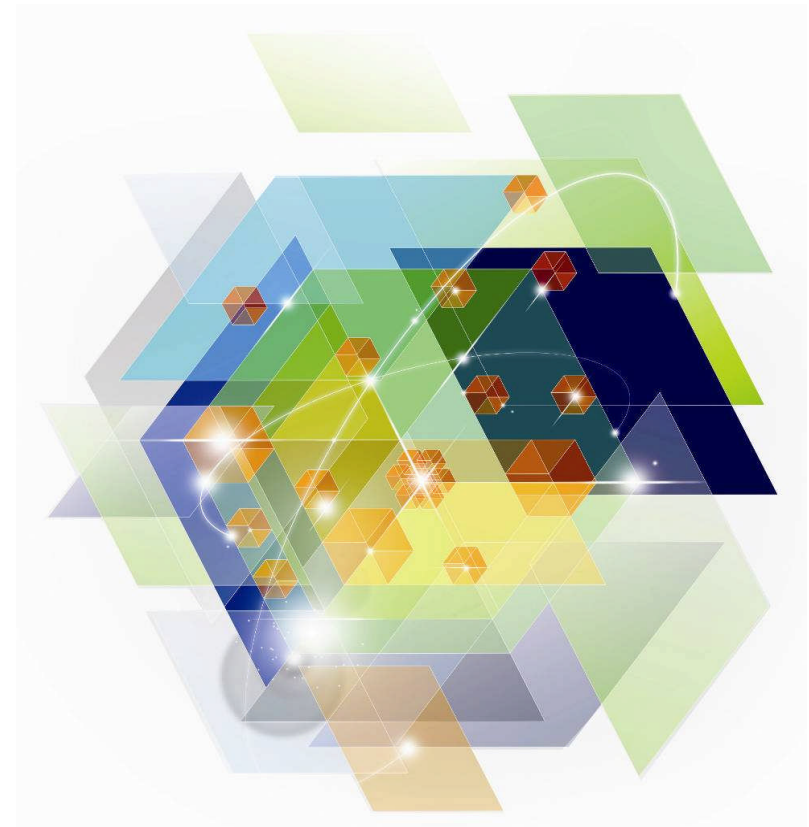




System z Reduces Cost Per Workload

Dr. Barry Willner

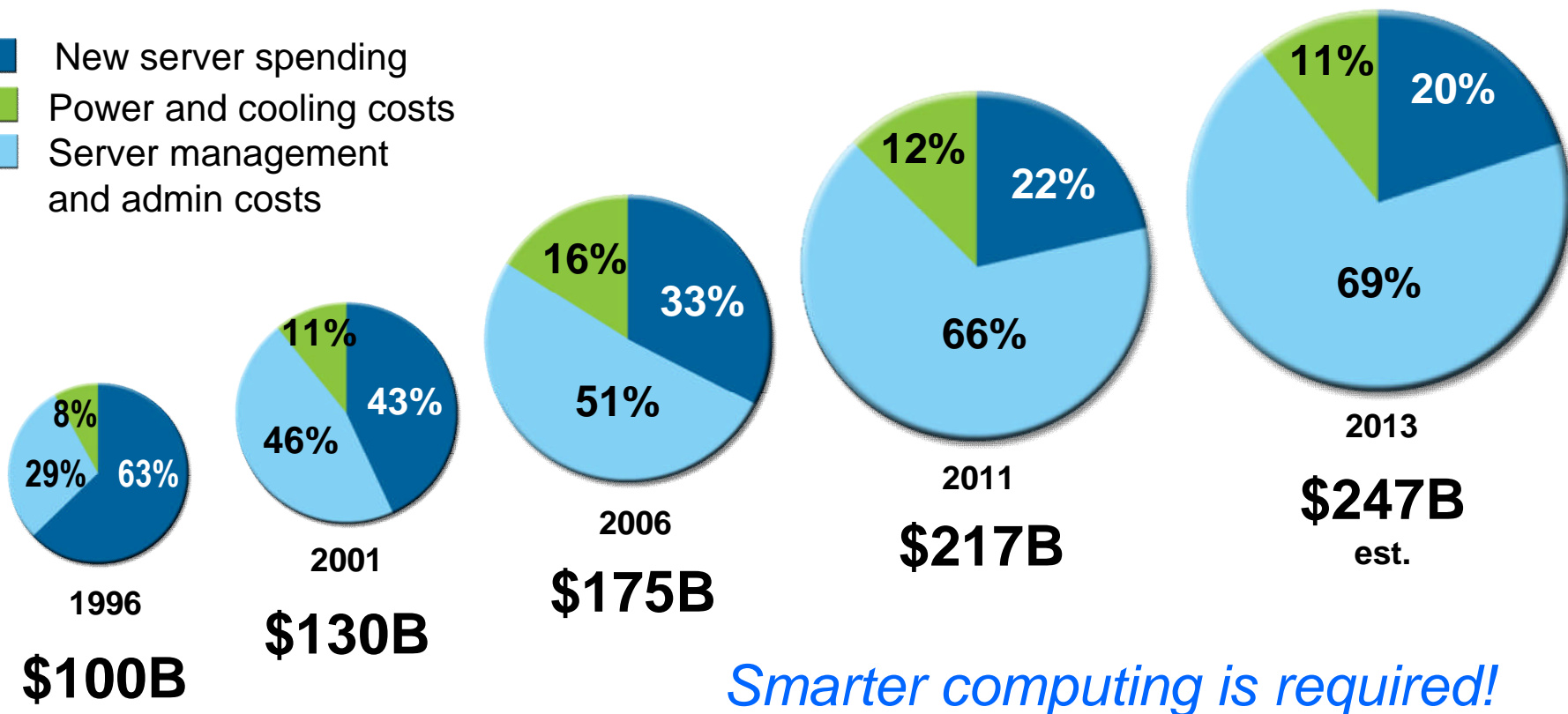
Distinguished Engineer, SWG CPO



A Fundamental Shift In Costs

Worldwide IT Spending on Servers, Power, Cooling and Management Administration

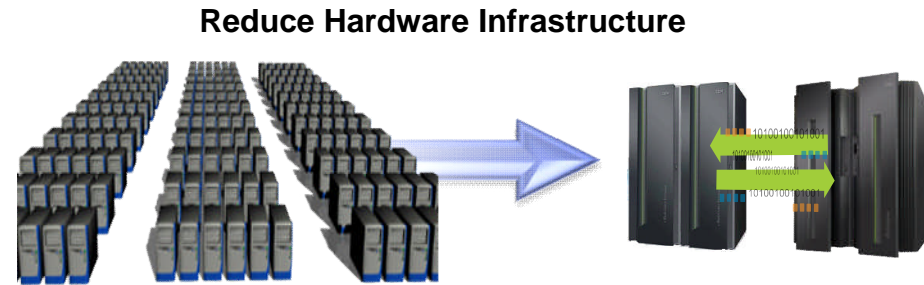
- New server spending
- Power and cooling costs
- Server management and admin costs



Source: IDC, 2012

Adopting Smarter Computing Strategies Reduces Costs And Improves Value

Consolidate servers on virtualized platforms



Leverage systems optimized for specific workloads



Processor intensity

Data intensity

Reduce labor costs with a private cloud

Integrated Service Management



Visibility



Control



Automation

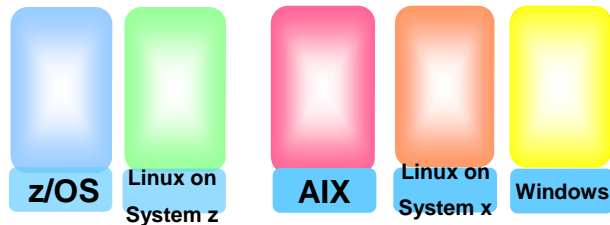


Cloud Computing

zEnterprise plays a major role in these strategies

System z Can Play A Major Role In Your Smarter Computing Strategy

Platforms Optimized For Different Workloads

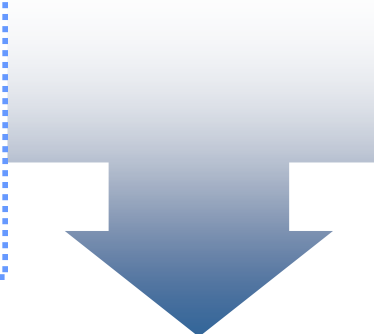


Best fit for workload

Private Cloud Management



Lowest labor costs



Lowest Cost Of Acquisition Per Workload

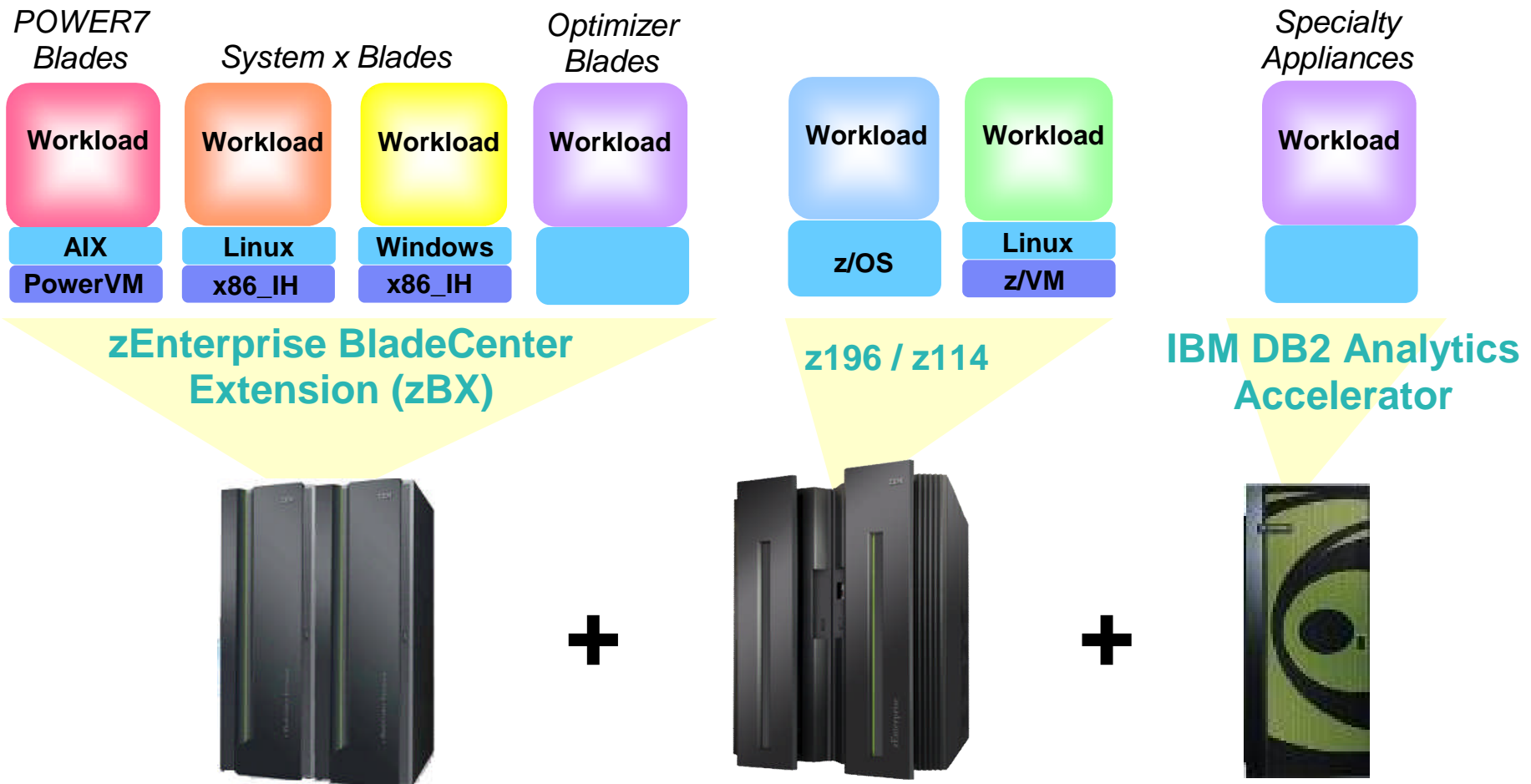


Lowest Cost Of Operation Per Workload

Lowest Cost Per Workload

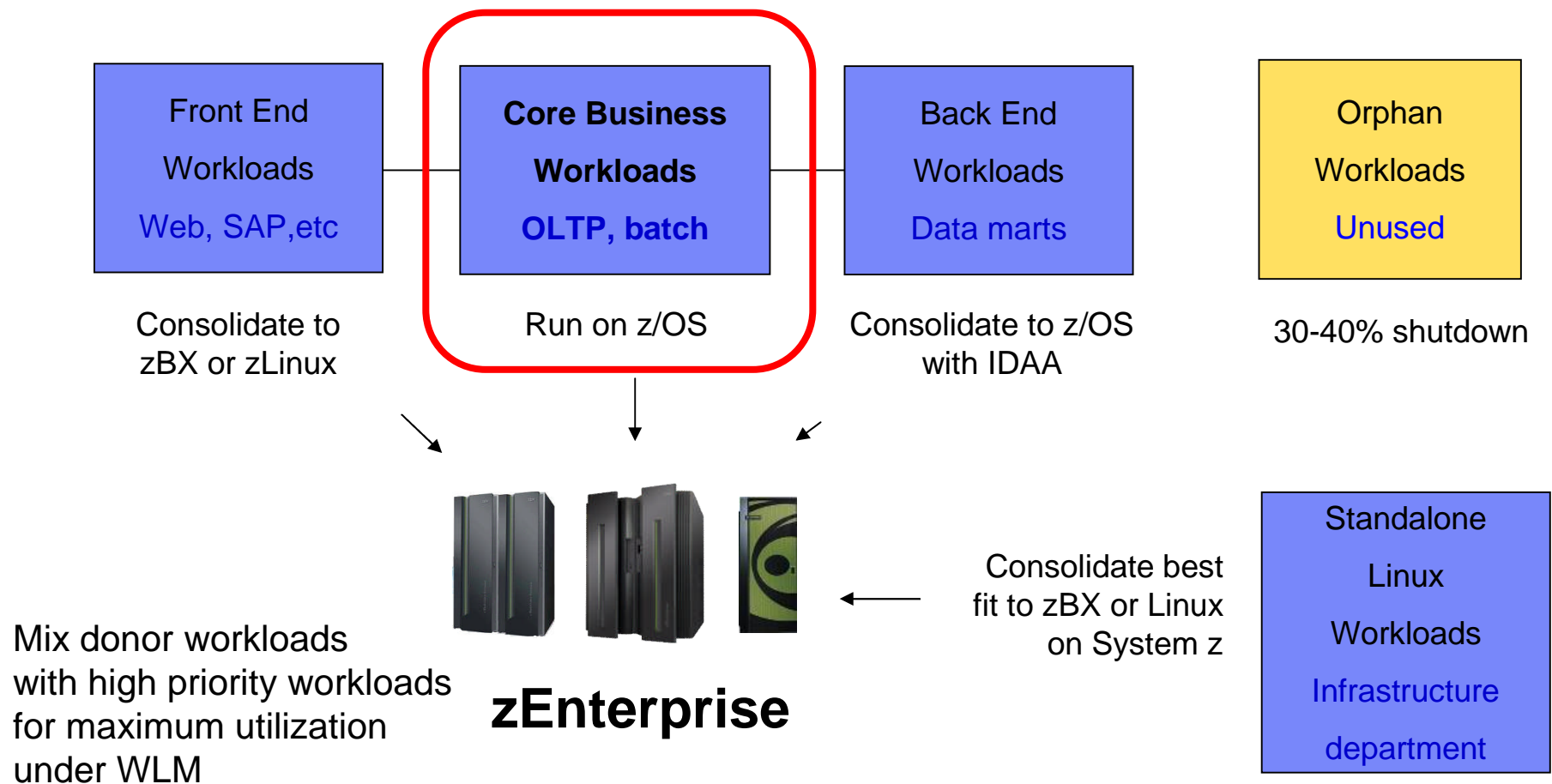
zEnterprise Provides A Variety Of Platforms For All Workloads

