\$72,240
		QMF MLC x12	\$34,716
		z/OS MLC x12	\$67,368
		SubTotal MLC x12	\$174,324
TOTAL	\$556,140	TOTAL	\$218,778

Distributed Incremental Hardware

OTC		ANNUAL	
3 16x32 Itanium Superdome Servers	\$1,451,817	Servers Maintenance (Prepaid in year 1 for 3 years)	\$369,417
TOTAL	\$1,451,817	TOTAL	\$369,417 (year 1) \$0 (year 2, 3)

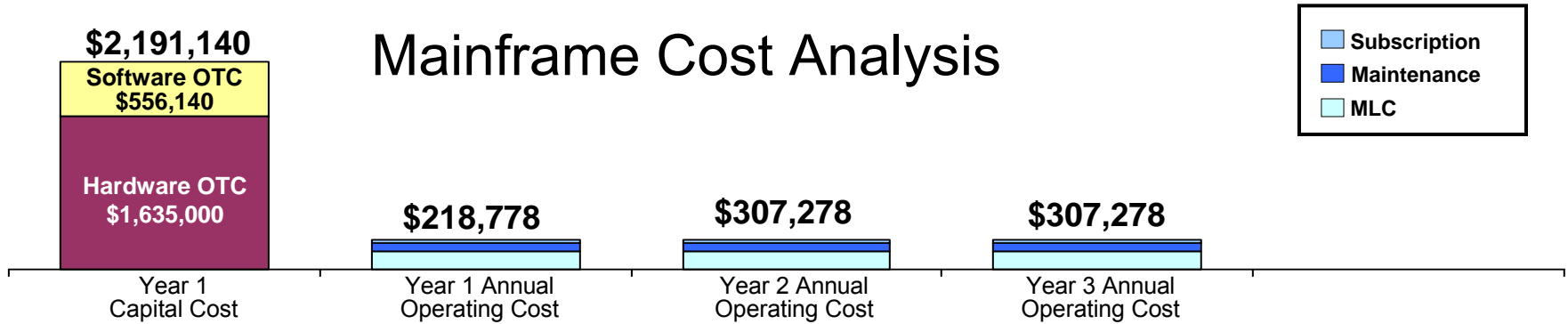
Distributed Incremental Software

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 (prepaid in year 1 for 3 years)	\$132,726
TOTAL	\$1,216,272	TOTAL	\$373,461 (year 1) \$240,735 (year 2, 3)

* Mainframe Processor Maintenance includes the maintenance for general purpose processors and specialty engines

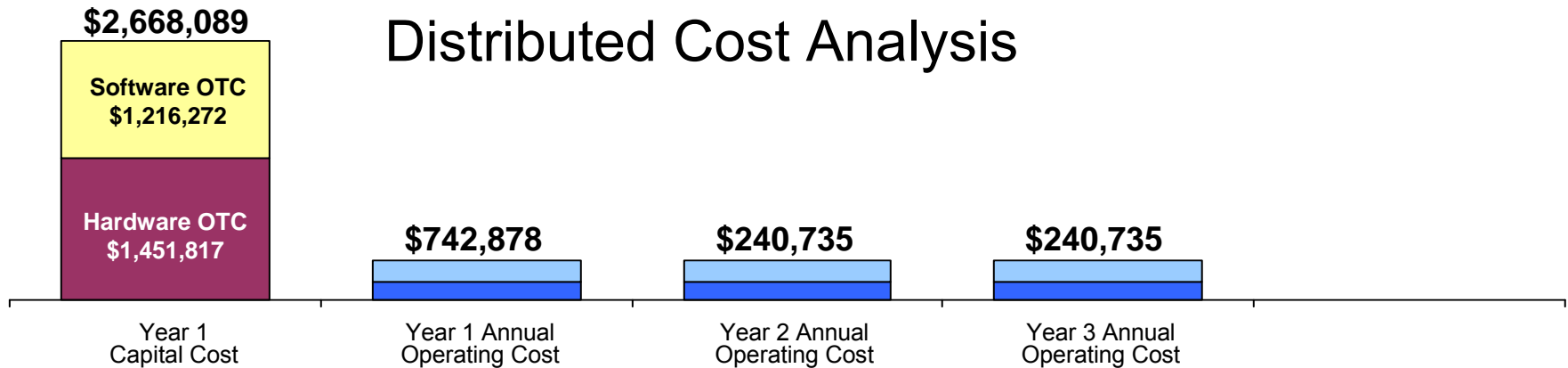
zAAP Processor Lowers the Cost of Acquisition

Mainframe Cost Analysis



Total cost = **\$3,024,474**

Distributed Cost Analysis



Total cost = **\$3,892,437**

1.3 times more expensive

Cost Savings From Consolidation

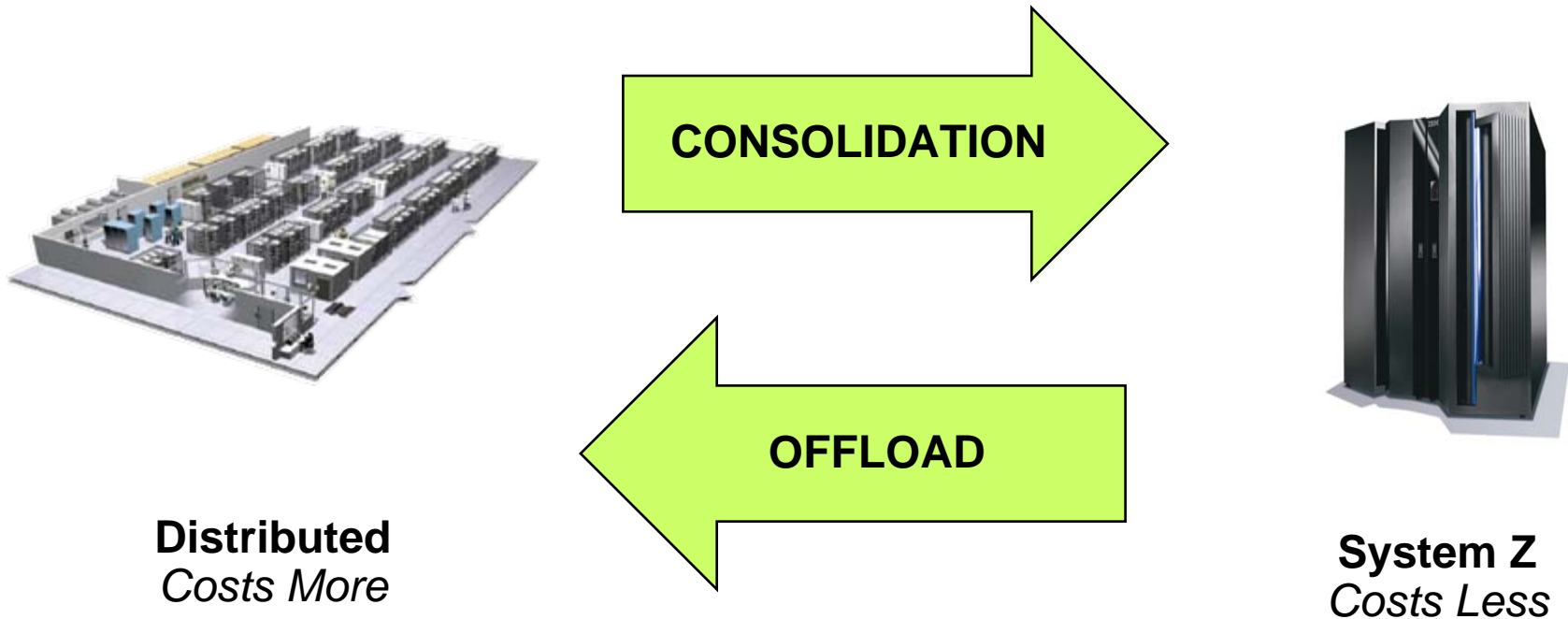
■ Rollup Consolidation

- Initial migration cost to consolidate
- Lower ongoing operating cost
- Enjoy lower operating costs after pay back period
- **Pay now, Save money going forward**

■ Strategic Hosting Consolidation

- No migration cost
- Each new application is an incremental workload
- Each new incremental workload costs less than distributed deployment
- **Save money now, each time**

What About Saving Money By Offloading?



Same story in reverse – Same answer
Server *proliferation* instead of consolidation
More cost instead of less

Tough Customer

The distributed servers run twice as fast as the mainframe processors, and they are cheap. I don't believe your TCO comparison.



