Extending Your Mainframe For More Business Value

Affordable Business Growth
With System z

Quiz

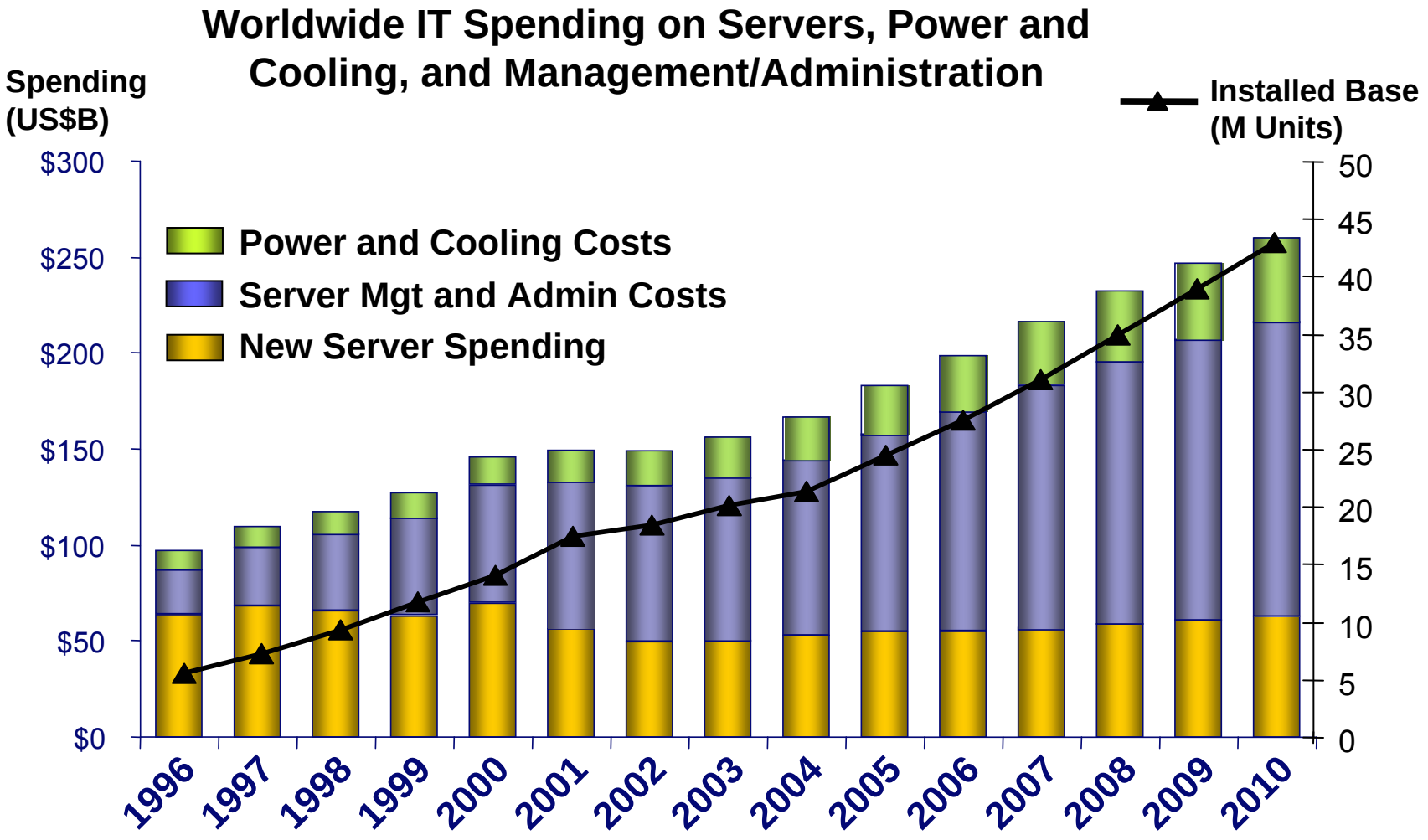
How fast are IT costs growing?