Use a Best Fit Strategy for Workload Assignment



How To Make The Best Use Of System z To Reduce Costs

■ Survey workloads for best assignments



Surveys Confirm Mainframes Are Lowest Cost For Core Business Workloads

Industry	Measure	Average IT Cost of Goods	Mainframe Biased	Distributed Biased	% Mainframe Cost Less Than Distributed
Bank	Per Teller Transaction	\$0.31	\$0.12	\$0.35	66%
Mortgage	Per Approved Loan	\$263.67	\$98.38	\$290.80	66%
Credit Card	Per Transaction	\$0.16	\$0.10	\$0.18	44%
Railroads	Per Ton Mile	\$0.0014	\$0.0012	\$0.0018	33%
Armed Service	Per Person	\$8,036	\$6,871	\$9,839	30%
Automotive	Per Vehicle	\$333	\$275	\$370	26%
Retail	Per Store (Door)	\$494,818	\$421,346	\$560,300	25%
Utilities	Per MegaWatt Hour	\$2.63	\$2.21	\$2.94	25%
Hospitals	Per Bed per Day	\$64.30	\$54.4	\$71.7	24%
Oil & Gas	Per Barrel of Oil	\$2.10	\$1.78	\$2.32	23%
Consulting	Per Consultant	\$53,060	\$48,900	\$62,344	22%
Trucking	Per Road Mile	\$0.177	\$0.155	\$0.194	20%
Airlines	Per Passenger Mile	\$0.007	\$0.0061	\$0.0076	20%
Chemicals	Per Patent	\$57,717	\$55,800	\$59,552	6%
Web Sites	Per Search	\$0.042	\$0.046	\$0.041	-12%

Most businesses running core workloads on mainframes had 6% to 66% lower IT costs per good than those using distributed servers

From Rubin Worldwide analysis of customer data and Gartner Research IT costs

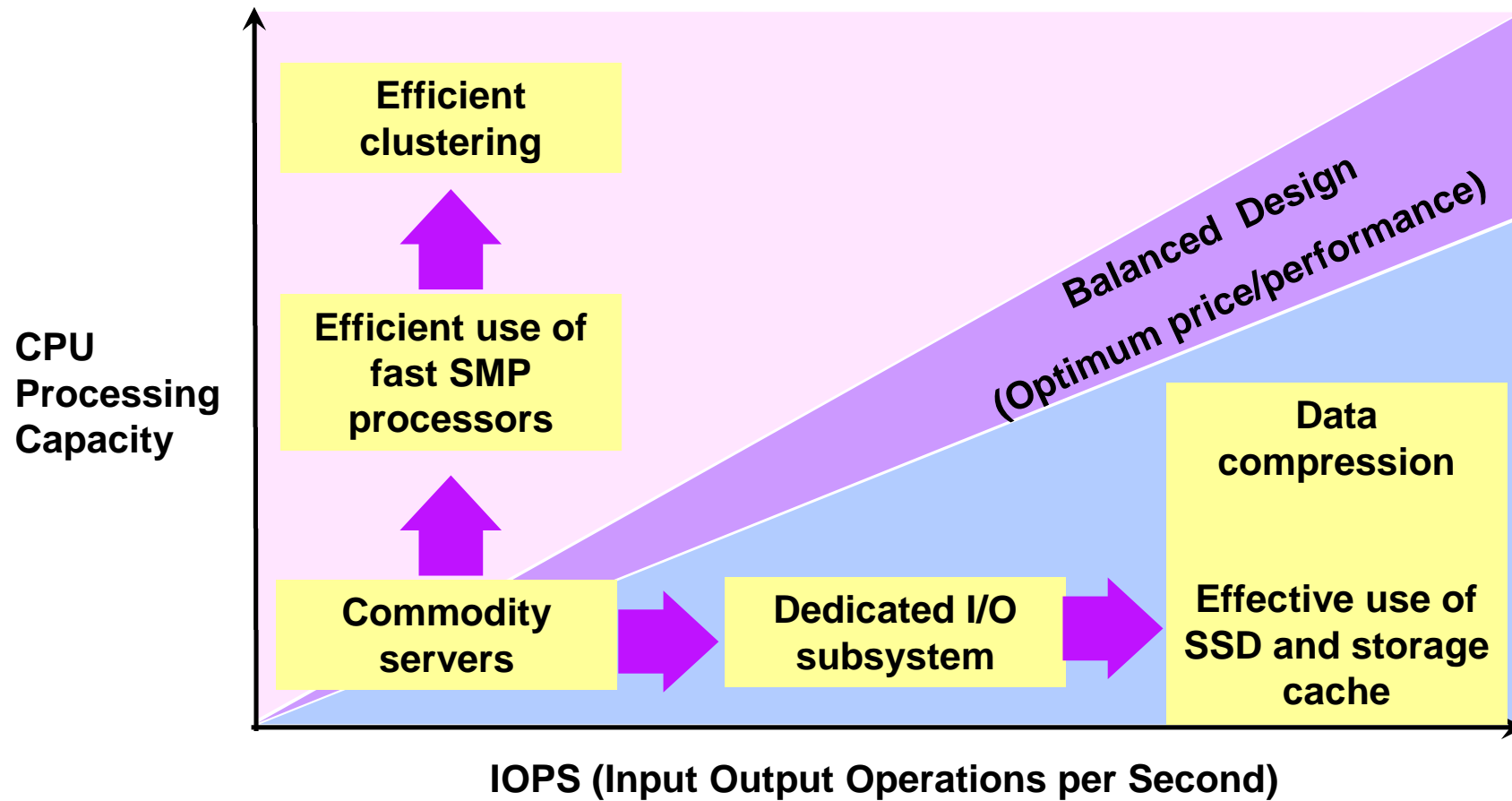
Core Business Workloads Fit Best On System z

- **System z is optimized for real-world **transaction processing** workloads**
 - ▶ DB2 on z/OS beats Oracle in price/performance

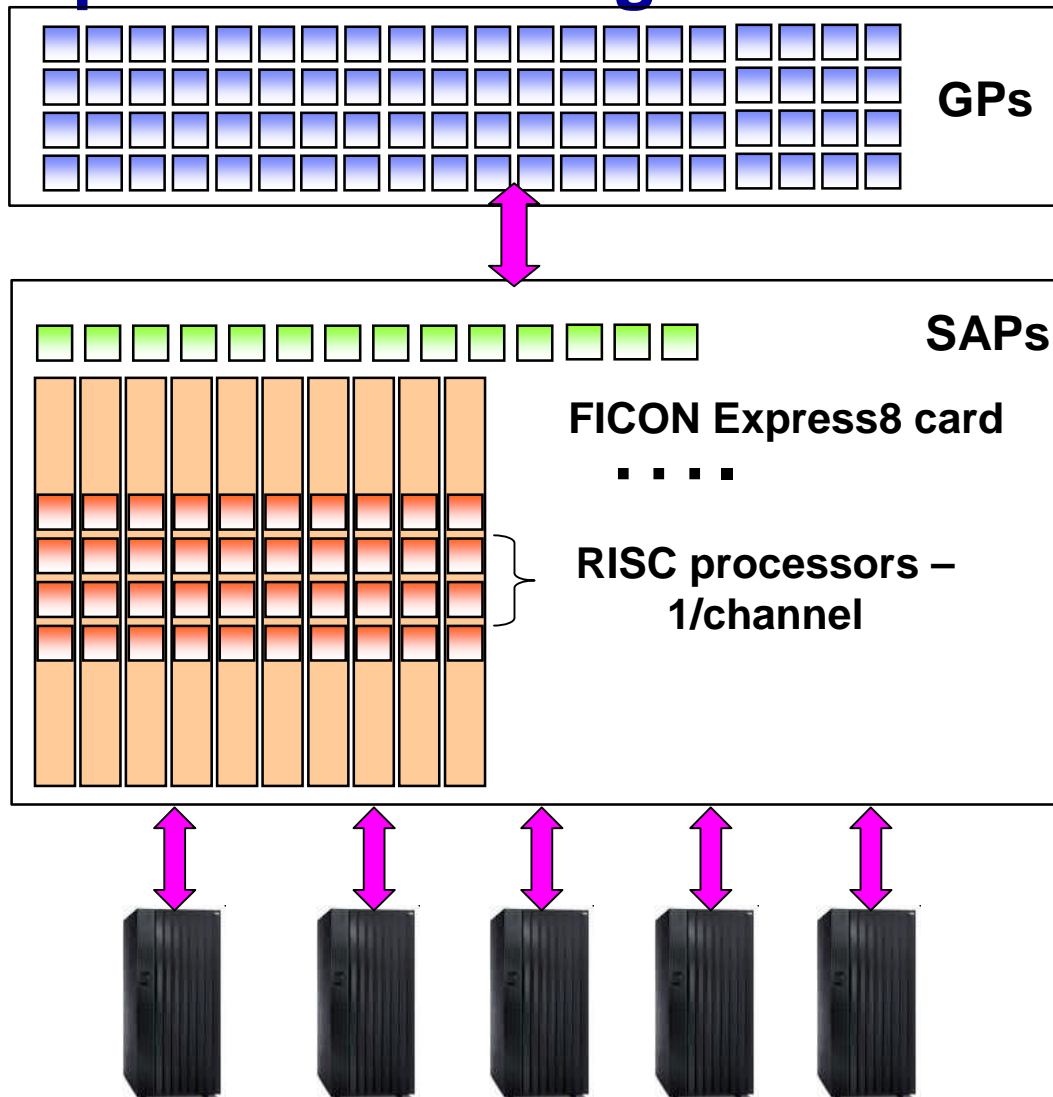
- **System z is optimized to run **multiple workloads** thereby enabling higher levels of utilization**
 - ▶ Online and batch
 - ▶ Consolidating multiple SAP Databases on z/OS beats Oracle in price/performance

- **System z is optimized to run **business analytics****
 - ▶ Co-locating data marts on z/OS reduces costs
 - ▶ IBM DB2 Analytics Accelerator (IDAA) beats competitor hands down!

System z Balances Optimization Technologies To Yield Best Performance With Most Efficiency



System z Dedicated I/O Subsystem Is Unique - Optimized For High I/O Bandwidth



- **z196 has up to 80 General Purpose (GP) or Specialty Engine processors**
 - ▶ Execute business logic

- **Up to 14 System Assist Processors (SAP) to manage I/O requests**
 - ▶ Can sustain up to **2.2M IOPS*** operations per second
- **Up to 84 physical FICON cards for I/O transfers**
 - ▶ Up to **336 RISC channel I/O processors**
 - ▶ Up to 1024 logical channels

- **IBM DS8800 Storage System**
 - ▶ Up to **440K IOPS capability**

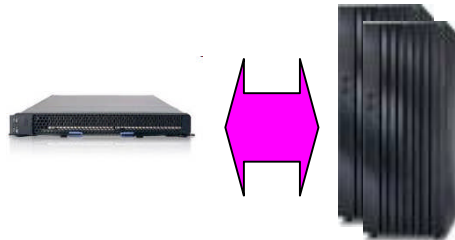
* Recommend 70% max SAP Utilization – 1.5M IOPS

Batch Sort/Merge Comparison – Demonstrates I/O Bandwidth Capacity

Intel x3550 + DS8300

12 processors

128 GB RAM



Sorting

Average CPU

89%

z/OS + DS8800

8 z196 processors

128 GB RAM



Sorting

Average CPU

72%

SORT Job: Sort a 3 GB transaction file – Repetitions: 300

Sorting Total Elapsed 28,800 secs

Bytes Per Sec **64 MB**

Sorting Total Elapsed 644 secs

Bytes Per Sec **3,072 MB**

MERGE Job: Merge 30 sorted files into a 90 GB master file – Repetitions: 10

Merging Total Elapsed 16,800 secs

Bytes Per Sec **109 MB**

Merging Total Elapsed 558 secs

Bytes Per Sec **3,543MB**

**48x
more I/O
bandwidth
than Intel**

Intel Batch window is 38x longer than z/OS

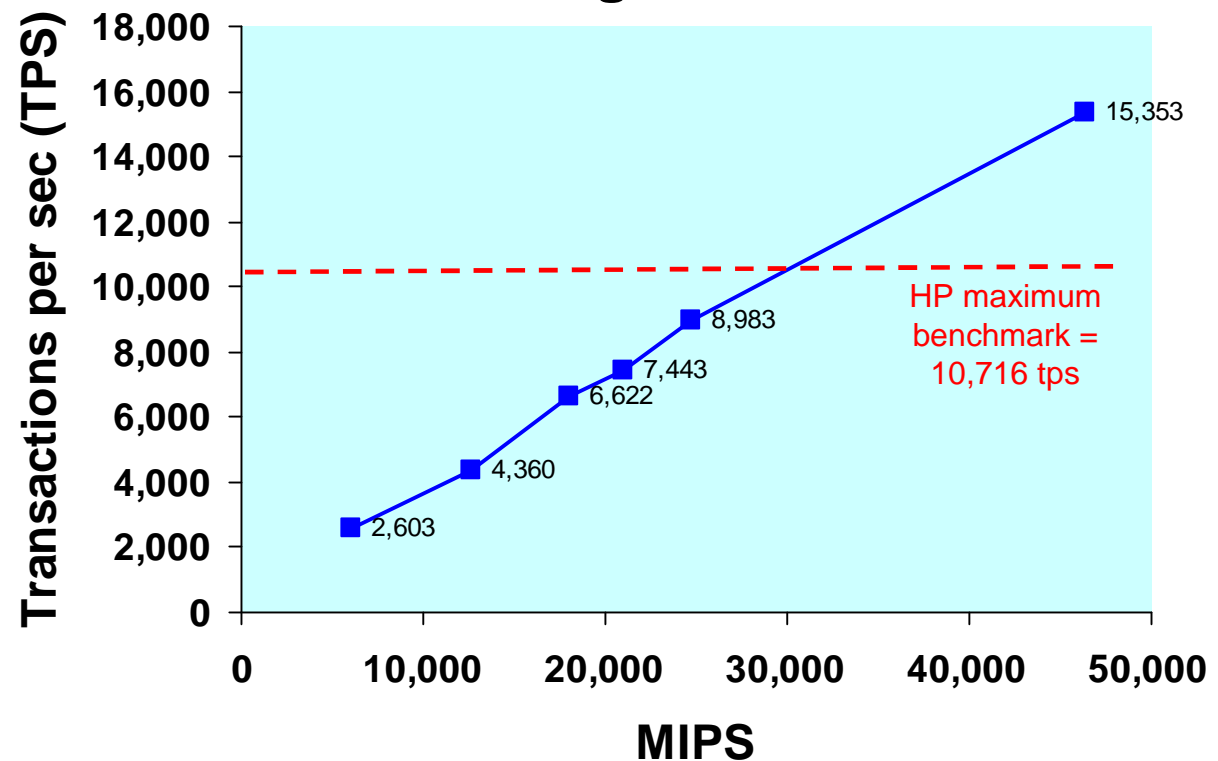
Source: IBM Internal Study. Results may vary based on customer workload profiles/characteristics.