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	<u>Δ\$2.7M</u>
	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	<u>Δ\$40.6M</u>
	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
 - Low utilization due to peak-to-average and growth provisioning
 - Batch workload may stress I/O capabilities
 - Separate servers for production, failover, development/test, disaster recovery
 - Processing comparisons
 - Language expansion (CICS/COBOL path lengths are highly optimized)
 - Conversion factor (MIPS to RPE) worsens as I/O rates increase
 - Oracle RAC inefficiencies compared to DB2

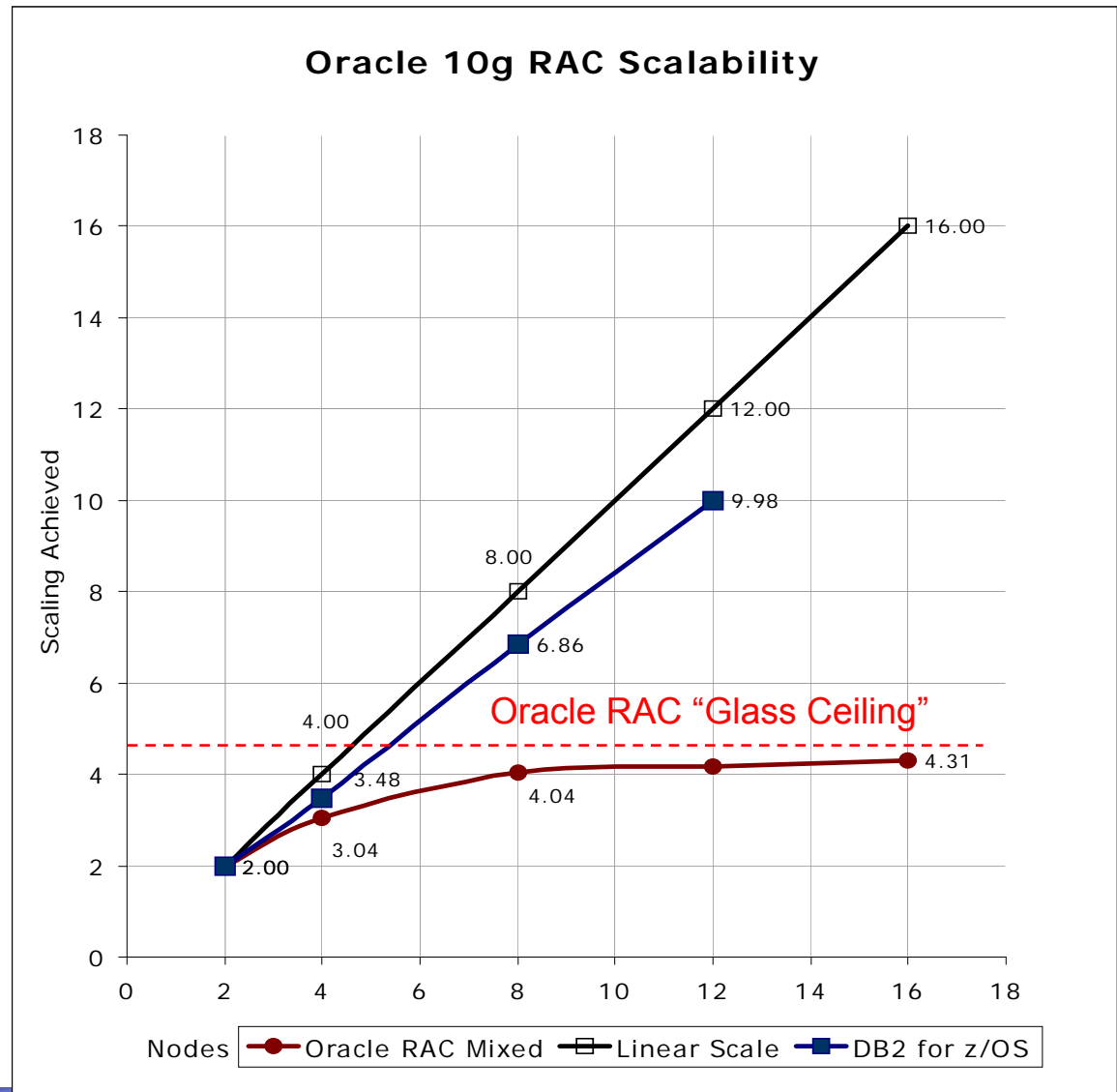
- **Other TCO considerations**
 - 3 to 5 year lifetime for distributed servers requires repurchase
 - Dual environments during migration

Oracle RAC Inefficiencies Compared to DB2

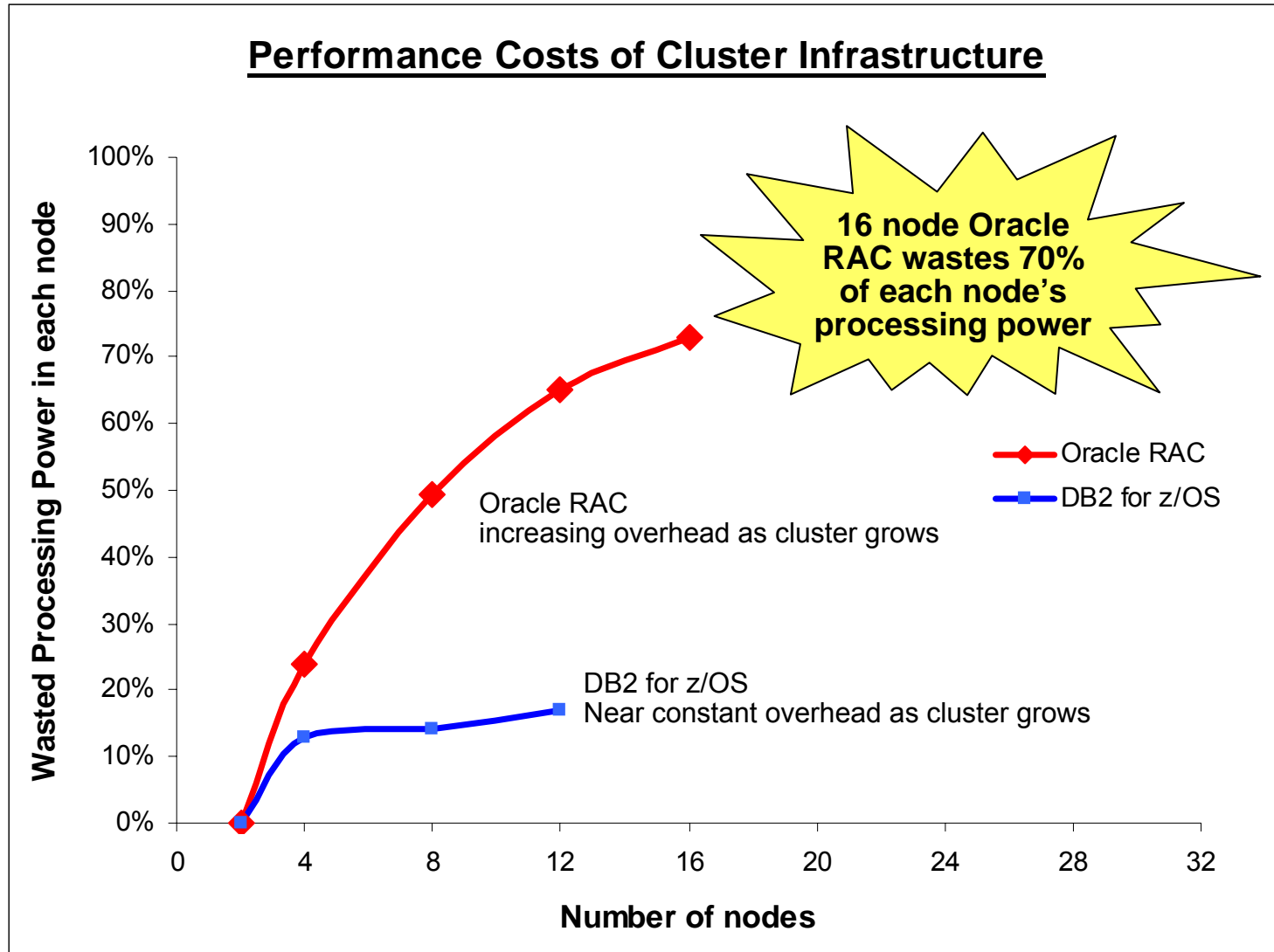
- **DB2 for z/OS provides near-linear scalability with relatively little overhead as nodes are added**
- **With Oracle RAC, overhead increases rapidly as additional nodes are added and performance degrades after only 4 to 6 nodes**

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

DB2 for z/OS source: "Enterprise Data Base Clustering Solutions" ITG, October 2003