A: Slower than business revenue growth

B: About equal to business revenue growth

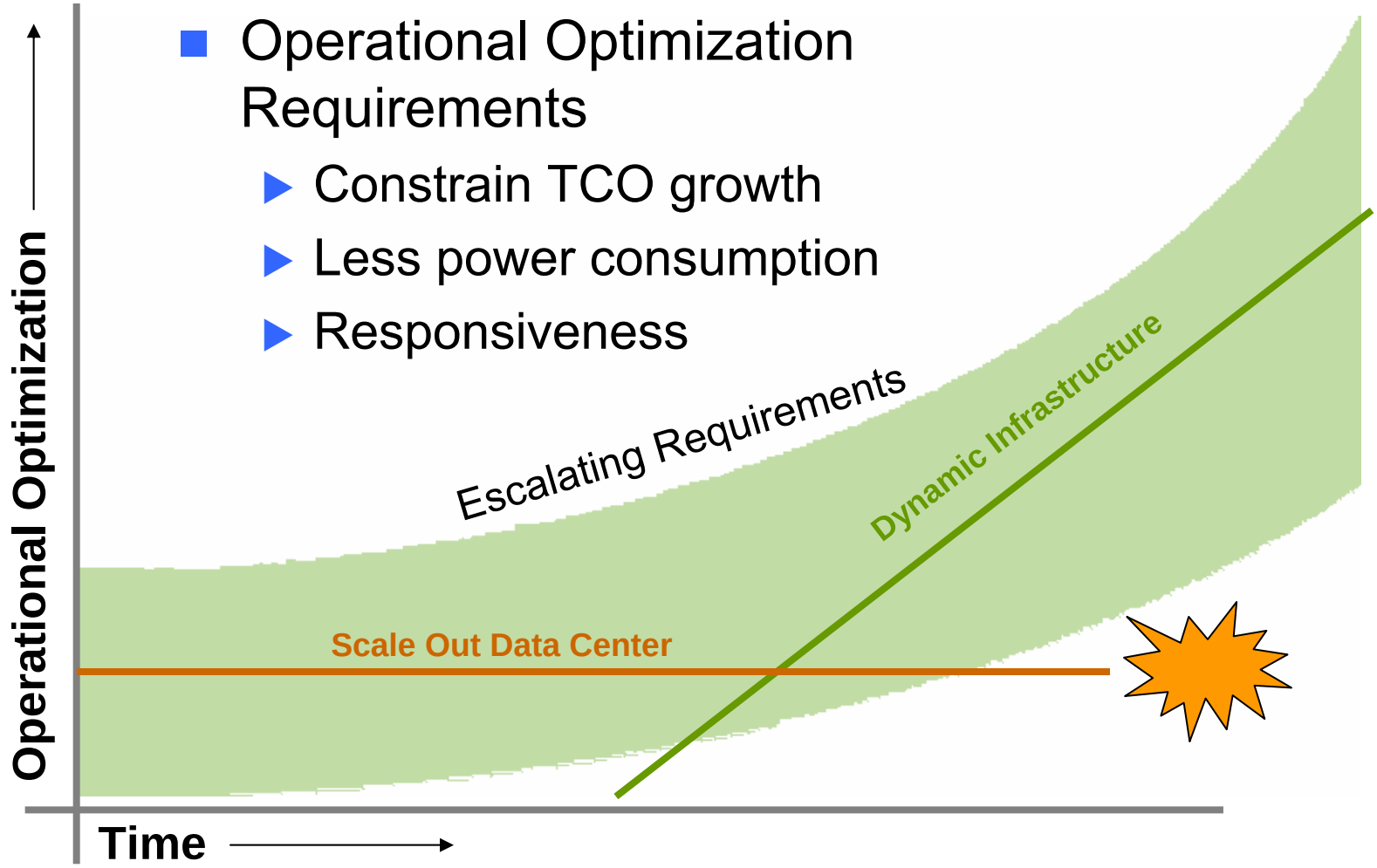
C: Faster than business revenue growth

Rising Operational Costs For Distributed Servers Are A Contributing Factor

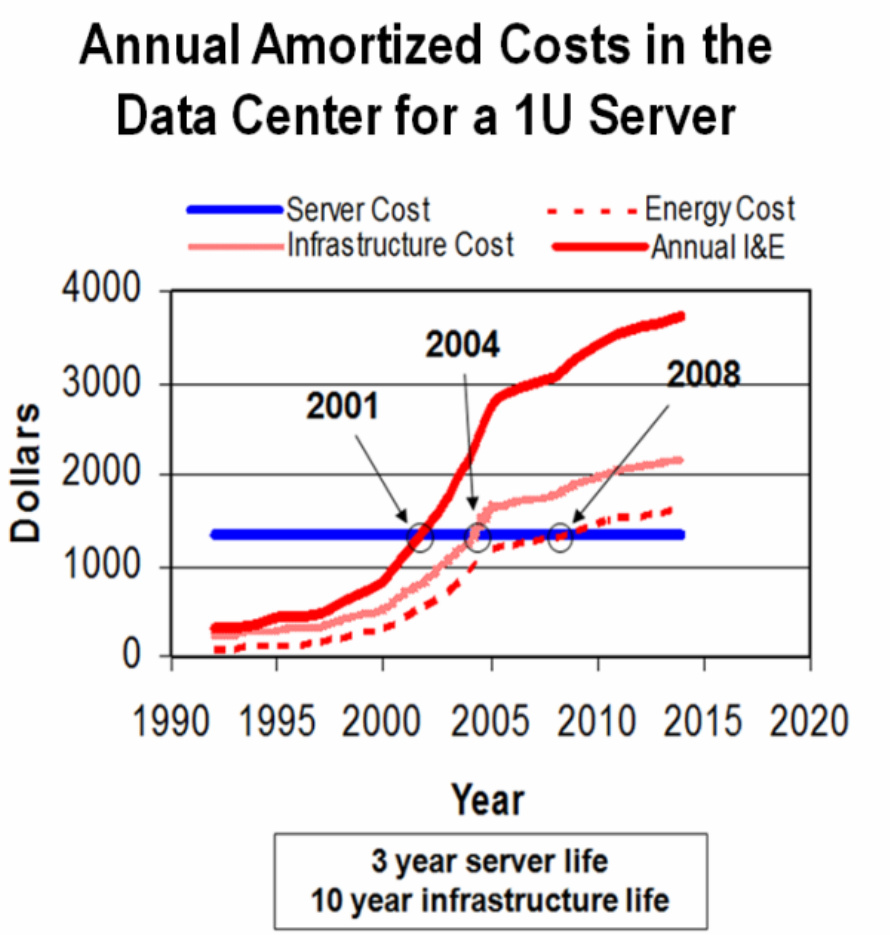