Real-World Benchmarks Show DB2 For z/OS Delivers Better Performance Than Oracle On HP

System z and BaNCS Online Banking Benchmarks

- **Kookmin Bank**
 - ▶ **IBM System z and DB2**
 - ▶ TCS BaNCS
 - ▶ **15,353 Transactions/second**
 - ▶ **50 Million Accounts**
 - ▶ IBM benchmark for customer
 - ▶ DB2 V9, CICS 3.1, z/OS V1.8

- **State Bank of India¹**
 - ▶ **HP Superdome**
 - ▶ TCS BaNCS
 - ▶ **10,716 Transactions/second**
 - ▶ **500 Million Accounts**
 - ▶ Largest banking benchmark performance claimed by HP



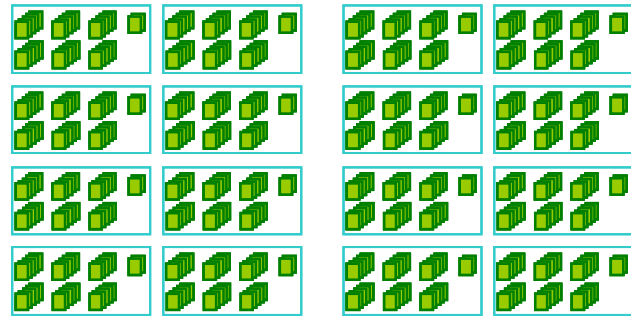
¹ Source: <http://www.enterprisenetworksandservers.com/monthly/art.php?2976> and *InfoSizing FNS BANCS Scalability on IBM System z*
 – Report Date: September 20, 2006; Clement Report; <http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA1-4027ENW.pdf> Feb 2010

Compare The Cores Needed To Achieve Equivalent Throughput (10,716 tps)

Development and Test processors included

BaNCs Application Servers:

16x HP Superdome (16ch/32co)



49 processors
(41 GPs + 8 zIIPs)
(39,112 MIPS)

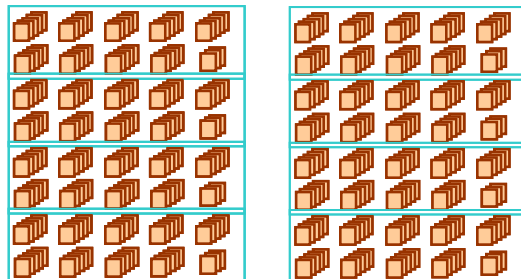
TCS BaNCs
1x z196-741
with 8 zIIPs



896 processors

BaNCs Database Servers:

8x HP Superdome (24ch/48co)



(3,668,600 PerfUnits)

Hardware \$98.2M

Software \$78.2M

Power \$1.5M

Space \$1.1M

Hardware \$64.2M

Software \$45.6M

Power \$0.13M

Space \$0.08M

Total (5yr TCA) **\$180M**

Total (5yr TCA) **\$110M**

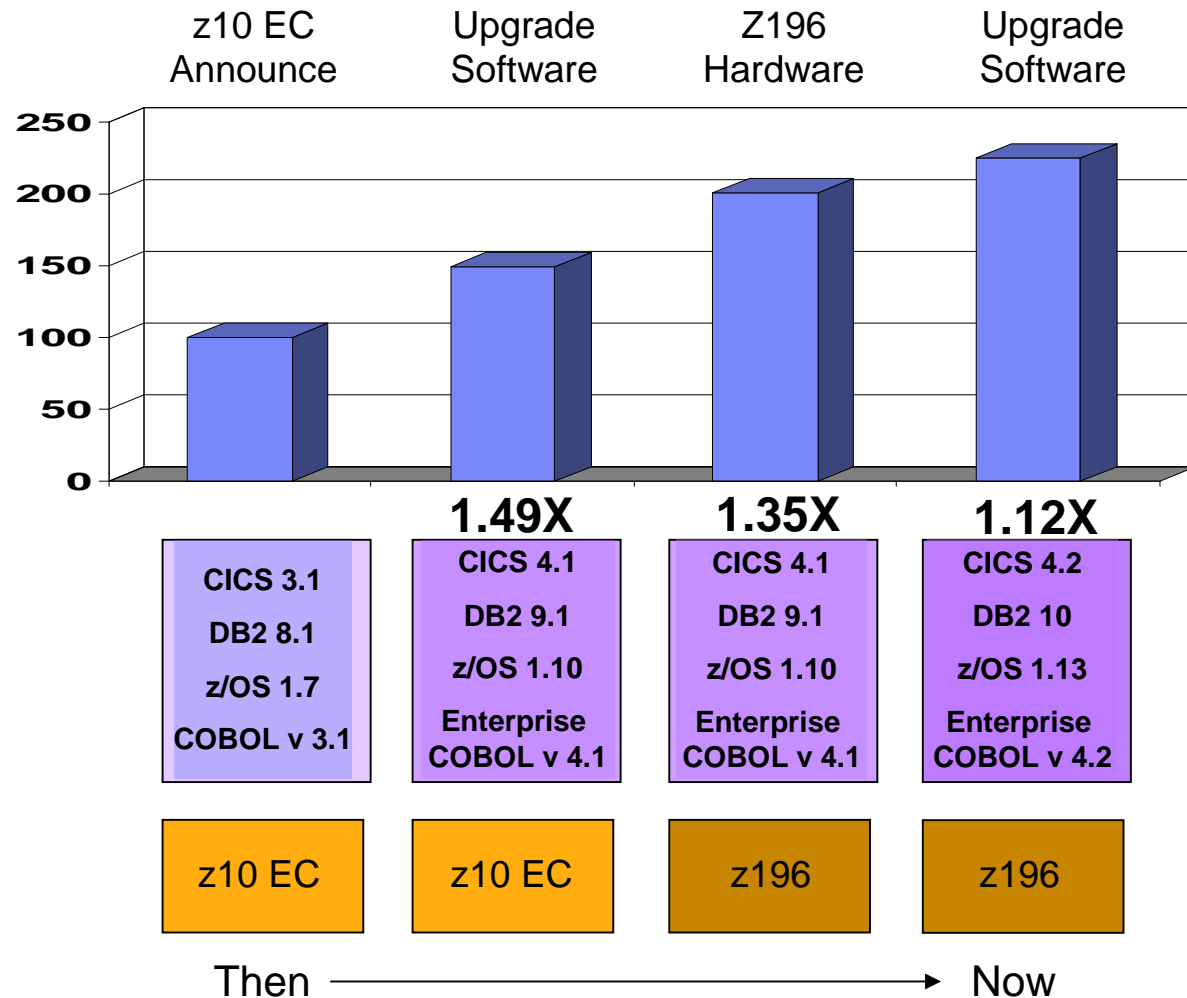
NOTE: To cover DEV/QA capacity, add 100% servers for distributed servers, add 25% MIPS (8,000) to System z

Constant Optimizations - CICS/DB2 From Then To Now

Continued investment in optimization of key z/OS software

1. Upgraded CICS/DB2 stack produces 1.49x performance improvement
2. Move to z196 hardware produces 1.35x performance improvement
3. Upgrade to latest software produces 1.12x improvement
4. Combined hardware and software updates – **2.25x** performance improvement

Results may vary

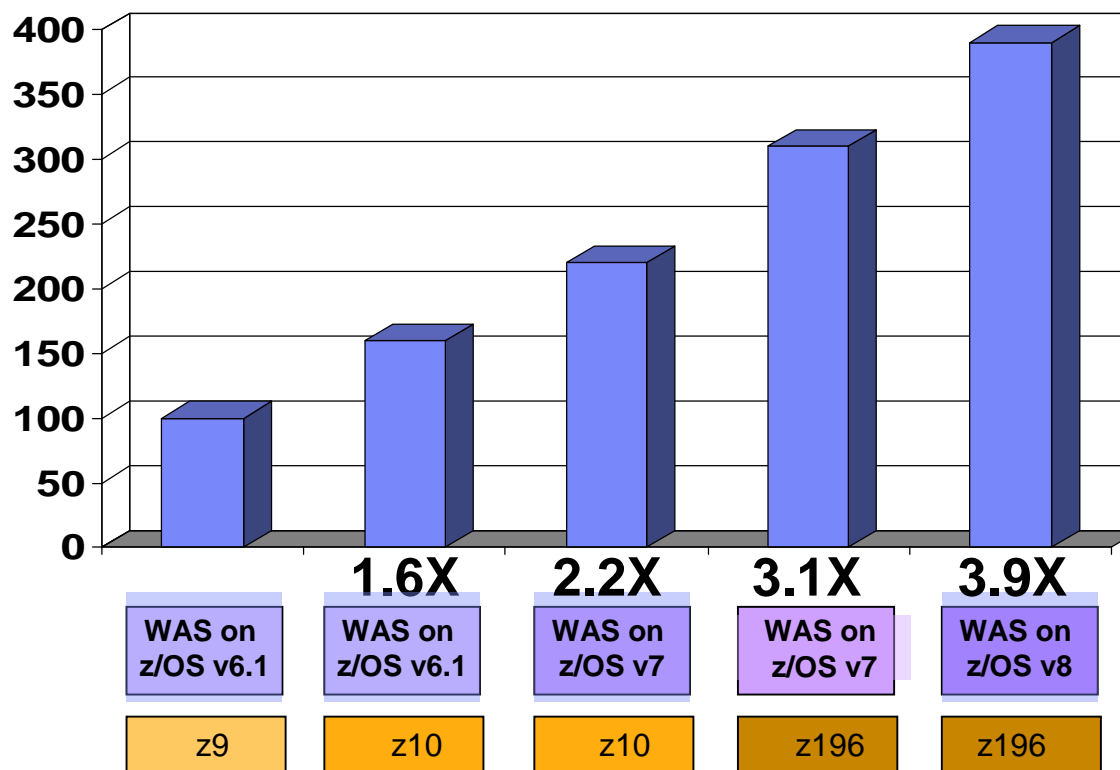


Constant Optimizations – WebSphere On z/OS From Then To Now

- Steady improvements to hardware and software means WAS on z/OS now yields almost 4x more performance than just 6 years ago

- Additional 20-30% performance improvement anticipated with z/OS-Liberty (2012)

NEW!



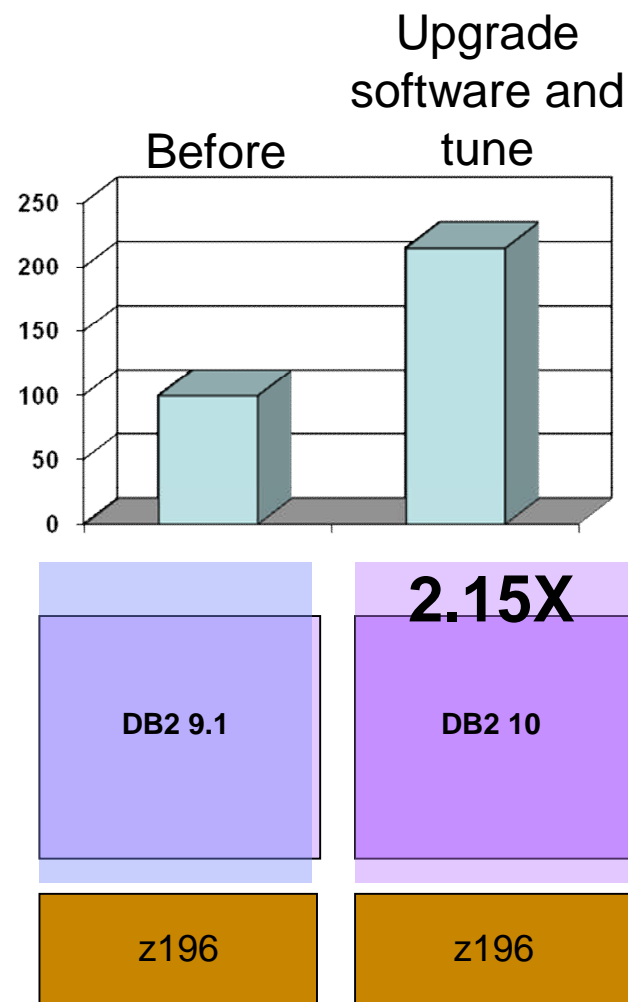
Currency And Tuning Can Minimize Costs On z/OS

■ US Financial Company doubles performance after upgrading to DB2 10 and tuning

- ▶ Tests showed **2.15x** boost in performance of business intelligence queries

■ Performed tuning such as computing additional indexes, collecting additional statistics and pre-computing global Temp tables

■ Lower utilization reduces cost

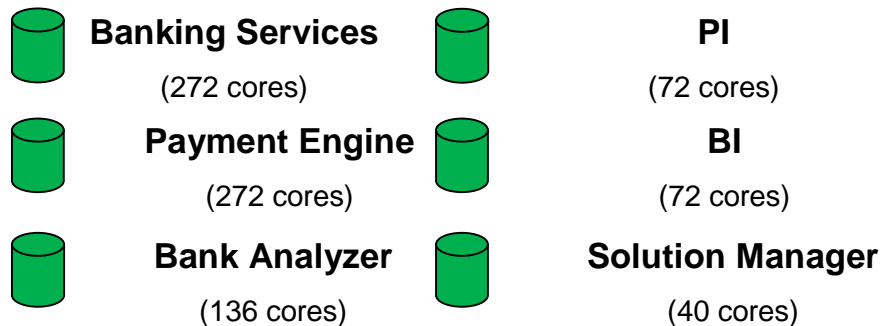


Results may vary

European Bank Study – Consolidating SAP On DB2 With Solution Edition

Six SAP databases, Oracle on Intel

2 x 100% Production and Pre-production with active/passive failover; 18% Dev/QA, no failover



30 x HP DL Servers X7560 2.27GHz with Oracle

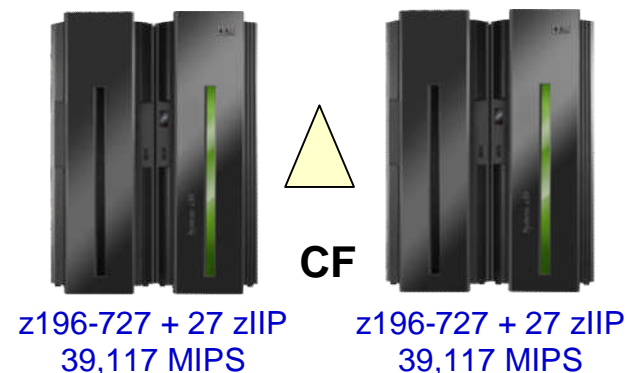
864 cores

Total (5yr TCA) \$97.2M

Hardware	\$3,097,858
Software	\$92,908,752
Networking	\$1,185,000

Multi-Tenancy, DB2 on z/OS

Consolidated Databases DB2 for z/OS Sysplex
100% Production, 33% Pre-Production, 18% Dev/QA