Oracle RAC Overhead Wastes Processing Power in Each Node



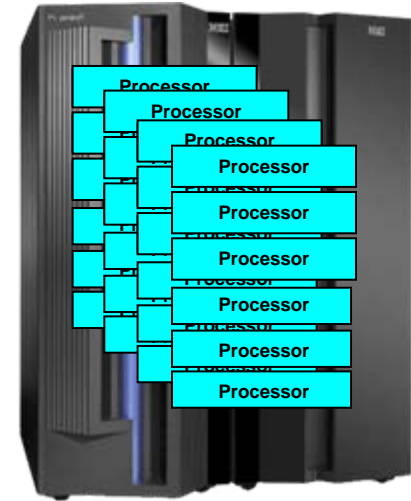
Oracle RAC source:
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 Hewlett-Packard, 2005

DB2 for z/OS source:
 "Enterprise Data Base
 Clustering Solutions"
 ITG, October 2003

Telco Industry Benchmarks Allow Direct Comparison of HP Superdome to IBM System z9

HP Superdome – 64 x 1.5GHz Itanium2

System z9 24-way Benchmark



64 UNIX processors

24 processors

**Call initiation rate:
1,000/second**

**Call initiation rate
on z9 is 6.5x more**

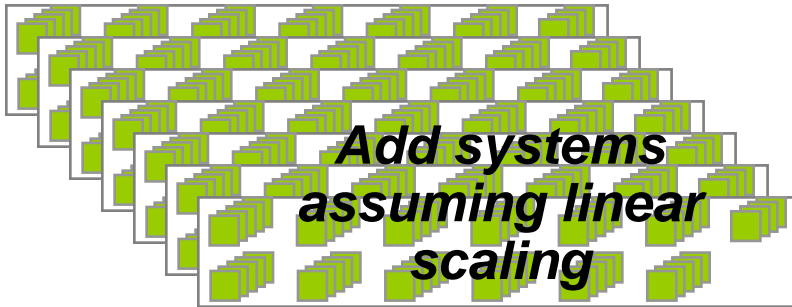
**Call initiation rate:
6,568/second**

Sources: *CommuniGate-Superdome-VoIP-Benchmark.pdf* & *IBM-CommuniGate-z9.pdf* from <http://www.communigate.com/Papers>

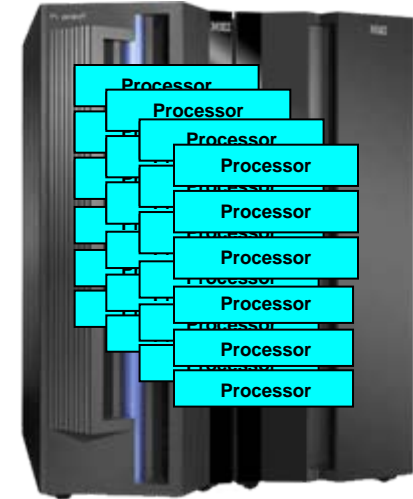
Telco Industry Benchmarks Allow Direct Comparison of HP Superdome to IBM System z9

HP Superdome – 64 x 1.5GHz Itanium2

System z9 24-way Benchmark



(64 x 6,568/1,000)

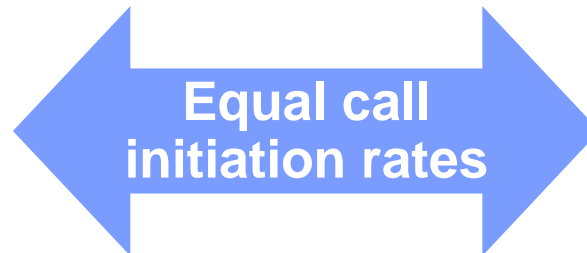


420 UNIX processors
(719,590 RPE's)

96 RPE's/MIP

24 processors
(7,509 MIPS)

Call initiation rate:
6,568/second

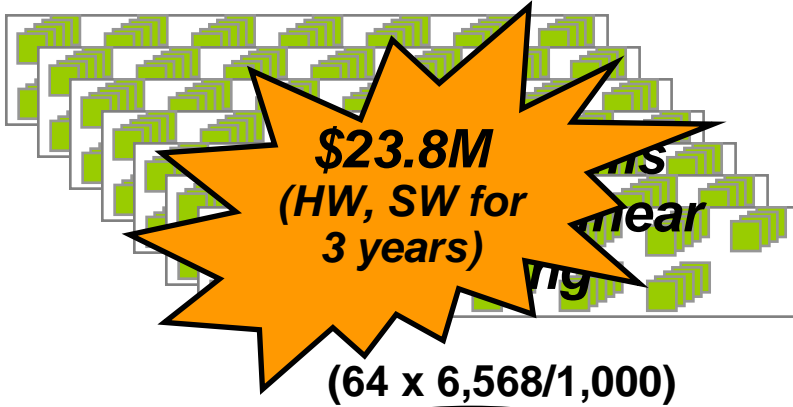


Call initiation rate:
6,568/second

Sources: CommuniGate-Superdome-VoIP-Benchmark.pdf & IBM-CommuniGate-z9.pdf from <http://www.communigate.com/Papers>

Telco Industry Benchmarks Allow Direct Comparison of HP Superdome to IBM System z9

HP Superdome – 64 x 1.5GHz Itanium2

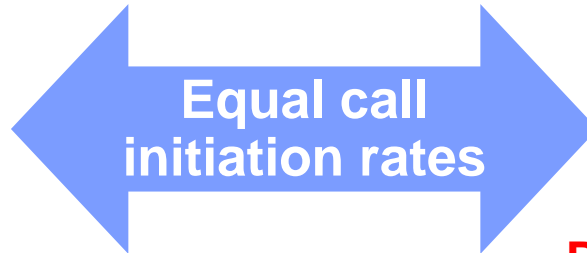


13 times more power & heat

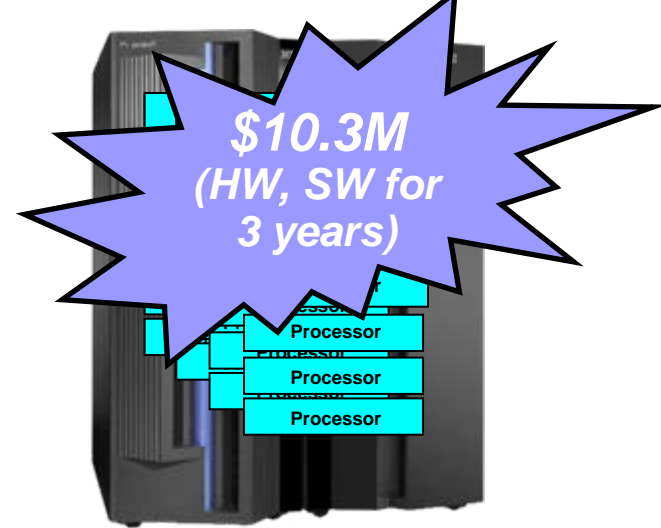
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System z9 24-way Benchmark



24 processors
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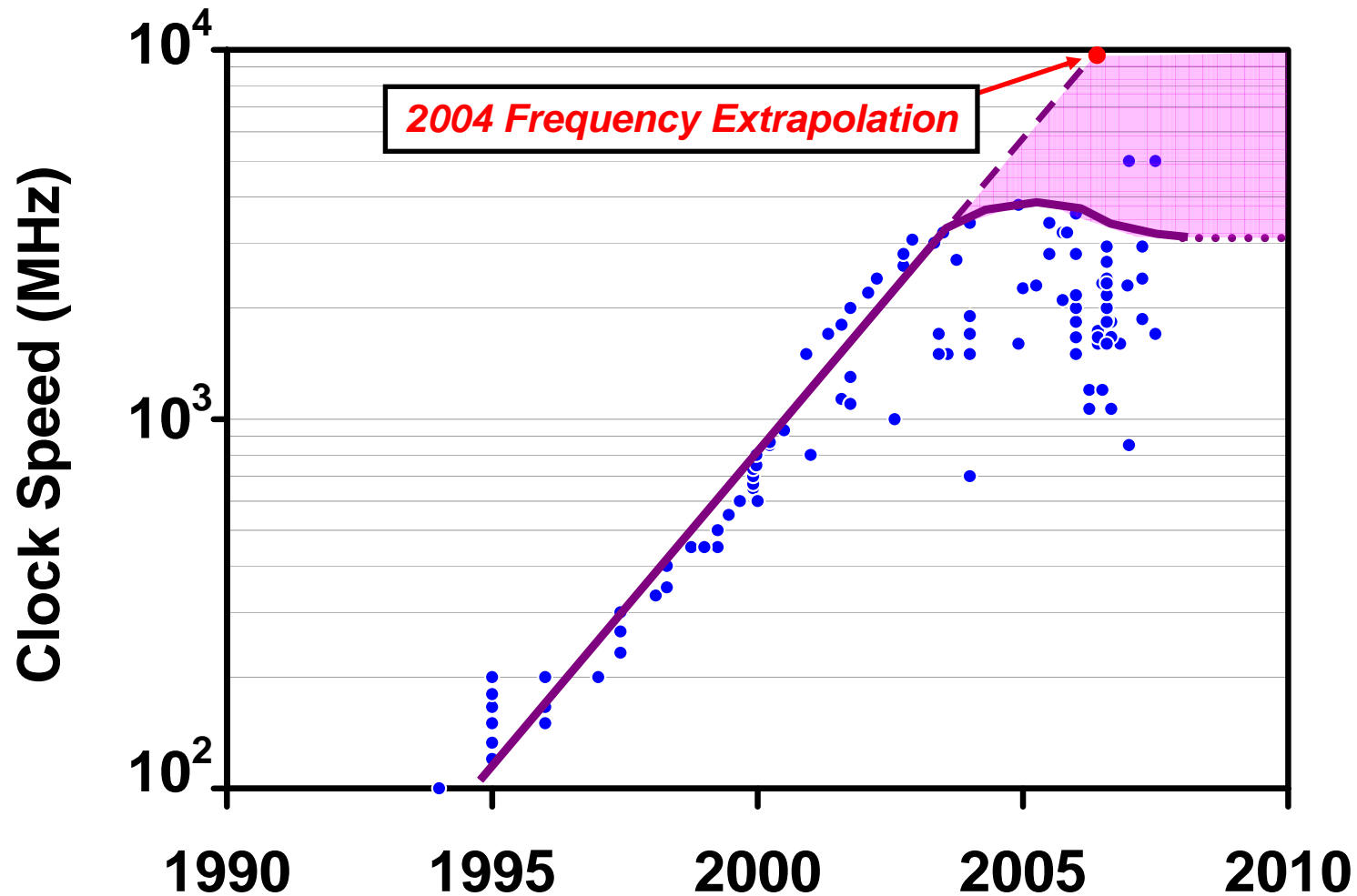
Call initiation rate:
6,568/second

**Compute-intensive
Production comparison only
No Disaster Recovery**

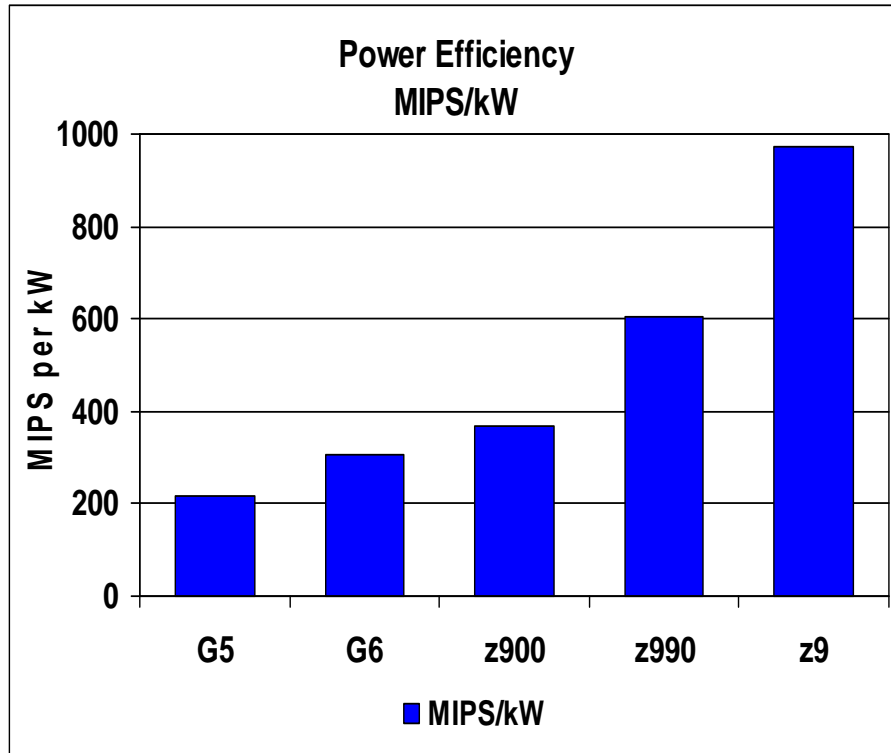
Sources: CommuniGate-Superdome-VoIP-Benchmark.pdf & IBM-CommuniGate-z9.pdf from <http://www.communigate.com/Papers>