108 cores

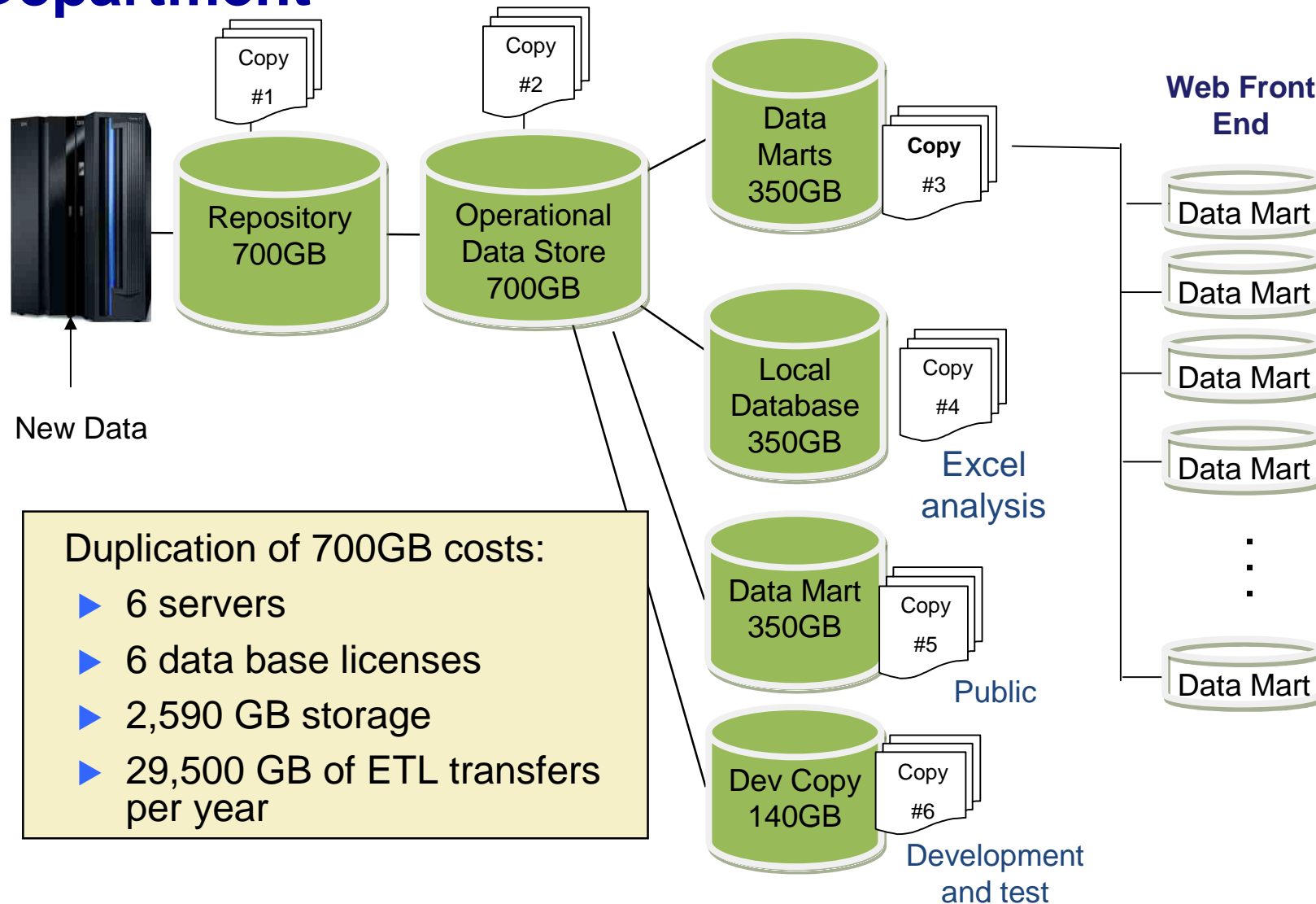
88% less

Total (5yr TCA) \$11.8M

Hardware & Software (Solution Edition SAP)	\$11,699,122
Networking	\$79,000

6 SAP DB Instances with total Prod. DB QuickSizer SAPS = 177,000 consolidated into DB2 z/OS (multi-tenancy), Performance Equivalence = 64, US Prices with System z Solution Edition for SAP DB and List Prices for Oracle SW & HP HW. Does not include cost of SAP software.

Data Mart Proliferation At A Local Government Department



IBM Smart Analytics System 9700 For Cost-effective Business Analytics

New!

- A comprehensive business analytics solution for System z

- Hardware and OS

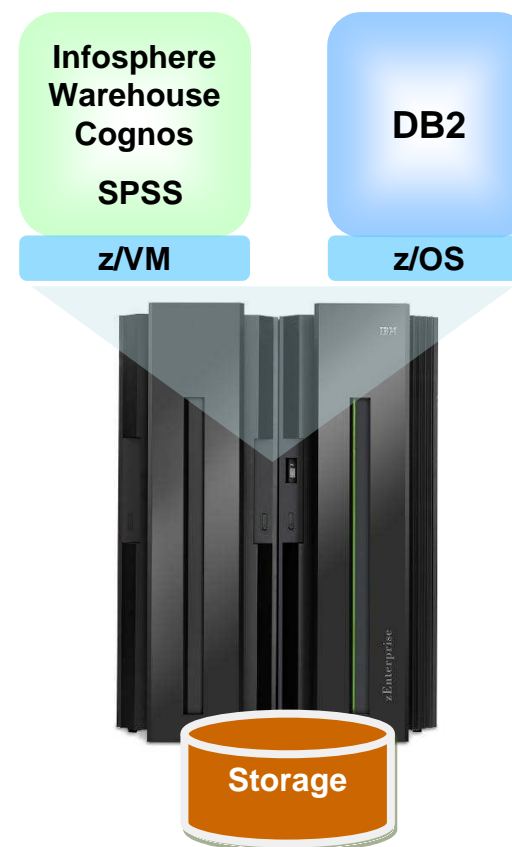
- ▶ IBM zEnterprise z196 technology
- ▶ IBM System Storage DS8800 Intelligent Disk controller
- ▶ z/OS 1.12

- Business Analytic Software

- ▶ DB2 10 for z/OS
- ▶ Cognos 10 BI
- ▶ InfoSphere Warehouse
- ▶ SPSS Modeler

- Optional Components

- ▶ Solid State drives integrated in DS8800
- ▶ IBM DB2 Analytics Accelerator



Optional SSD drives

Optional Analytics Accelerator

Add IBM DB2 Analytics Accelerator For Even Better Performance

Customer experience - queries run significantly faster with IBM DB2 Analytics

New!



Query	DB2 (Secs)	DB2 + IDAA (Secs)	Speed Up	Rows Reviewed	Rows Returned
Query 1	9,540	5	1,908x	2,813,571	853,320
Query 2	8,220	5	1,644x	2,813,571	585,780
Query 3	4,560	6	760x	8,260,214	274
Query 4	4,080	5	816x	2,813,571	601,197
Query 5	4,080	70	58x	3,422,765	508
Query 6	3,180	6	530x	4,290,648	165
Query 7	3,120	4	780x	361,521	58,236
Query 8	2,640	2	1,320x	342,529	724
Query 9	2,520	193	13x	4,130,107	137

“We had this up and running in days with queries that ran over 1000 times faster”

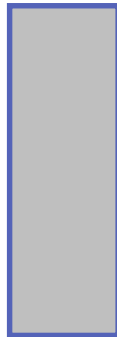
“We expect ROI in less than 4 months”

Actual customer results, October 2011

Compare Cost Of Standalone Data Mart To Incremental Cost Of Consolidating On System z

Standalone Competitor

Quarter Rack



Unit Cost (3yr TCA) \$97/RpH

Reports/Hour (RpH)	29,572
Competitor ¼ Rack (HW+SW+Storage)	\$2,857,500

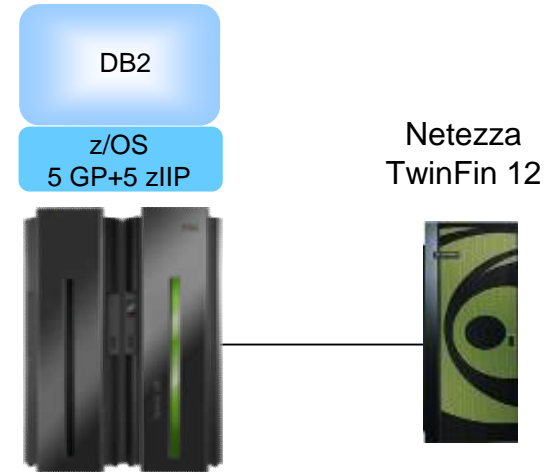
IBM Smart Analytics System 9700



Unit Cost (3yr TCA) \$62/RpH

Reports/Hour (RpH)	57,904
IBM Smart Analytics System 9700 24-cores (HW+SW+Storage)	\$3,600,000

IBM Smart Analytics System 9700 + IDAA



Unit Cost (3yr TCA) \$24/RpH

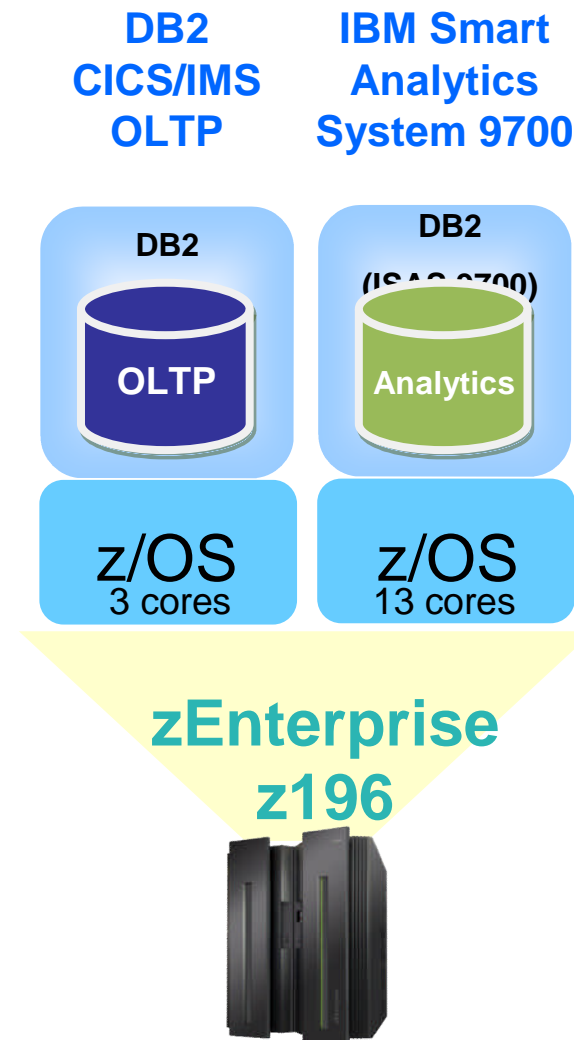
Reports/Hour (RpH)	154,893
IBM Smart Analytics System 9700 10-cores (HW+SW+Storage)	\$1,500,000
IDAA (HW+SW+Storage)	\$2,140,600

Source: Customer Study running 161,166 concurrent operational reports. Intermediate/Complex Reports offloaded to IDAA for serial execution. Results may vary based on customer workload profiles/characteristics.

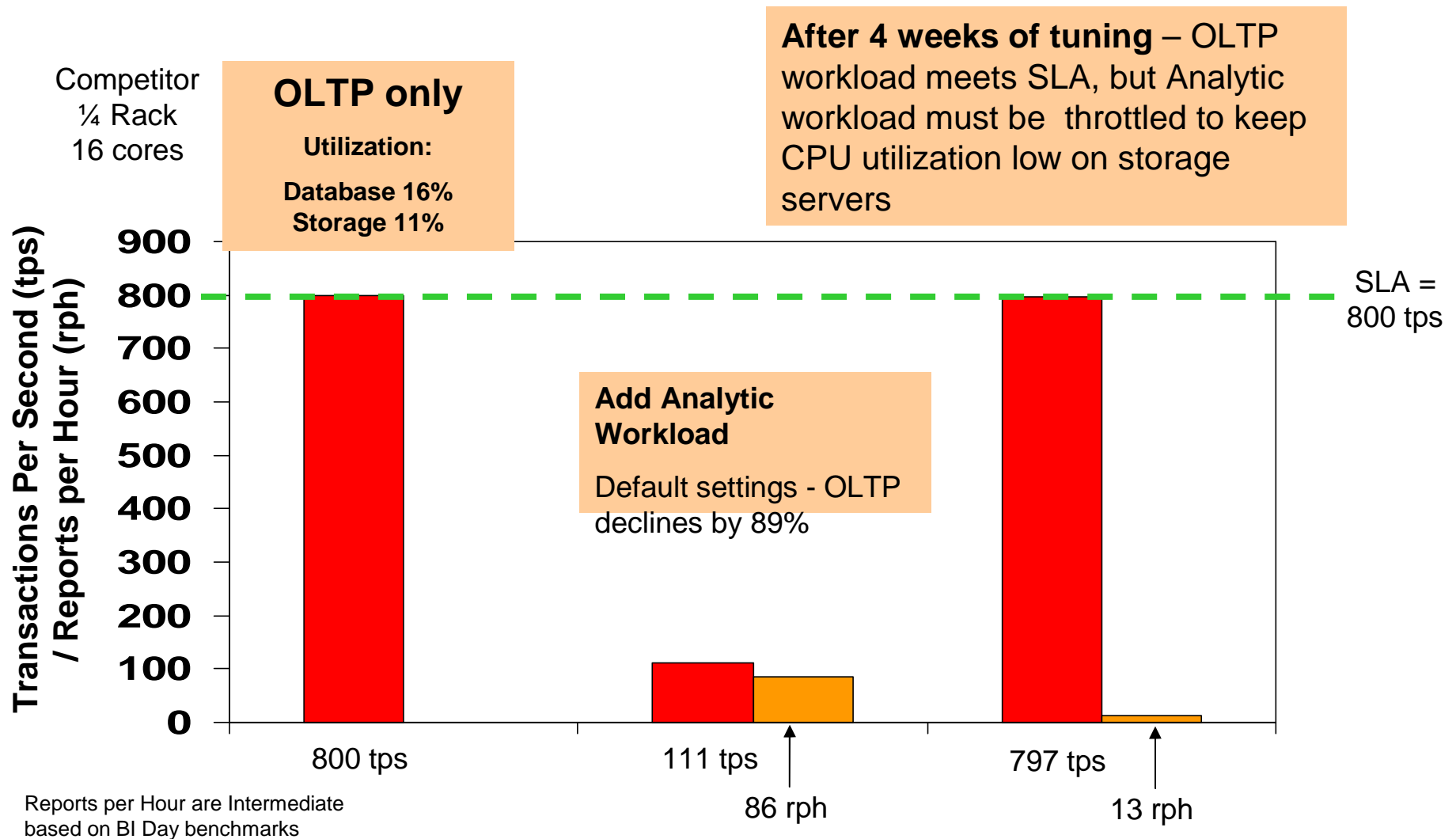
**5x performance
at ¼ the cost!**

System z Workload Management Can Mix OLTP And Analytics On The Same Platform

- Add new business analytic workload to a System z196
 - ▶ Has 3 cores assigned
 - ▶ Service level agreement must be maintained at 800 tps
- Add new business analytic workload in a separate LPAR
 - ▶ Assign additional 12 cores to LPAR
- Execute simultaneously while maintaining OLTP service level
- z196 optimized workload management avoids OLTP degradation

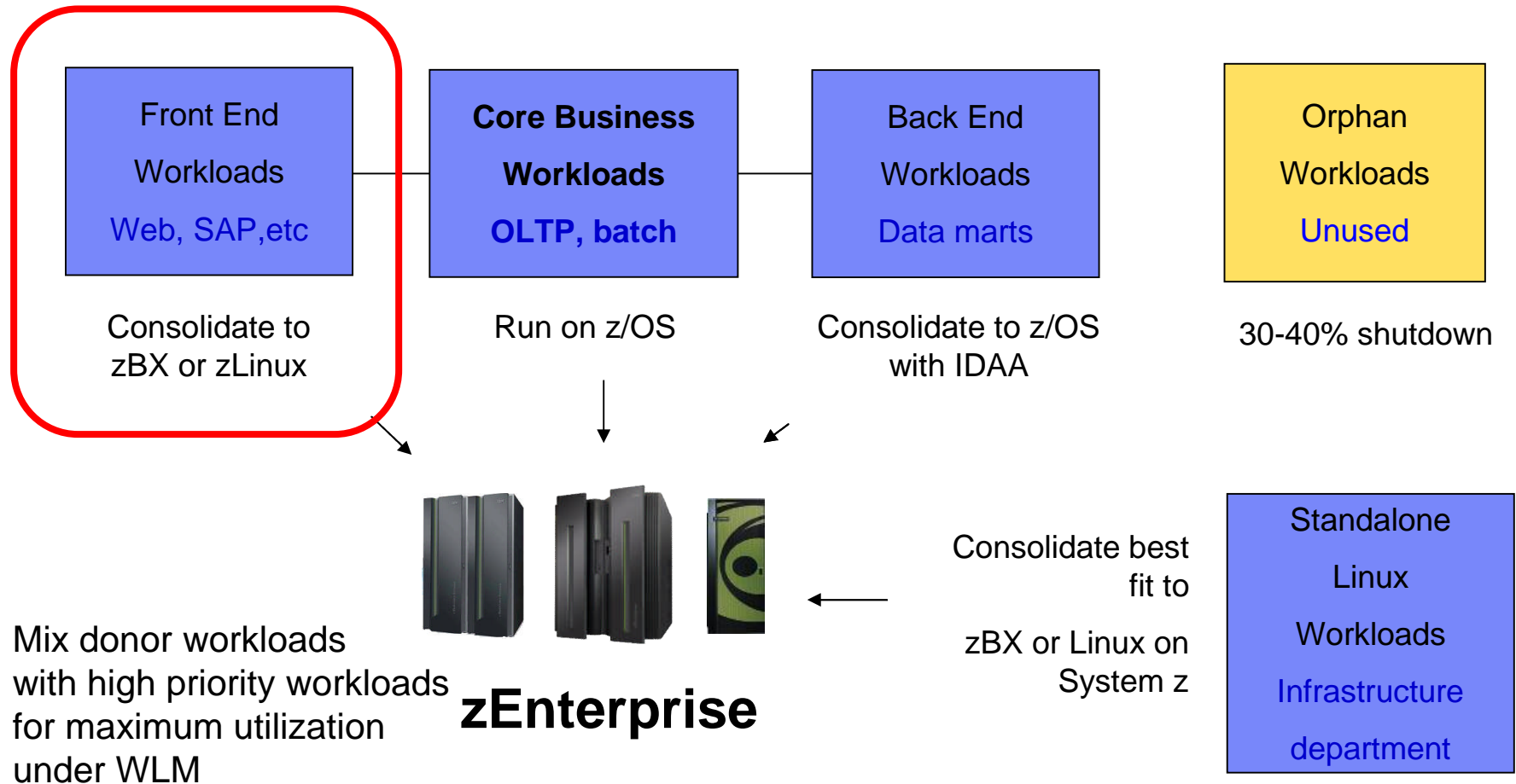


Competitor's Platform Fails To Effectively Manage Mixed OLTP And Analytics Workloads



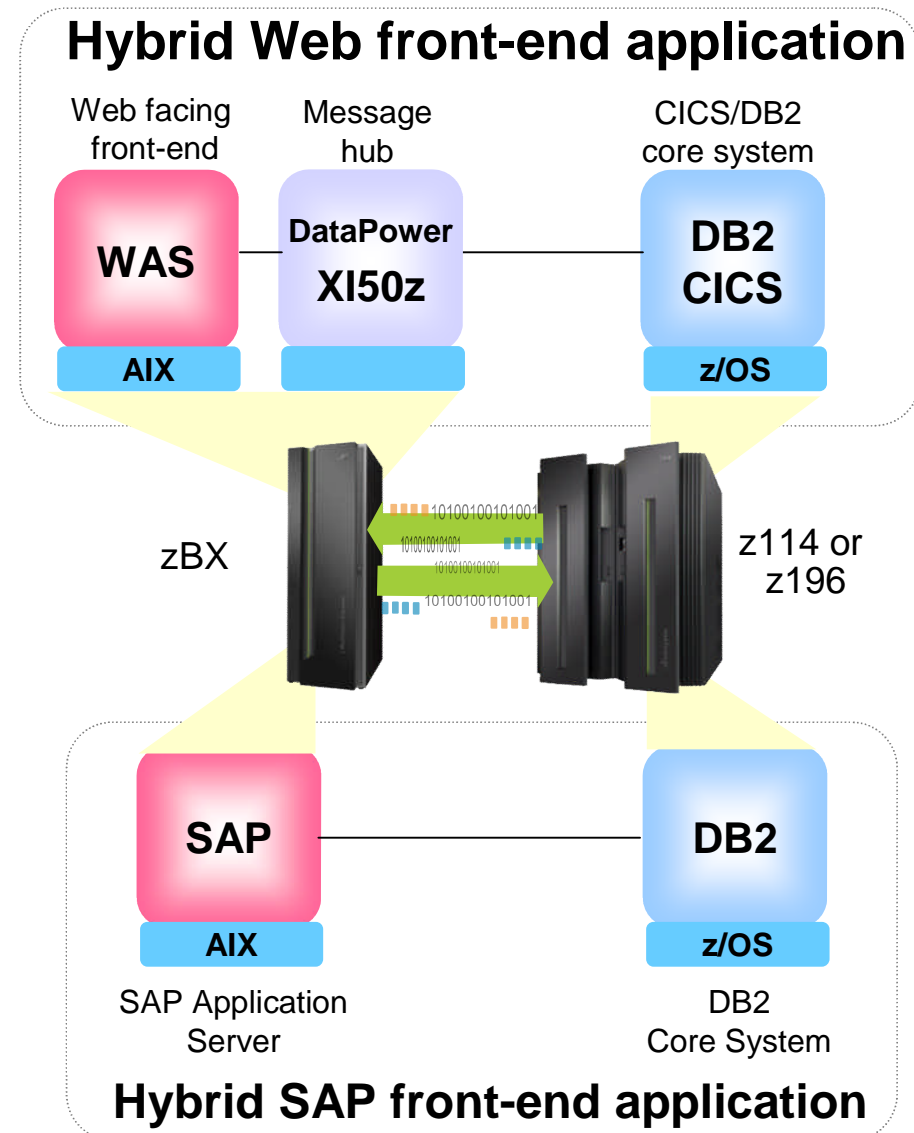
How To Make The Best Use Of System z To Reduce Costs

■ Survey workloads for best assignments



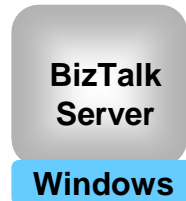
Consolidate Multi-tier Hybrid Workloads On zEnterprise Platform

- DB2 and CICS core systems are already best fit on z/OS
- Assign front end components to zBX blades and optimizers according to best fit strategy
 - ▶ Utilize virtualization for workload isolation
 - ▶ Manage as ensemble of virtual servers with service goals
 - ▶ Utilize embedded secure data network
- Mission critical qualities of service extended to hybrid environments



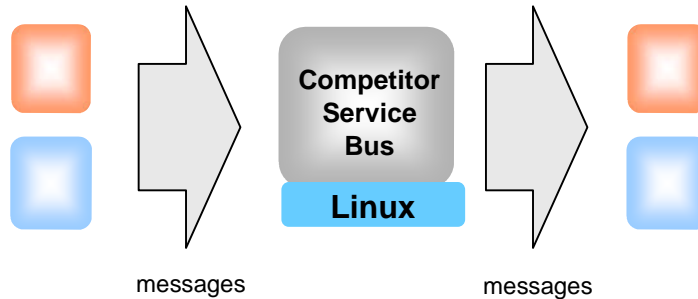
Purpose-Built DataPower XI50z Appliance Delivers Stunning Price/Performance

*Enterprise
Service Bus
comparison*



Microsoft BizTalk Server
Windows on Intel Server
4 sockets, 32 cores
128 GB

492 messages
per sec
\$764 per mps



Competitor Service Bus
Linux on HP DL380
2 sockets, 12 cores
128 GB

5,839 messages
per sec
\$120 per mps

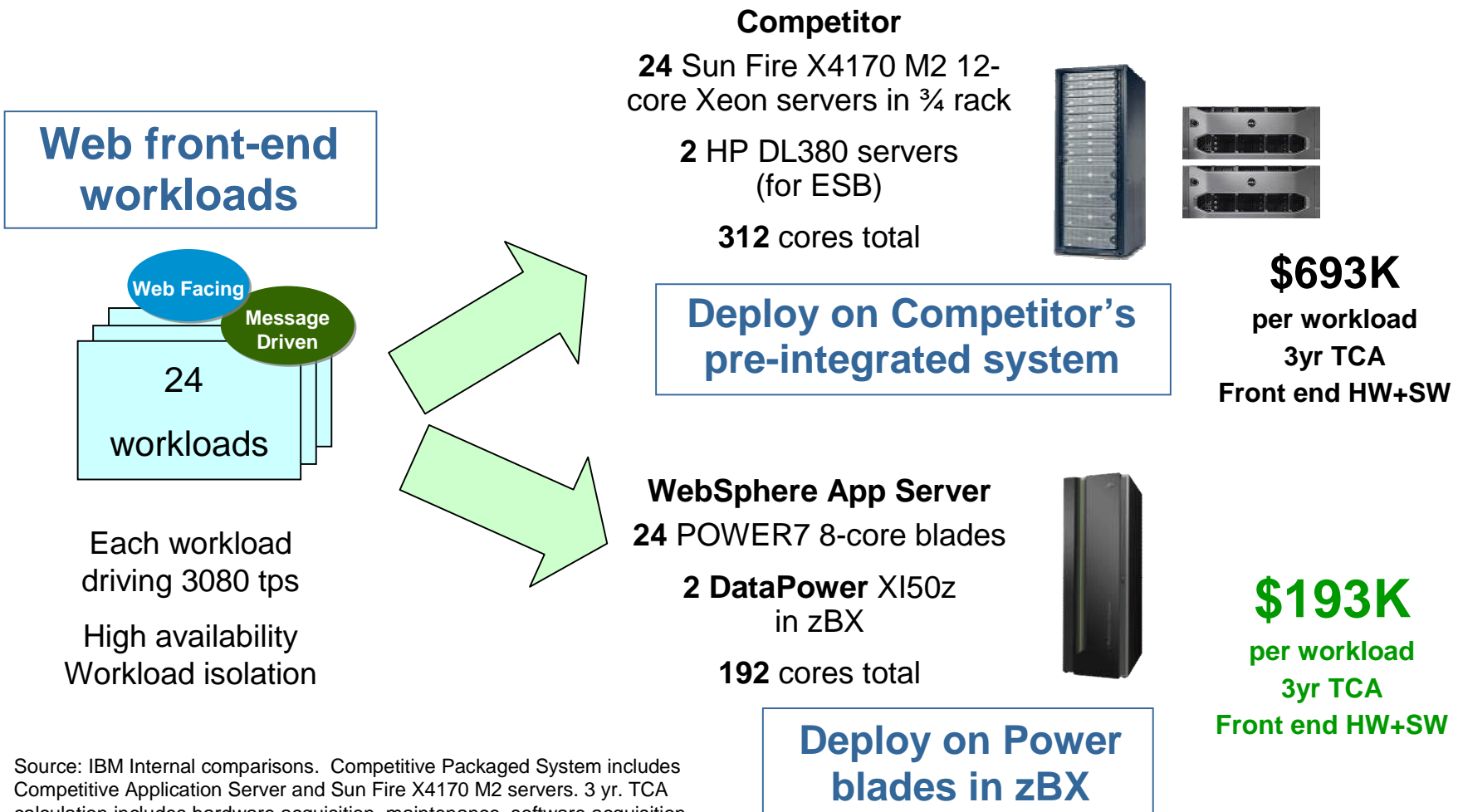


**DataPower
XI50z in zBX**

5,117 messages
per sec
\$52 per mps

Tests consists of measuring maximum throughput of ESB while performing a variety of message mediation workloads: pass-through, routing, transformation, and schema validation

Web Front Ends Cost Less On zBX



Source: IBM Internal comparisons. Competitive Packaged System includes Competitive Application Server and Sun Fire X4170 M2 servers. 3 yr. TCA calculation includes hardware acquisition, maintenance, software acquisition and S&S. US list prices. Prices may vary by country.

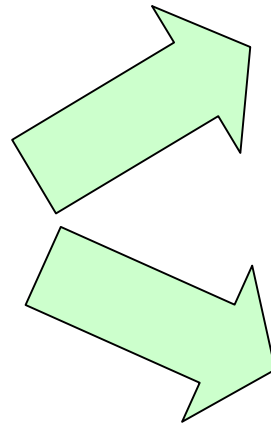
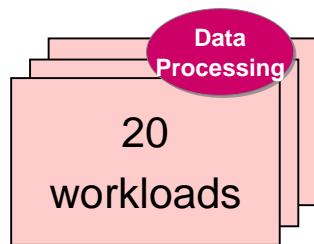
SAP Applications Cost Less On zBX

SAP applications on older SPARC T2+ servers

34 Sun T4-1 blades in Sun rack
272 cores total



\$58K
per workload
3yr TCA
Front end HW+SW



Upgrade to new SPARC T4 hardware

23 POWER7 blades in zBX
184 cores total



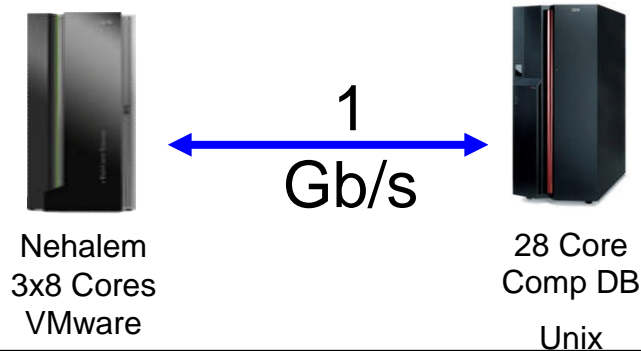
\$44K
per workload
3yr TCA
Front end HW+SW

Consolidate on zEnterprise

Source: IBM Internal sizing comparisons for SAP. 3 yr. TCA calculation includes hardware acquisition, maintenance, software acquisition and S&S. US list prices. Prices may vary by country.