Fast and Hot Distributed Servers

Managing power dissipation is limiting clock speed increases

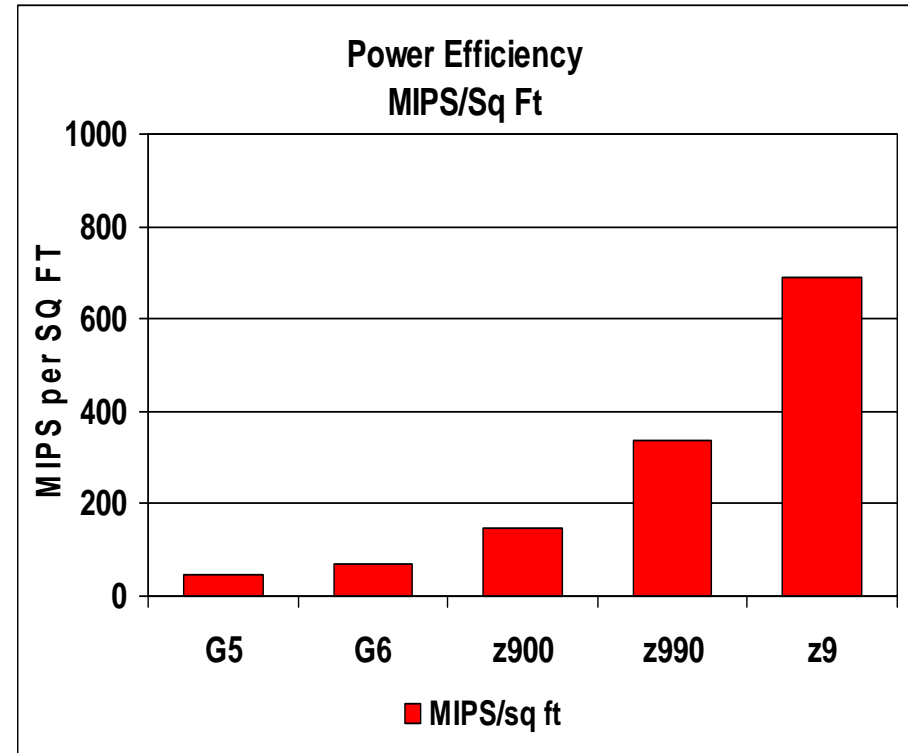


Mainframe Exhibits Increasing Space and Power Efficiencies with Each Generation



22% annual increase
in MIPS/kW

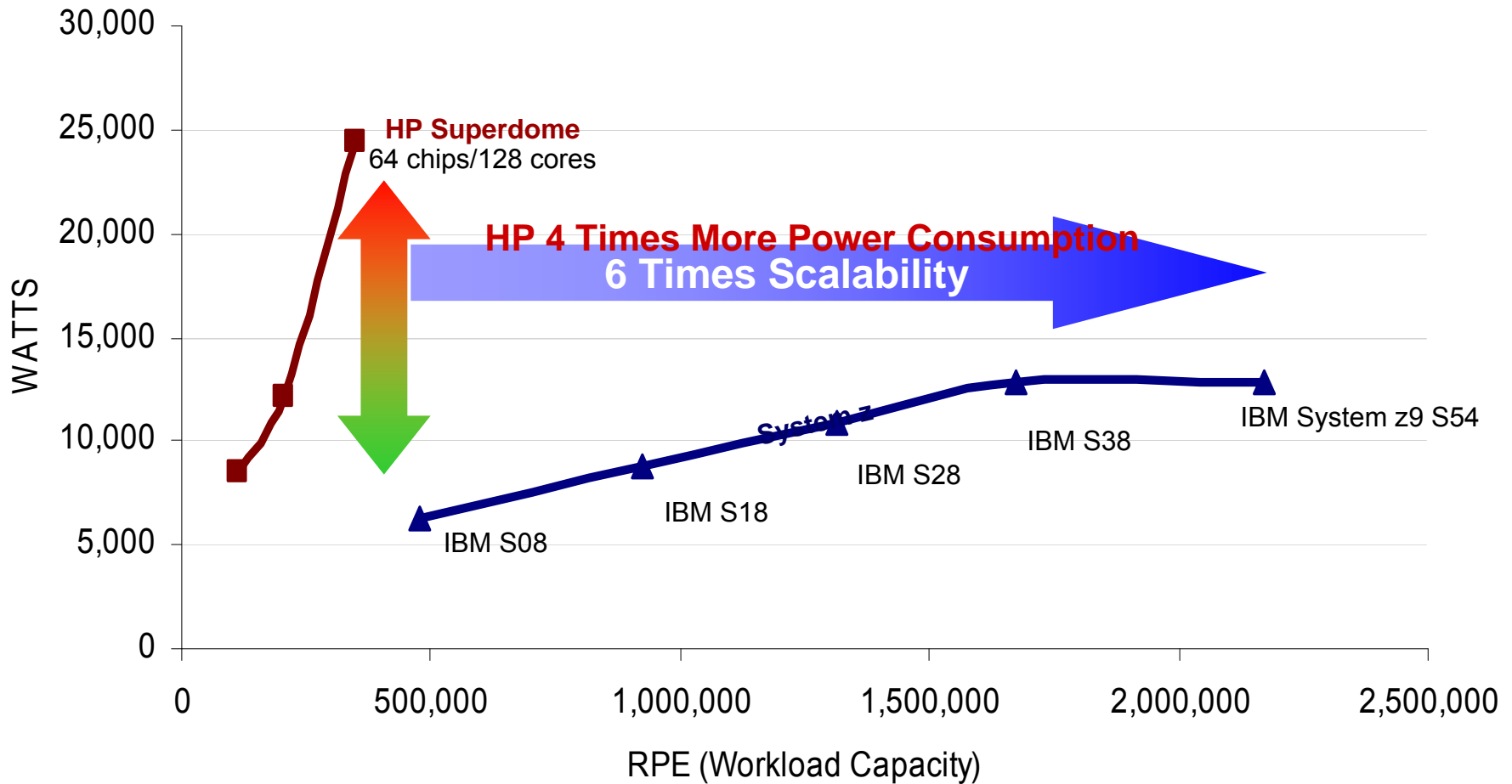
Decreasing energy consumption



46% annual increase
in MIPS/space

Decreasing square footage per MIPS

Mainframe Consumes Less Power Than HP Superdome



Source for HP Servers: Ideas International, Nov 06
 Note: Uses equivalence ratio of 122 RPE's per MIPS

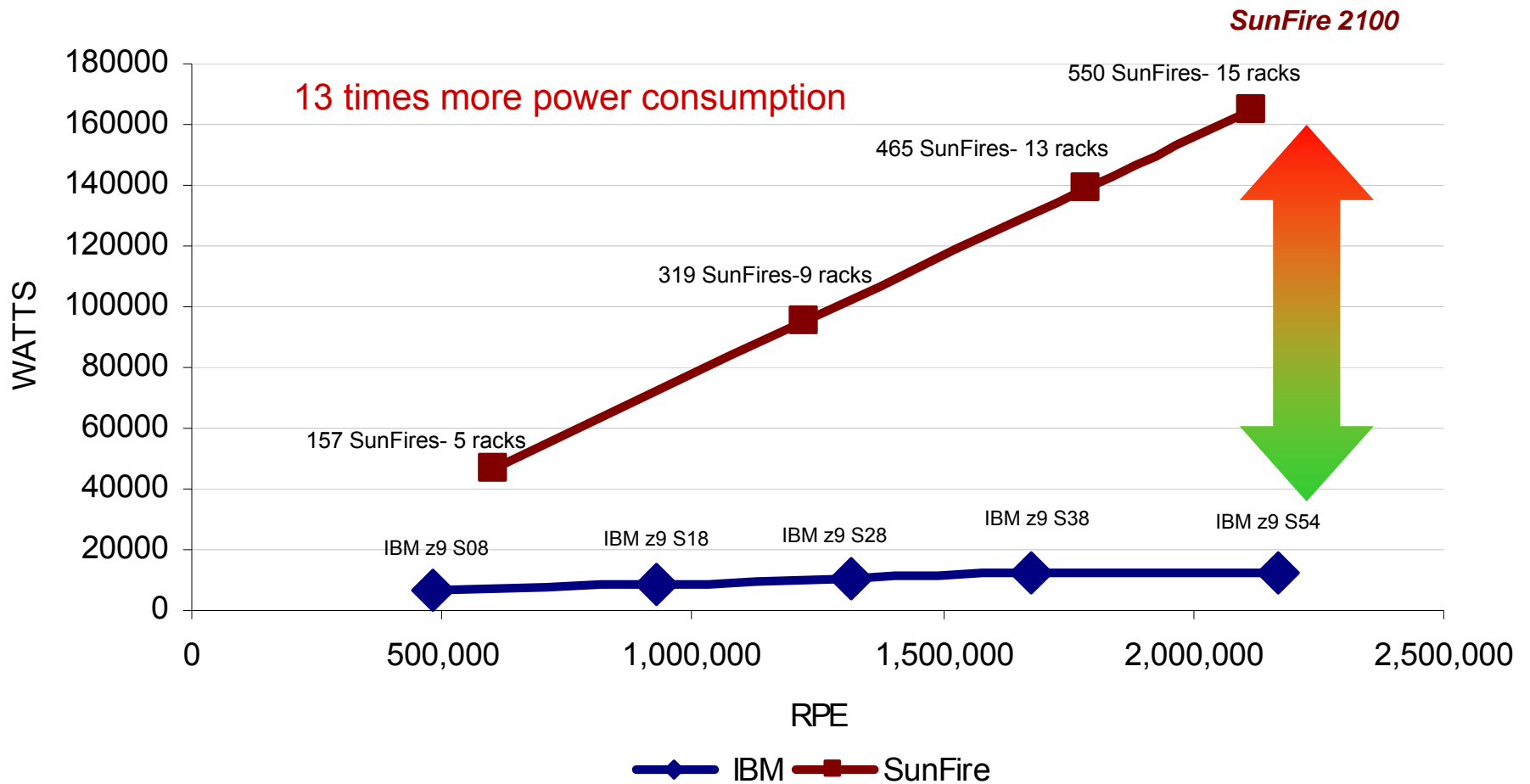
Do the Math

- **HP Itanium 2 Superdome 9050 (64ch/128co)* consumes a maximum of 24,392 watts**
 - $[24,392 \times \$0.09 \times (24 \times 365)]/1000 = \$19,230$ per year for electricity
- **Mainframe with similar computing capacity – a System z9 S08 machine using 6.3 kW**
 - **\$4,967** per year for electricity
- **Similar savings on cooling capacity**
 - Cost of cooling is about 60% additional
 - Superdome total **\$30,768** per year vs. Mainframe **\$7947**
 - Cost of mainframe power and cooling is **\$22,821** per year less than HP