European Utility Company - SAP Comparisons Show zEnterprise Beats Intel

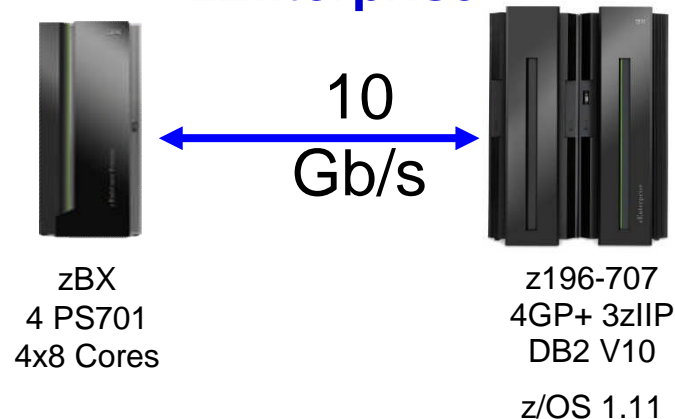
x Blades / Competitor DB on Unix



Unit Cost (3yr TCA) \$16.15/BPH

Hardware	\$1,537,822
Software	\$1,689,348
Bills/Hour (BPH)	200K

zEnterprise



71% less

Unit Cost (3yr TCA) \$4.59/BPH

Hardware	\$844,432
Software	\$352,536
Bills/Hour (BPH)	261K

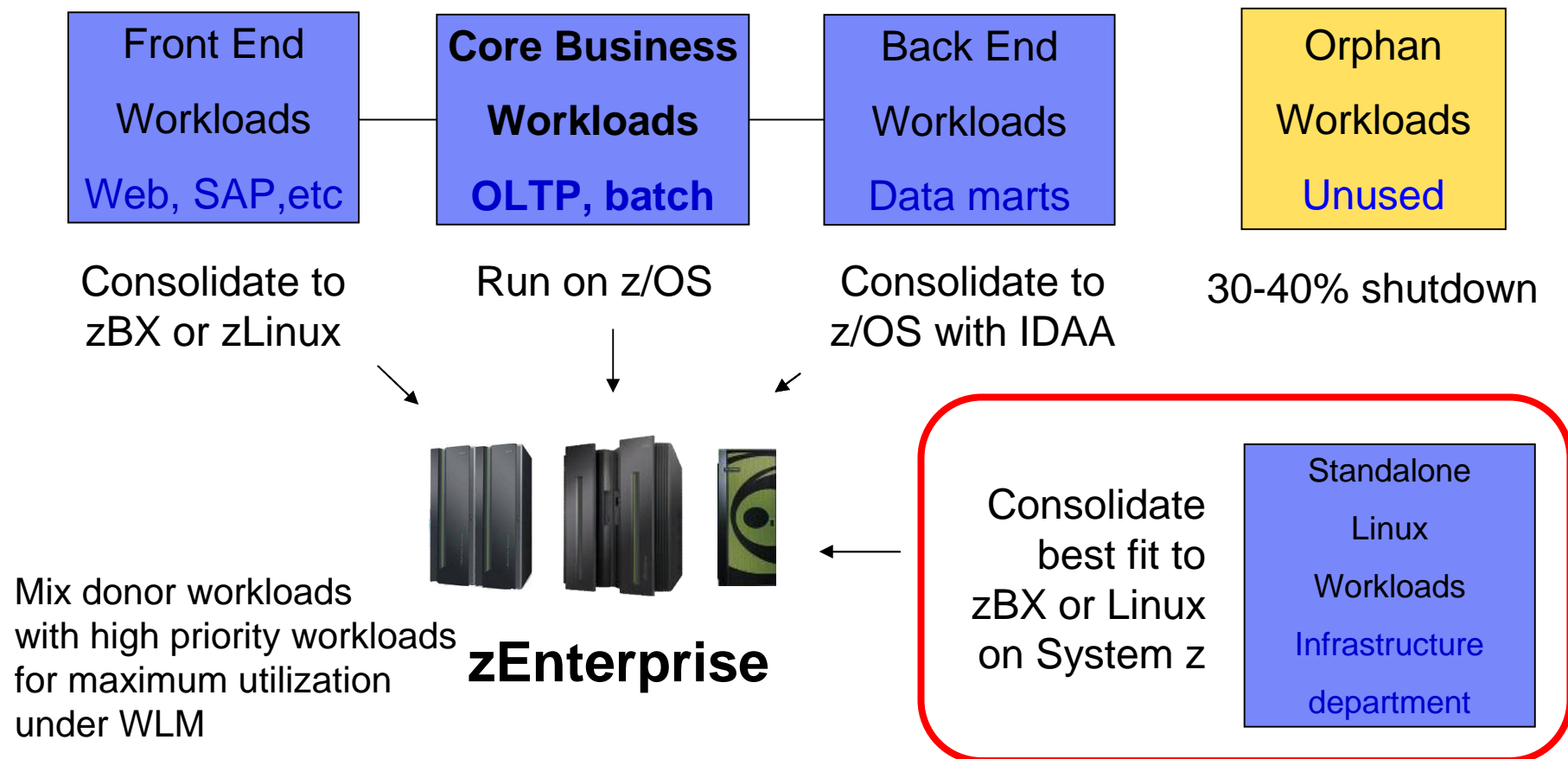
SAP Applications

SAP Database

Based on customer data. 3Yr TCA calculation includes hardware acquisition, maintenance, application and database software acquisition and S&S. U.S. list prices prices, prices will vary by country. Cost of packaged application (SAP) not included.

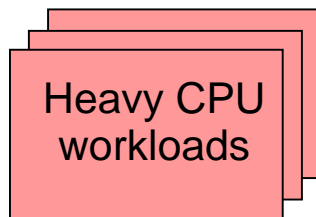
How To Make The Best Use Of System z To Reduce Costs

■ Survey workloads for best assignments



Assigning Standalone Workloads With Heavy CPU Requirements

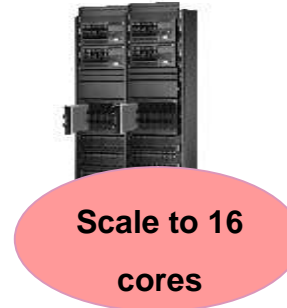
Use case to determine which platform provides the lowest TCA over 3 years



- IBM WebSphere ND
- Monitoring software
- On 8 core Nehalem servers

Online banking workloads, each driving **460** transactions per second with light I/O

2 workloads per Intel blade



Virtualized on Intel
16 core HX5 Blade
\$200,055 per workload
Best Fit

1 workload per POWER7 blade



PowerVM on PS701
8 core POWER7 Blade
\$216,658 per workload

10 workloads per 32-way z/VM

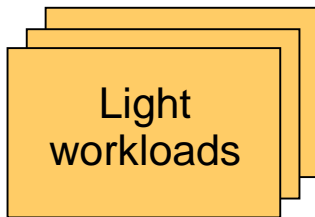


z/VM on z196 CPC
32 IFLs
\$328,477 per workload

Consolidation ratios derived from IBM internal studies. HX5 2.13GHz 2ch/16co performance projected from x3550 2.66GHz 2ch/12co measurements. zBX with x blades is a statement of direction only. Results may vary based on customer workload profiles/characteristics. Prices will vary by country.

Assigning Standalone Workloads With Light CPU Requirements

Use case to determine which platform provides the lowest TCA over 3 years



- IBM WebSphere ND
- Monitoring software
- On 4 core “older” Intel

Online banking workloads, each driving **22** transactions per second with light I/O

Consolidation ratios derived from IBM internal studies. HX5 2.13GHz 2ch/16co performance projected from x3550 2.66GHz 2ch/12co measurements. zBX with x blades is a statement of direction only. Results may vary based on customer workload profiles/characteristics. Prices will vary by country.

47 workloads per Intel blade



Virtualized on Intel
16 core HX5 Blade
\$8,165 per workload

28 workload per POWER7 blade



Fast low cost threads

PowerVM on PS701
8 core POWER7 Blade
\$7,738 per workload
Best Fit

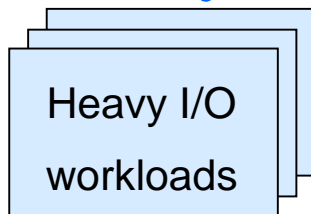
155 workloads per 32-way z/VM



z/VM on z196 CPC
32 IFLs
\$21,192 per workload

Standalone Workloads With Heavy I/O Requirements Are Best Fit On Linux On z/VM

Use case to determine which platform provides the lowest TCA over 3 years



- IBM WebSphere ND
- Monitoring software
- On 4 core "Older" Intel

Online banking workloads, each driving **22 transactions per second**, with **1 MB I/O per transaction**

Consolidation ratios derived from IBM internal studies. HX5 2.13GHz 2ch/16co performance projected from x3550 2.66GHz 2ch/12co measurements. zBX with x blades is a statement of direction only. Results may vary based on customer workload profiles/characteristics. Prices will vary by country.

1 workload per Intel blade



Virtualized on Intel
16 core HX5 Blade
\$400,109 per workload

1 workload per POWER7 blade



PowerVM on PS701
8 core POWER7 Blade
\$216,658 per workload

40 workloads per 32-way z/VM



z/VM on z196 CPC
32 IFLs
\$82,119 per workload

I/O bandwidth large scale pool

Best Fit

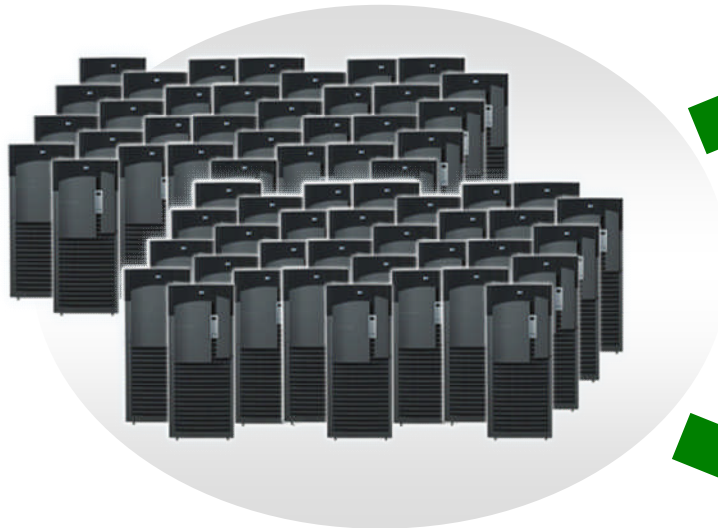
Linux On z/VM Also Offers Quality Of Service Advantages

- **Utilize System z dedicated I/O subsystem for high bandwidth workloads**
- **Inherit System z qualities of service for reliability, availability, and serviceability**
- **Add physical processors to Linux environment without disruption via capacity on demand**
- **Systematic site failover for disaster recovery**
- **New z/VM clusters enable virtual server mobility**
- **z/VM capacity to maintain thousands of guest images enables “standby virtual machine” strategy**

Internal IBM Project Consolidates Thousands Of Unix/Intel Servers On Linux For System z

2007

~15,000 distributed servers in data centers worldwide



Today

~3,900 servers consolidated on 30 fully-configured mainframes running Linux

z10 = 130:1; z196 = 200:1



Servers also virtualized on larger Power and System x servers

Power 5 = 65:1
Power 7 = 130:1
System x = 15:1



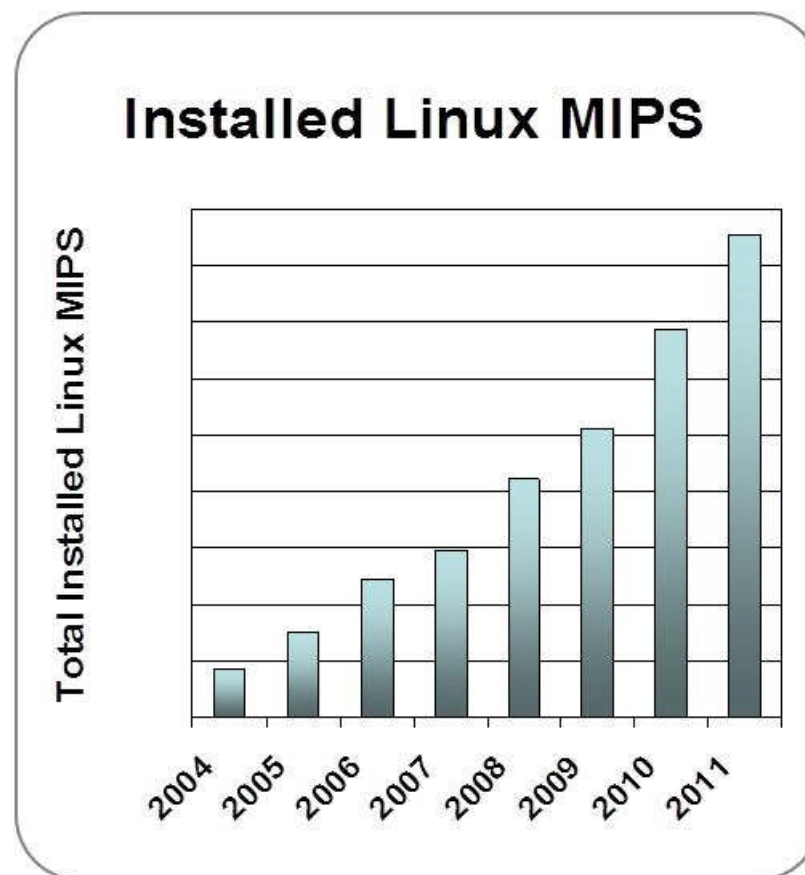
42% discovered to be unneeded and discarded outright



- Over 5,700 servers consolidated to date
- Average utilization up from <10% to 60%
- Administrator efficiency increased by 3.3x
- System z Linux relative operating costs less than 50% of distributed servers

Installed MIPS For Linux On z/VM Are Growing At 39% CAGR

- Linux is 20% of the System z customer install base (MIPS)
- 66 of the top 100 System z clients are running Linux on the mainframe
- More than 3,000 applications available for Linux on System z



zManager Provides Consistent Structured Management For All Virtual Environments

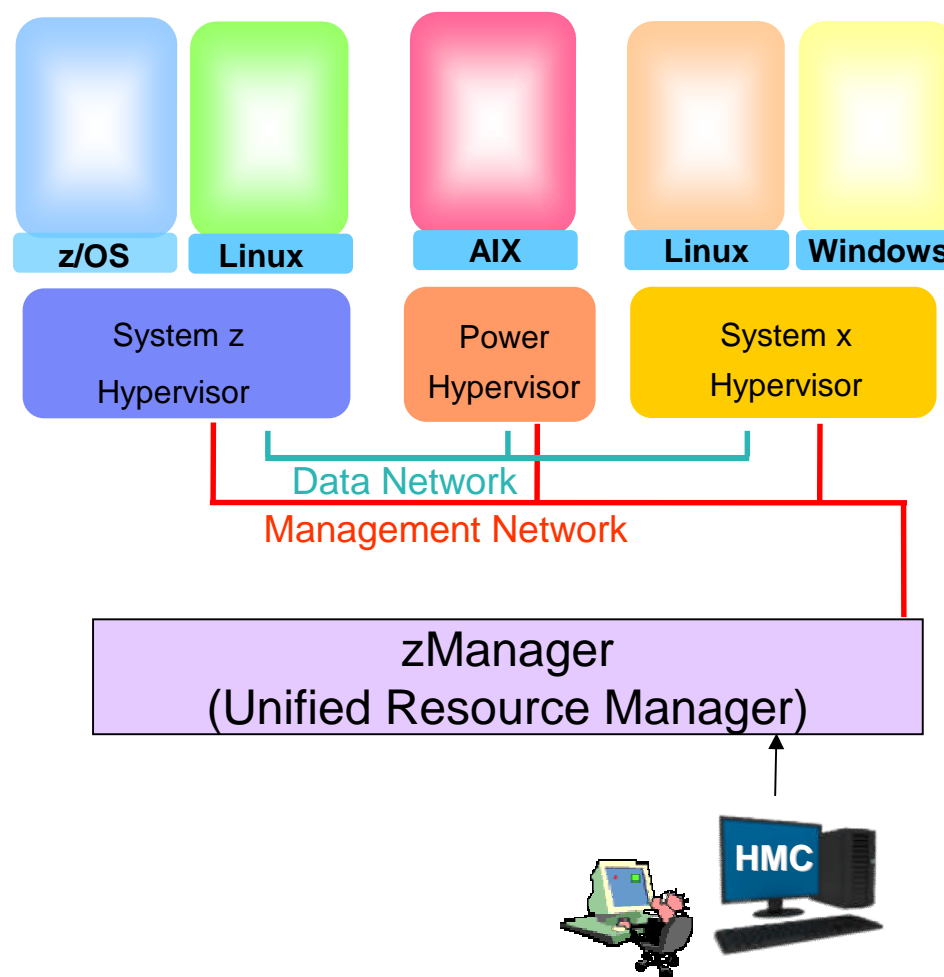
■ Manage machine resources from single focal point

- ▶ Add processors to z114 / z196 while running
- ▶ Add and configure a blade to zBX while running
- ▶ Create virtual machines and networks quickly
- ▶ Runs in service element