*Rated at 350,041 RPE

Mainframe Consumes Less Power Than SunFire Server Farms

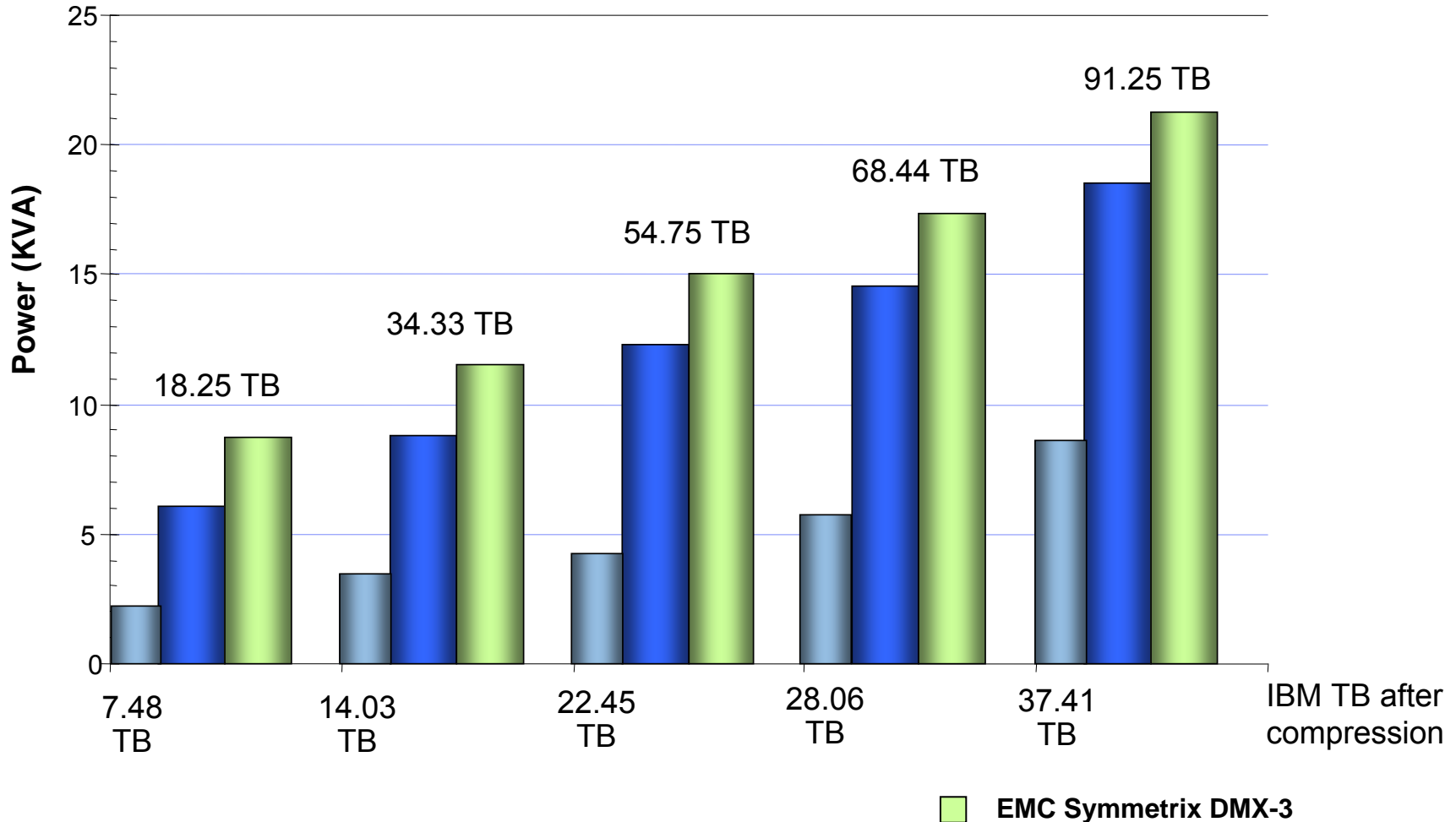


Source for SunFire 2100 Servers: Ideas International, Nov 06

Note: Uses equivalence ratio of 122 RPE's per MIP

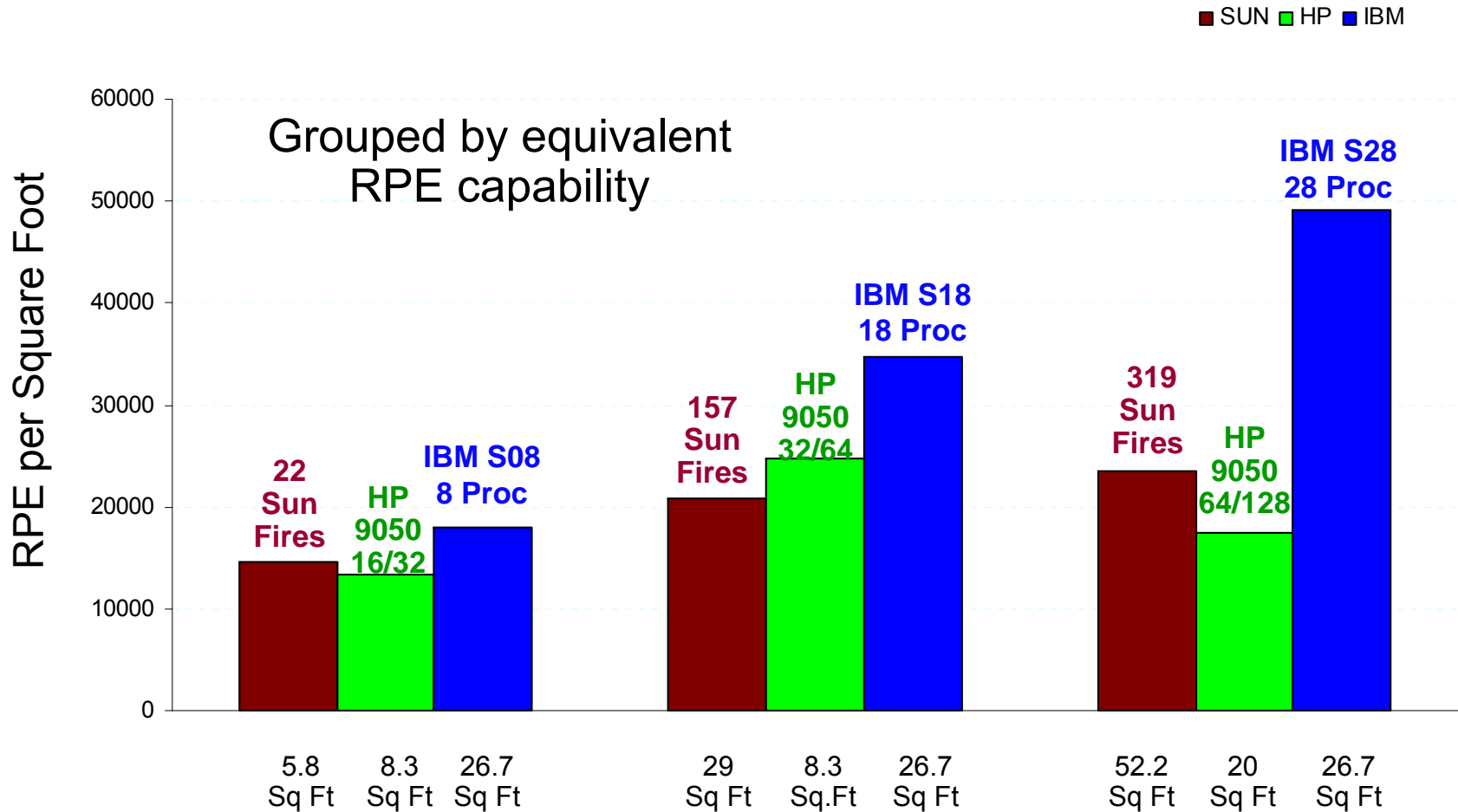
IBM Storage Also Saves Energy Costs

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



Study used 146 GB 15K rpm drives

The Mainframe Also Requires a Smaller Footprint

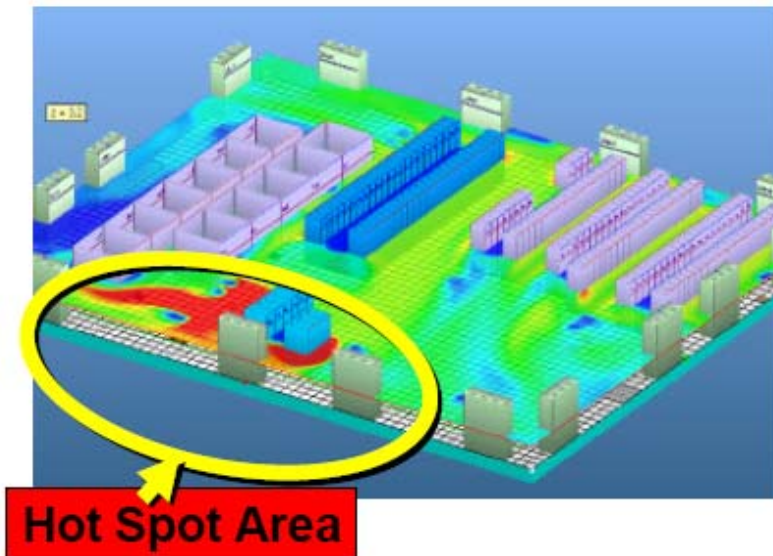


SunFire: 38 blades per rack

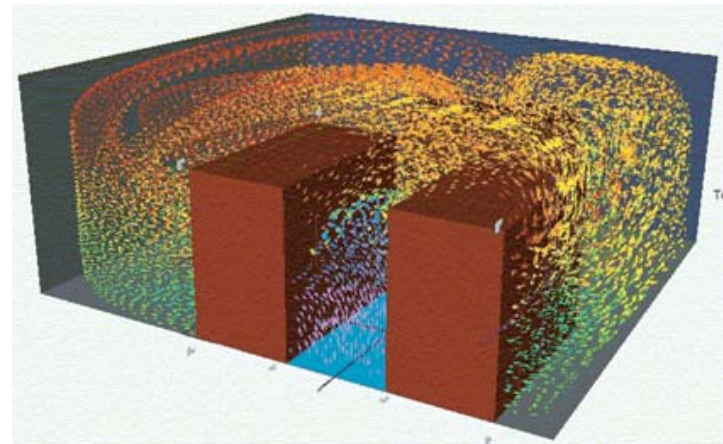
Based on 122 RPE per MIP

Cooling Issues

- Older data center floors were not designed to handle the heat load of current blade servers
- Racks with 2,500 to 3000 Watts/square foot create hot spots
- Denser racks consume the total energy rating allowable in a data center
- Front to rear airflow in blades mixes chilled air with warmer ambient air



Computer simulation of ambient air flow



Power and Space Costs

- **The cost of electricity to power and cool the servers**
 - Electricity usage differences are large, but the costs are typically small in magnitude compared to other project costs
- **The cost to re-arrange servers on the floor to take advantage of existing cooling vents**
 - One customer spent \$250K to place Superdomes near the vents
- **The cost to upgrade cooling capacity**
- **The ultimate cost – build a new data center facility at \$400 per square foot**

Customer Survey – How Many People to Manage Servers?

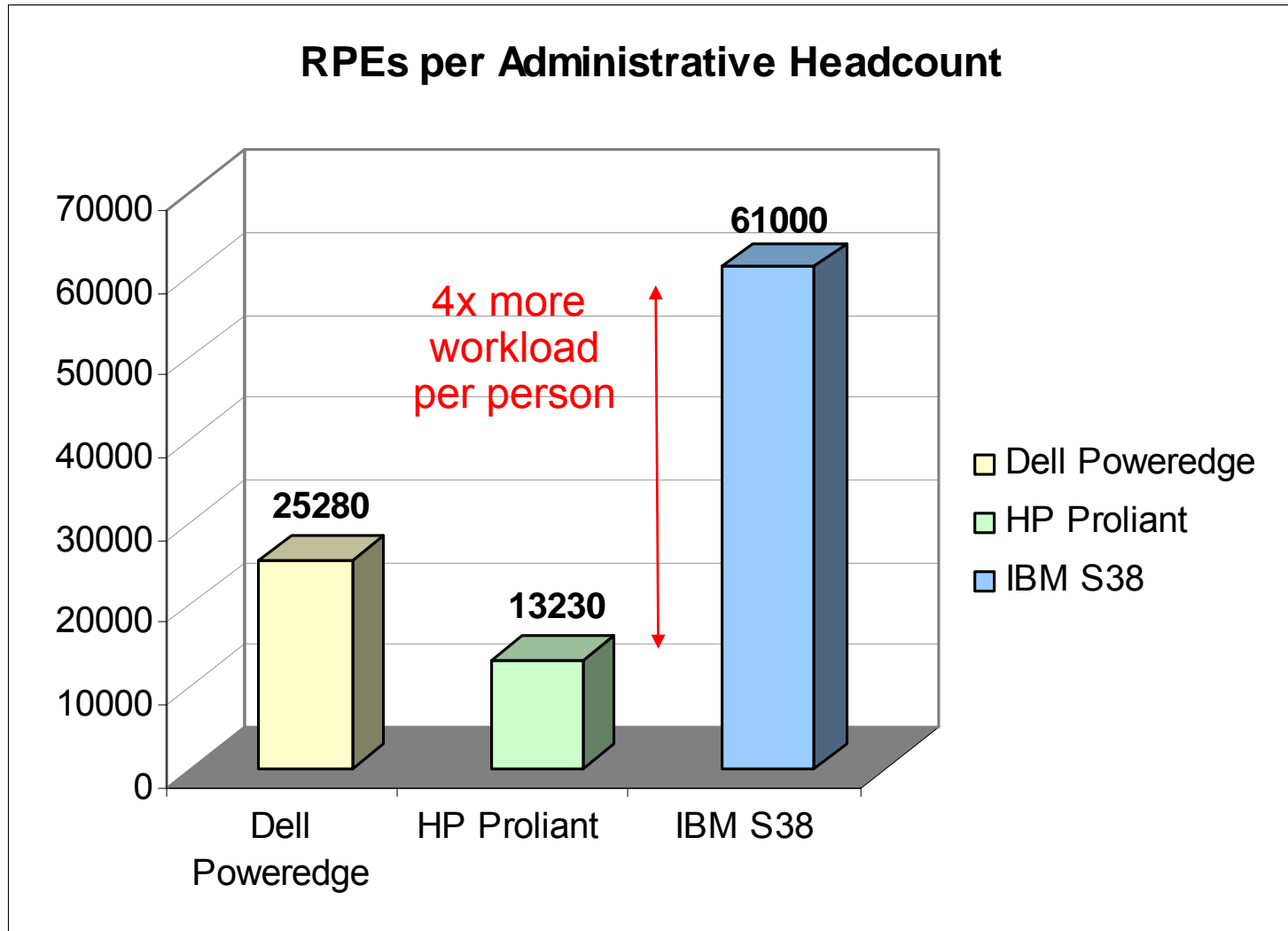
# NT Servers	# People	Ratio (s/p)
1123	68	16.5
228	20	14.4
671	51	13.1
700	65	11.5
154	18	8.5
431	61	7.1
1460	304	4.8
293	79	3.7
132	54	2.0

# 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



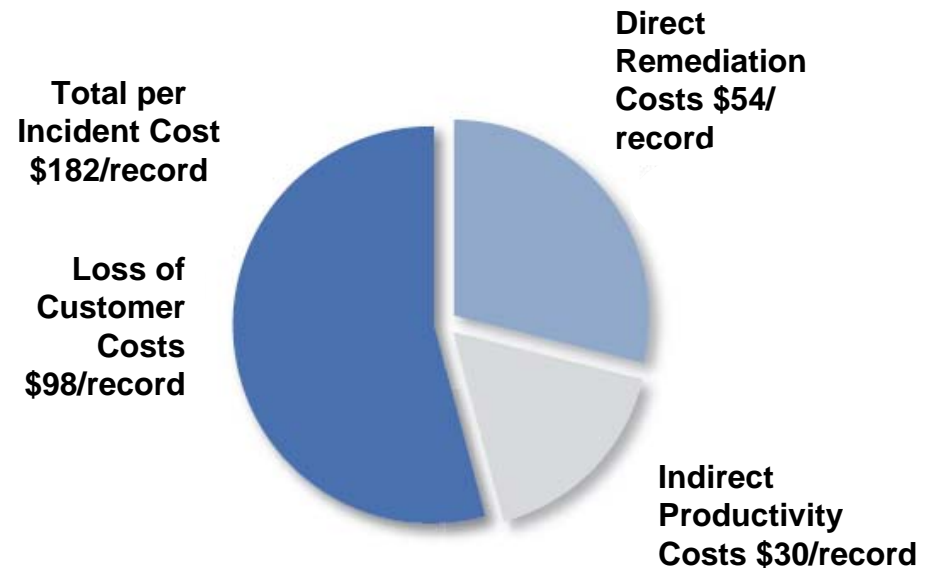
Compared at 122 RPE's = 1 MIP

Cost of a Security Breach

- **Total costs per compromised record**

- \$182 per record or \$4.8 million per incident
- Incident costs reported ranged from \$226,000 to \$22 million
- Total of \$148 million in costs across the sample of 31 companies

- Average customer loss was 2 percent of all customers, with some reporting up to 7%



Ponemon Study: 2006 Survey Cost of a Data Breach

Case Study Summary

- Roll up consolidation of Linux servers onto System z **saves** big money
- Incremental Data Server on System z costs **less** than Oracle RAC on HP Superdome
- Incremental Data Warehouse workload on System z costs **less** than Oracle RAC on HP Superdome
- Incremental WebSphere workload on System z costs **less** than distributed deployment
- System z uses less power and requires fewer operational staff

Customer Objections

Your story makes sense, but my monthly charges are much higher for the mainframe.



Data Center Cost Accounting

- **Two terms used to describe data center cost accounting**
 - IT cost accounting
 - Assign costs to department budgets
 - Charge Back policies
 - Bill departments for IT resources used

- **In this pitch we will use term “Charge Back” to refer to both**

Bad Charge Back Practices Mask True Costs

- Bad practices can create the **false impression** that the **mainframe costs to much**
 - Good practices allow business units to understand the economic impact of IT resource consumption decisions

- Mainframe Charges are typically overstated
 - It's easy to assign unrecoverable cost to the mainframe
 - Unrelated allocation of corporate overhead
 - Disproportional allocation of data center overhead
 - System Programming teams that support specific business projects
 - Security support for all platforms and businesses...