■ Virtual machine lifecycle management

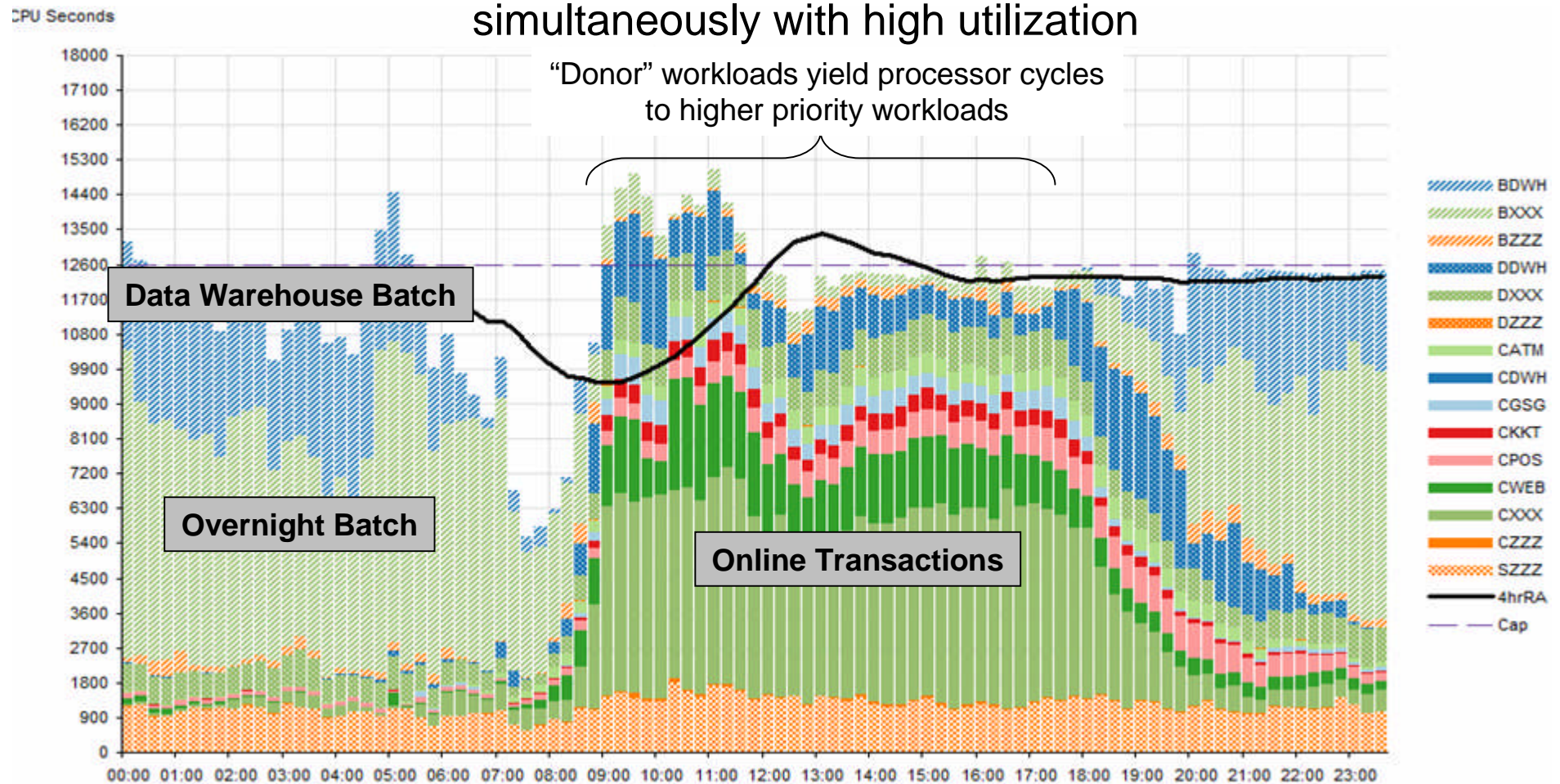
- ▶ Create, monitor, optimize, destroy

■ Automated functions reduce time and labor



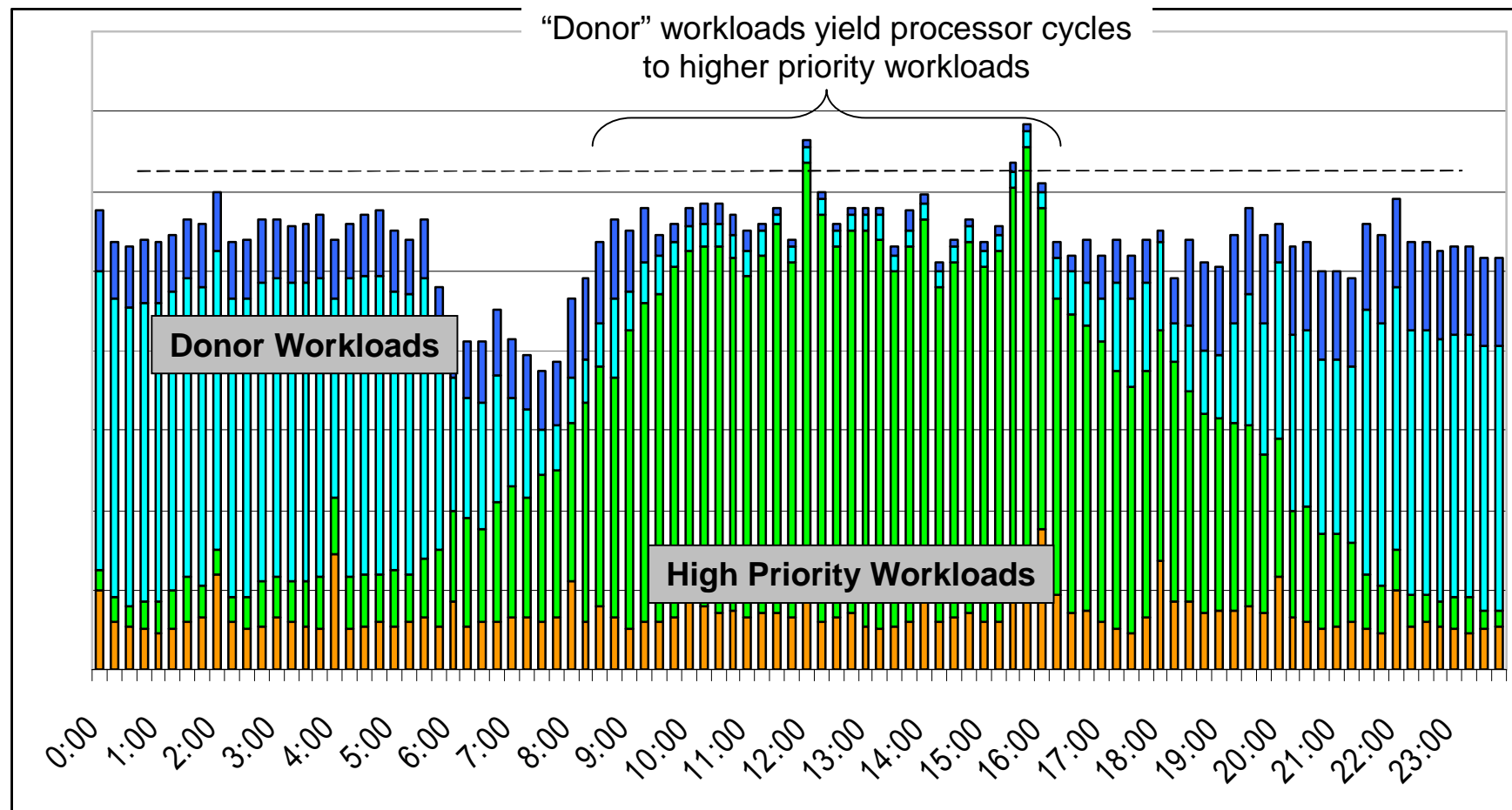
Traditional System z Workload Management Handles Workload Peaks With Maximum Core Efficiency

Example: Core banking workloads running on z/OS simultaneously with high utilization



zManager Extends Benefits Of Active Workload Management To Each zBX Blade Environment

Example: Four workloads running simultaneously on a zBX blade with high utilization

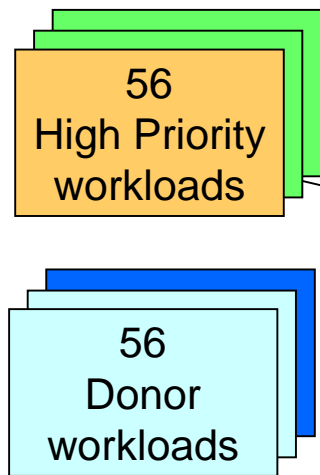


zManager Takes Processing Resources From “Donor” Workloads When Needed

- **Monitors virtual machine performance**
- **Automatically adjusts CPU resources to address demand spikes**
- **Considers priority and relative performance**

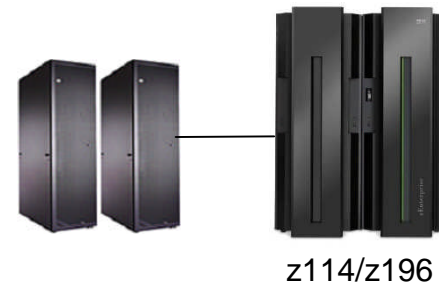
- **Benefits**
 - ▶ If you have low priority workloads, zManager enables donor workload management
 - ▶ Can maintain higher levels of blade utilization
 - ▶ Fewer zBX blades required compared to do-it-yourself blade configurations
 - ▶ Lower hardware, software, and labor costs

Because Of zManager Performance Management, No Need To Overprovision Blade Resources



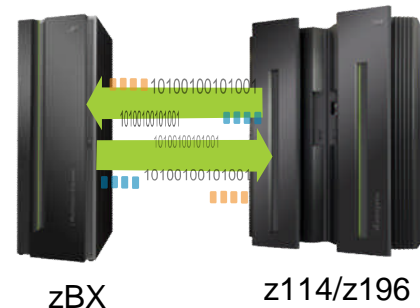
56 Web facing High Priority hybrid applications, 2 per pASB
 56 workloads that are lower priority 2 per pASB.
 DIY blades over provisioned by 40% because no zManager performance manager
 Includes hardware, WAS software and S&S

Results may vary based on customer workload profiles/characteristics. Prices will vary by country.



Do-It-Yourself

40 blades
 in 2 BladeCenter racks
 (28 blades for high priority workloads, 12 blades for donor workloads)
\$7,921K TCA

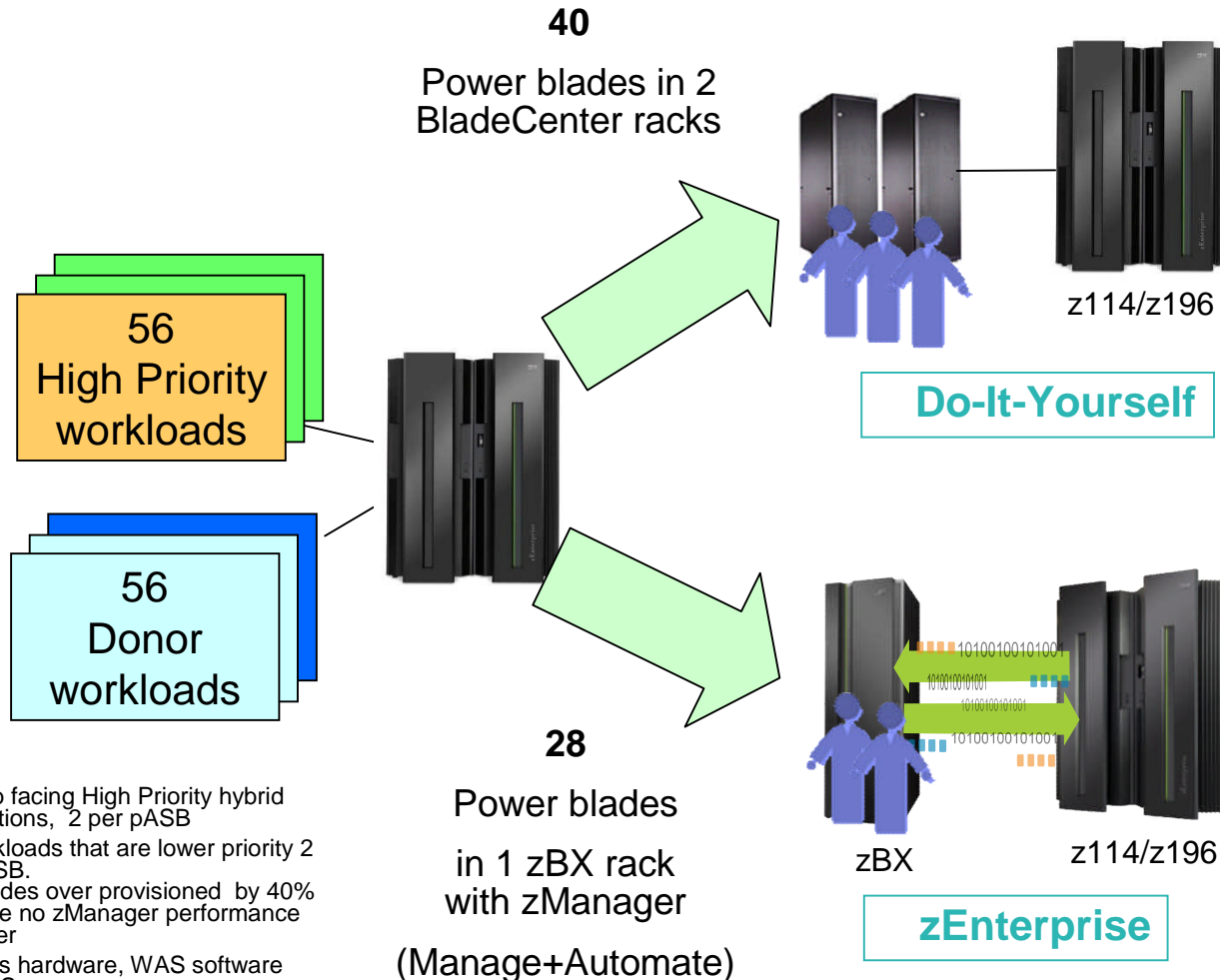


zEnterprise

28 blades
 in 1 zBX rack
\$5,794K TCA

27% less

zManager Consequently Saves Labor As Well



56 Web facing High Priority hybrid applications, 2 per pASB
56 workloads that are lower priority 2 per pASB.
DIY blades over provisioned by 40% because no zManager performance manager
Includes hardware, WAS software and S&S