When Good Charge Back Practices Are Applied

SAP Data Server With Disaster Recovery

■ Costs on the mainframe over 3 years

– 3 year incremental cost of acquisition	\$5.19M
– 3 years labor (2 FTE's @ \$120,000/yr times 3 years)*	\$0.72M
– 3 year power cost (\$0.09 per kw.hr)	<u>negligible</u>
– Total cost for 3 years	\$5.91M
– Monthly charge	Mainframe is half the cost \$164,000

■ Cost on the distributed system

– 3 year cost of acquisition	\$10.90M
– 3 years labor (3 FTE's @ \$120,000/yr times 3 years)**	\$1.08M
– 3 year power cost (\$0.09 per kw.hr)	<u>\$.018M</u>
– Total cost for 3 years	\$12.16M
– Monthly charge	\$378,000

* One FTE per 500 MIPS

** One FTE per 20 processors

When Bad Charge Back Practices Are Applied

SAP Data Server With Disaster Recovery

■ Costs on the mainframe over 3 years

- Use current cost/MIP figure of \$188/month/MIP for existing hardware and software
- 3 year hardware and software \$188x966MIPS x36 months \$6.54M
- 3 years additional labor (2 FTE's @ \$120,000/yr times 3 years)* \$0.72M
- Total cost for 3 years \$7.26M
- Monthly charge **Mainframe costs 10 times more** \$202K

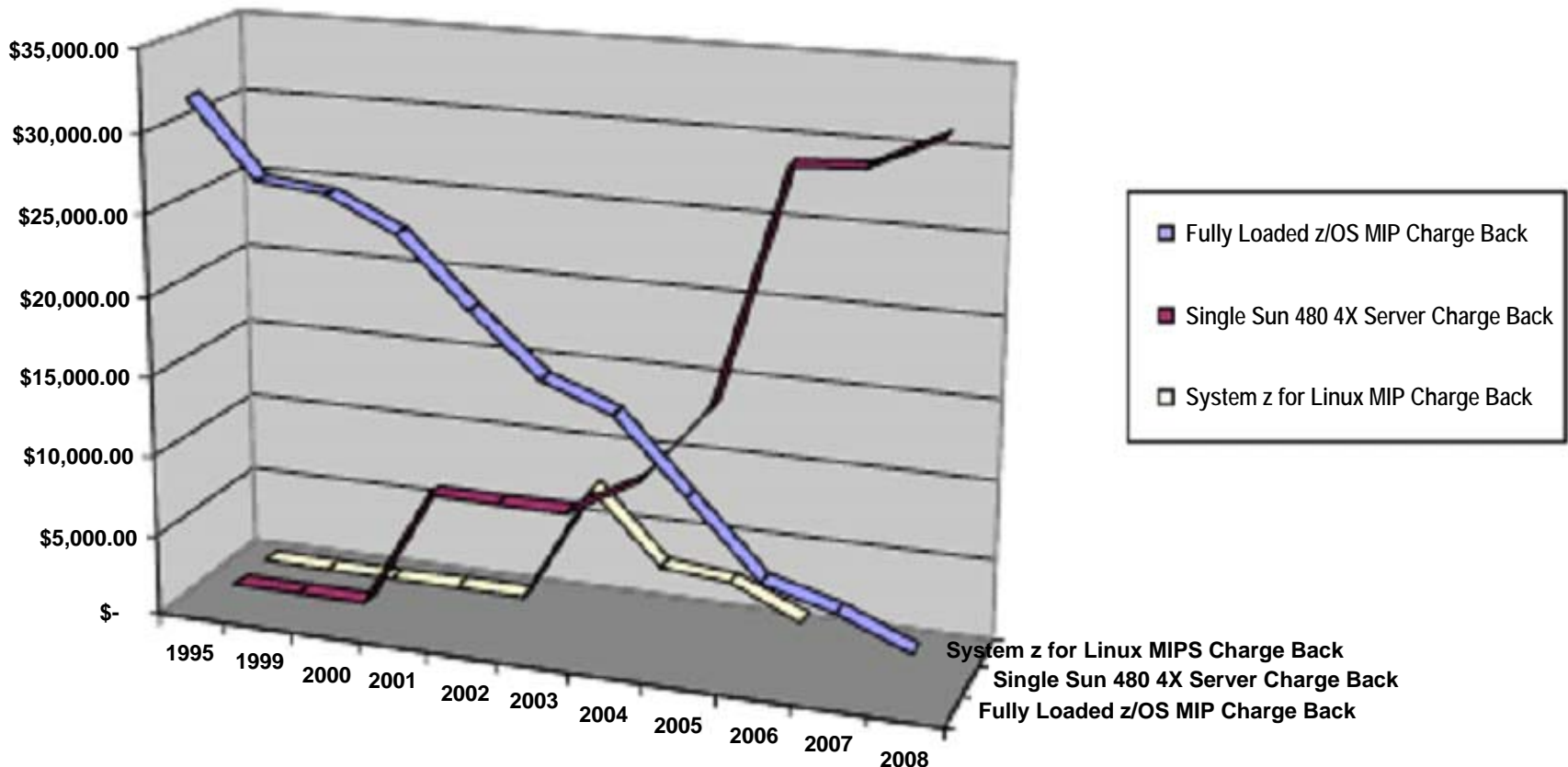
■ Cost on the distributed system

- 3 year cost of production server \$0.73M
- Disaster recovery allocated to general overhead not charged
- Cost of storage allocated to general overhead not charged
- Cost of software allocated to general overhead not charged
- Cost of labor allocated to general overhead not charged
- Additional electricity allocated to general overhead not charged
- Total cost for 3 years \$0.73M
- Monthly charge **\$20K**

* One FTE per 500 MIPS

** One FTE per 20 processors

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



More Accurate Charge Back Can Correct Perceptions of Relative Costs

Data Center Cost Recovery Model

What Costs
Need To
Be Recovered?

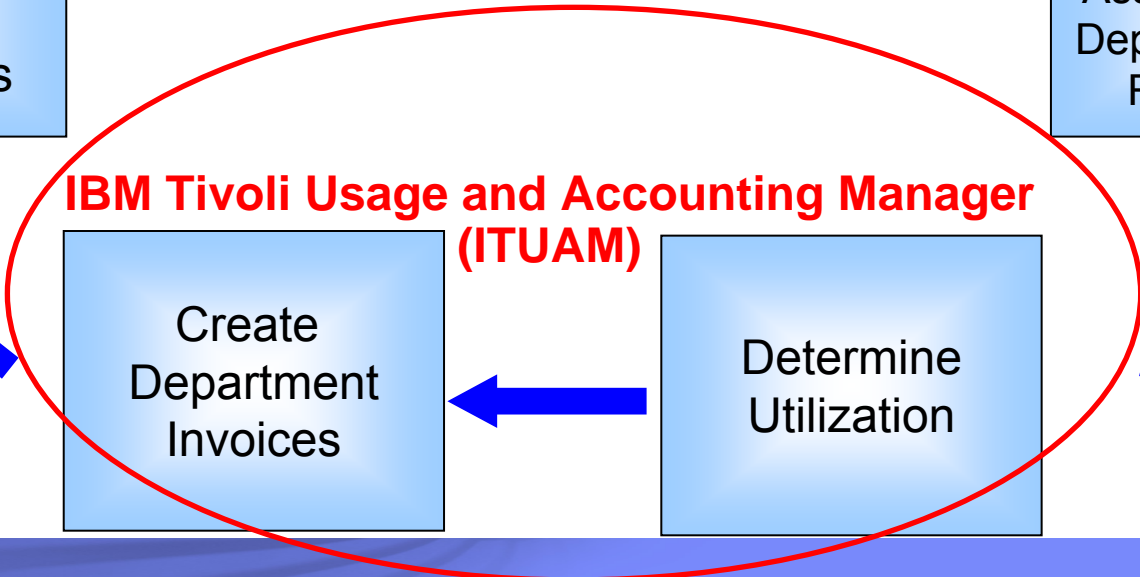


How Are Costs
Associated With
Applications?
(ATM, Credit Card,
Commercial Loans,
Mortgages)



Receive
Recoveries
From
Departments

How are
Applications
Associated With
Departments And
Resources?

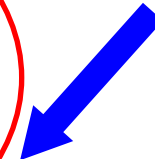


**IBM Tivoli Usage and Accounting Manager
(ITUAM)**

Create
Department
Invoices



Determine
Utilization



IT Financial
Management
Association
ITFMA.COM

Charge Back Policies are Fixed

**Now I'm paying the true
cost for my mainframe
applications**