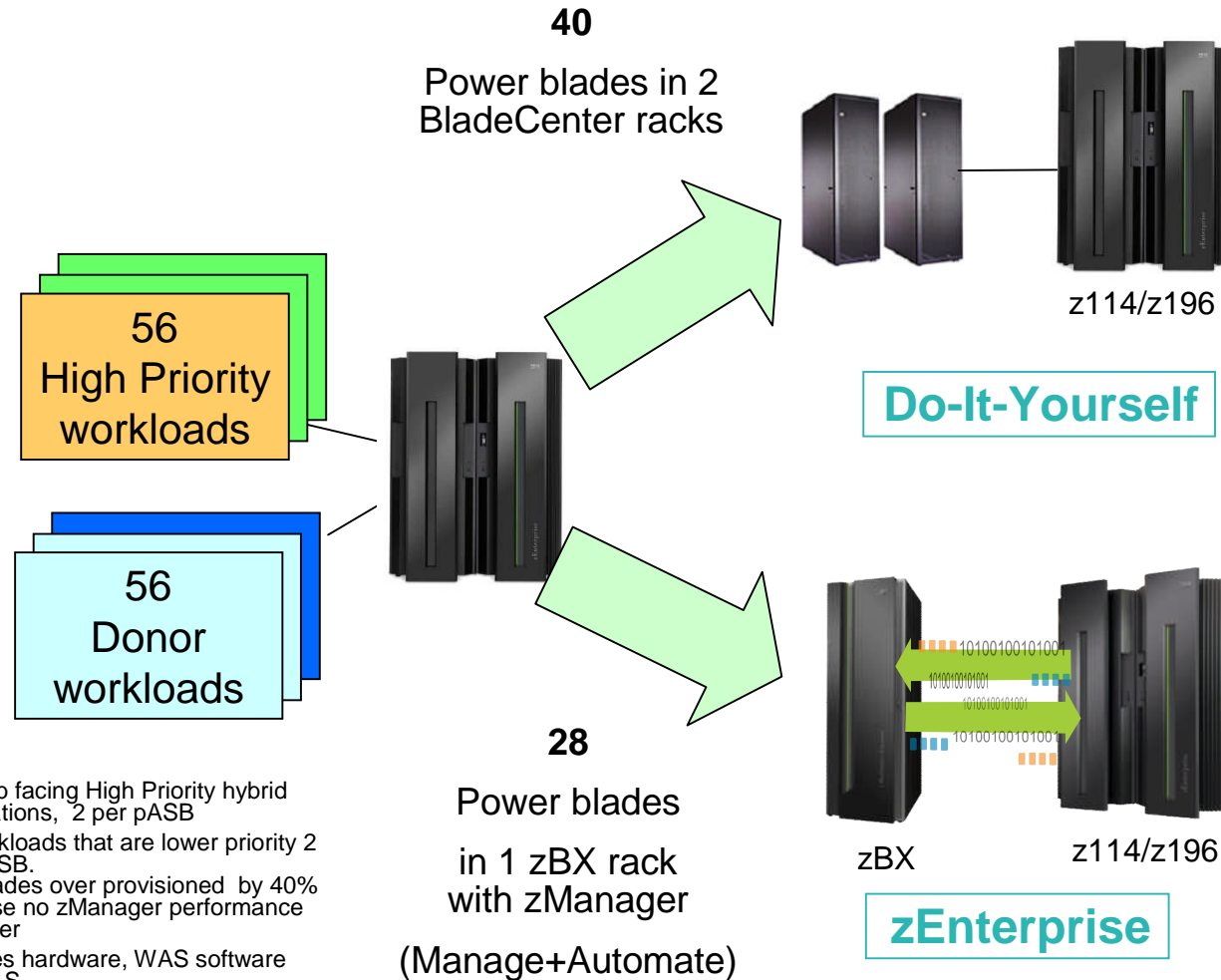
Results may vary based on customer workload profiles/characteristics. Prices will vary by country.

4,989 labor hours/yr
2.40 administrators
\$1,148K
3 years @ \$159,600/yr

3,114 labor hours/yr
1.59 administrators
\$763K
3 years @ \$159,600/yr

34% less

Compare Total Costs For Three Years



56 Web facing High Priority hybrid applications, 2 per pASB
 56 workloads that are lower priority 2 per pASB.
 DIY blades over provisioned by 40% because no zManager performance manager
 Includes hardware, WAS software and S&S
 Labor costs are for blade management only
 Labor rate \$159K per year

Results may vary based on customer workload profiles/characteristics. Prices will vary by country.

Blades Cost of Acquisition	\$7,921K
Labor	\$1,148K
Total (3yr)	\$9,069K

\$27.0K per workload per year

zBX Cost of Acquisition	\$5,794K
Labor	\$ 763K
Total (3yr)	\$6,557K

\$19.5K per workload per year

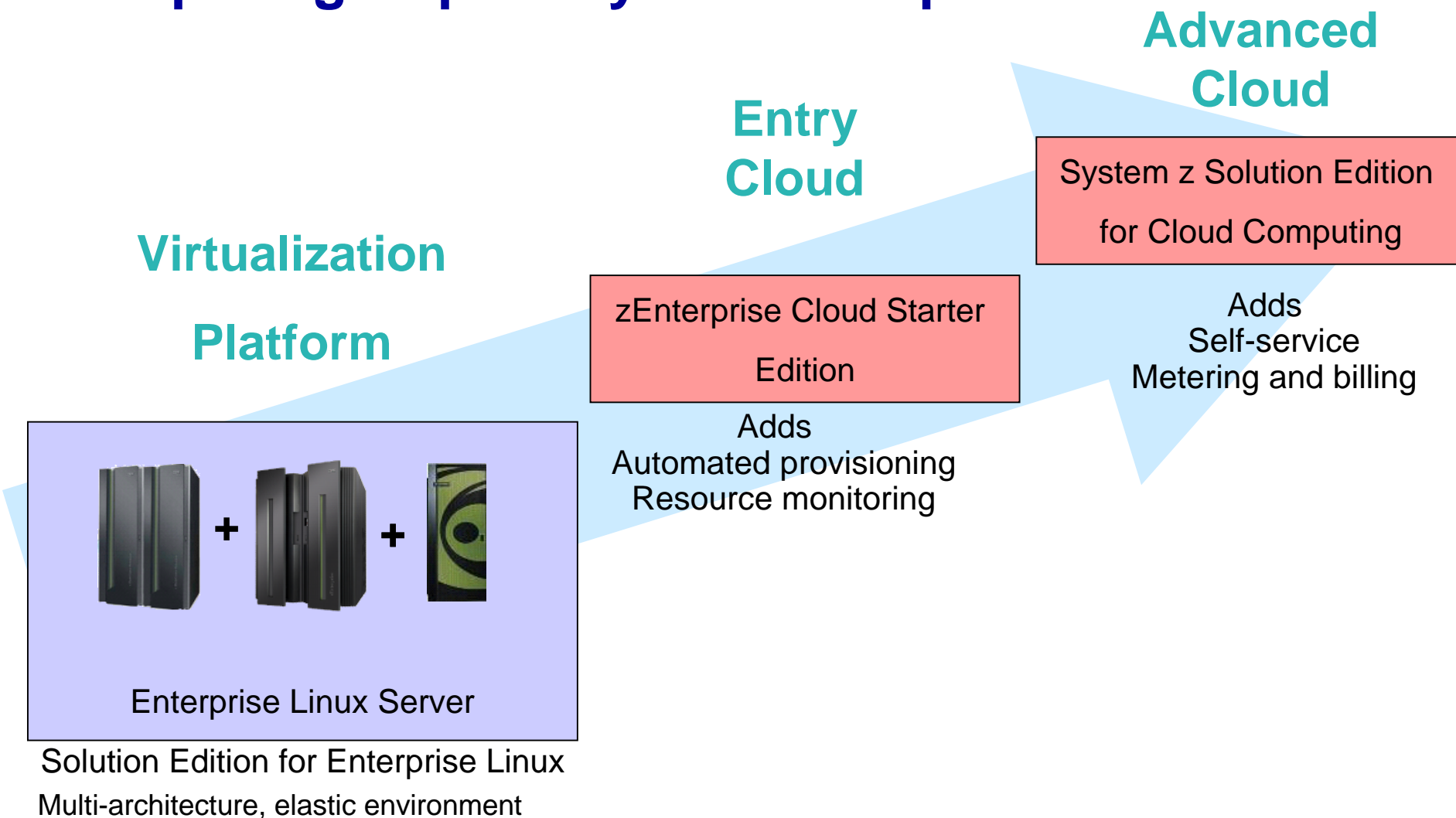
27% less

zEnterprise Is An Ideal Private Cloud Computing Platform

- **World's first multi-environment virtualized platform**
 - Flexibility to on-board different workloads without recoding
- **Virtualized Infrastructure is elastic and highly secure**
 - Secure separation of workloads
 - Easily scalable with capacity on demand
- **zManager and Tivoli software packages automate cloud operations**



Tivoli Software Packages Add Cloud Computing Capability To zEnterprise



zManager Capabilities Reduce Platform Labor Requirements

Process	Typical Distributed Management Practices	zManager
Deployment Management	<ul style="list-style-type: none"> Manually configure hypervisor and physically set up and configure networks 	<ul style="list-style-type: none"> Automated deployment of hypervisor and out-of-the box physically isolated networks
Incident And Capacity Management	<ul style="list-style-type: none"> Passive monitoring No end-to-end transaction monitoring Manually monitor virtual machine performance and adjust resources to meet performance goals 	<ul style="list-style-type: none"> Active and continuous monitoring to fix problems quickly End-to-end transaction monitoring to isolate and fix issues Automatic resource adjustments for workloads to meet performance goals
Asset Management	<ul style="list-style-type: none"> Discover assets with ad hoc manual methods Manual entitlement management 	<ul style="list-style-type: none"> Automated discovery and management of entitlement of assets
Security Management	<ul style="list-style-type: none"> Multiple, disparate user access management 	<ul style="list-style-type: none"> Centralized, fine-grain user access management
Change Management	<ul style="list-style-type: none"> No visibility into impact of changes. No standardized procedure to retrieve and apply firmware changes 	<ul style="list-style-type: none"> Visibility into impact of changes. Retrieve and apply firmware changes in a standardized fashion

zEnterprise Cloud Starter Edition Establishes Infrastructure-as-a-Service Delivery Model

Packaged software and services for automated provisioning and monitoring

New!

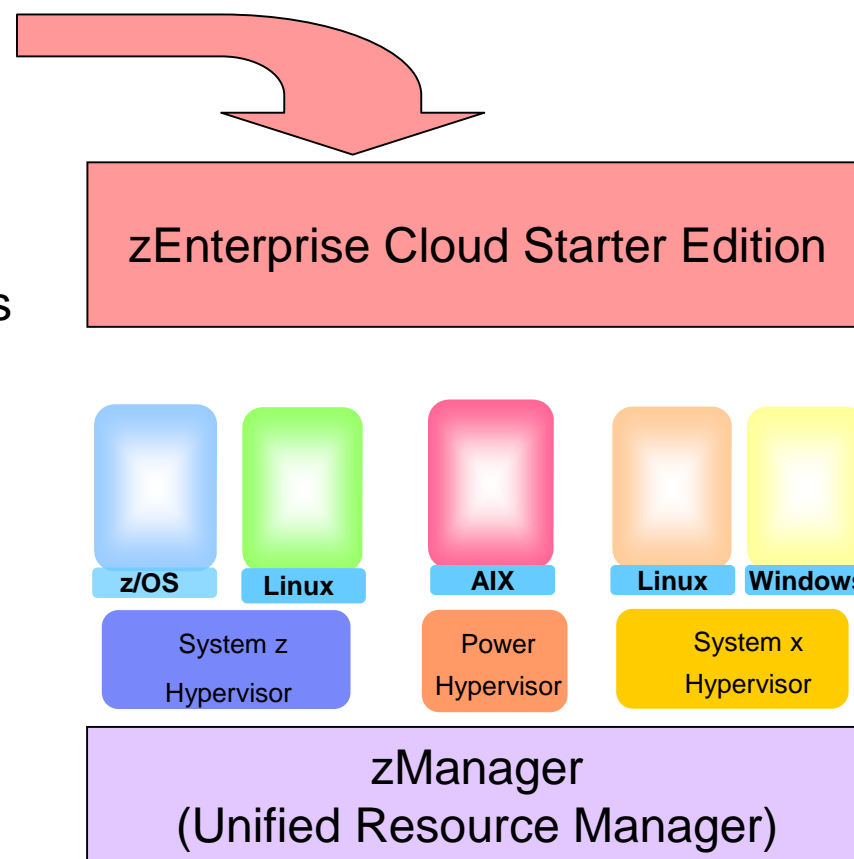
■ IBM Tivoli software

(runs on Linux on System z)

- ▶ Tivoli Provisioning Manager provides automated provisioning
- ▶ Tivoli OMEGAMON XE on z/VM and Linux provides monitoring

■ IBM Lab Services

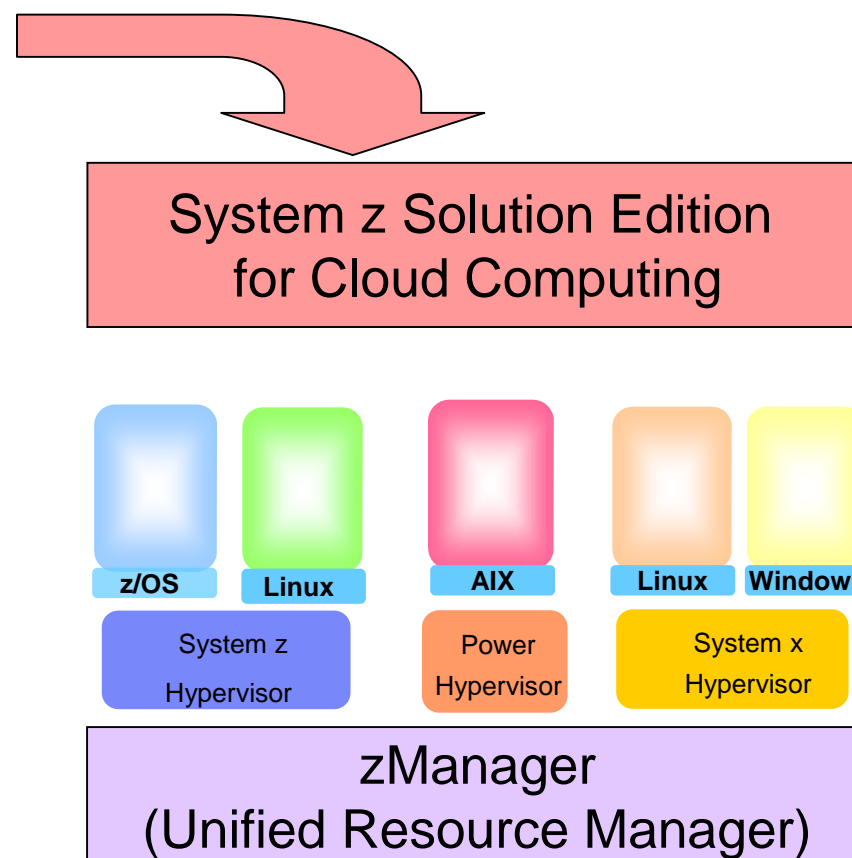
- ▶ Planning, installation, configuring, testing services



IBM System z Solution Edition For Cloud Computing Adds Additional Cloud Capability

Adds self-service provisioning, metering, billing and monitoring

- **IBM Tivoli software**
(runs on Linux on System z)
 - ▶ Tivoli Service Automation Manager provides self-service provisioning
 - ▶ Tivoli Usage and Accounting Manager provides metering and billing
- **IBM Lab Services**
 - ▶ Planning, installation, configuring, testing services
 - ▶ Significant package discounts



How To Make The Best Use Of zEnterprise To Reduce Costs

- **z/OS is optimized for core business workloads**
 - ▶ Run core business workloads with highest reliability and elasticity on z/OS
- **Consolidate front end workloads onto zBX**
 - ▶ Web facing front ends and packaged applications
- **Consolidate back end data marts onto z/OS**
 - ▶ IDAA is a game changer
- **Consolidate stand alone workloads onto zLinux or zBX**
 - ▶ Fit for purpose assignments
- **Mix donor workloads with high priority workloads on each virtualized server**
 - ▶ Active workload management will maximize utilization

CPO Eagle Team Performs Free-of-Charge TCO Studies

- Since 2007, the Eagle Team has performed over 200 TCO studies



- Typically, TCO study compares three "what-if" scenarios:

- 1) Taking applications off the mainframe to a distributed environment
- 2) Moving applications from a distributed environment to the mainframe
- 3) Identifying the least costly place to put a new application

For more information, contact Craig Bender
to discuss your particular situation

Thank You