Source: IDC, 2007

Dynamic Infrastructure –
Reinventing The Data Center To Meet Requirements



Microsoft Assessment Of The Problem



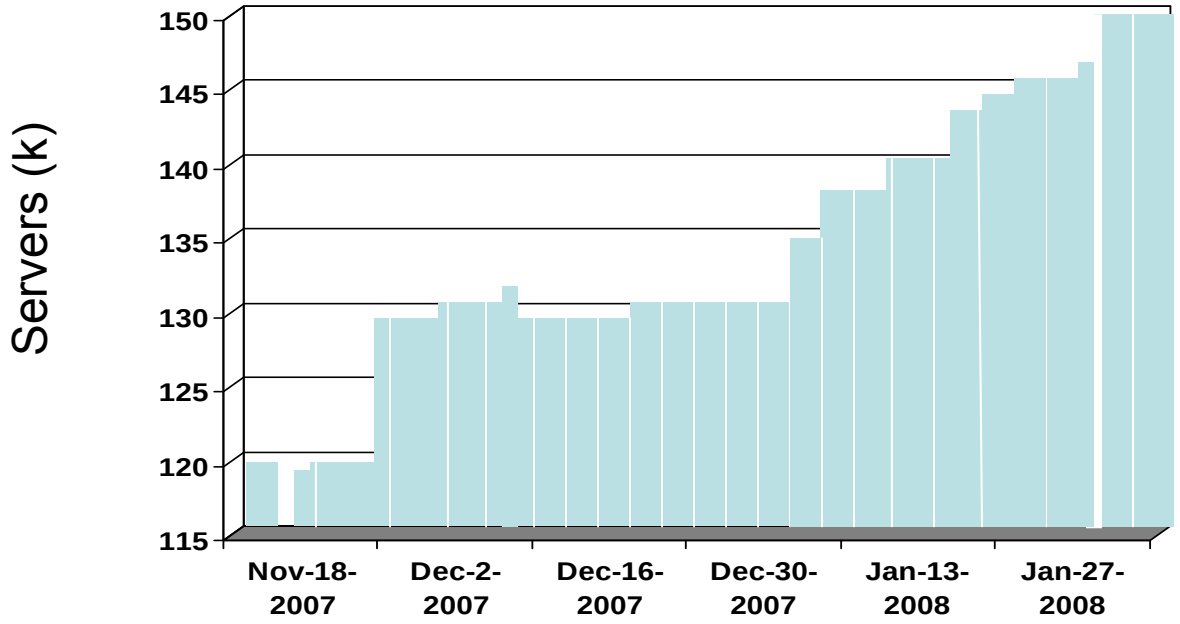
http://www.electronics-cooling.com/articles/2007/feb/a3/

Server power growth rate is from ASHRAE.

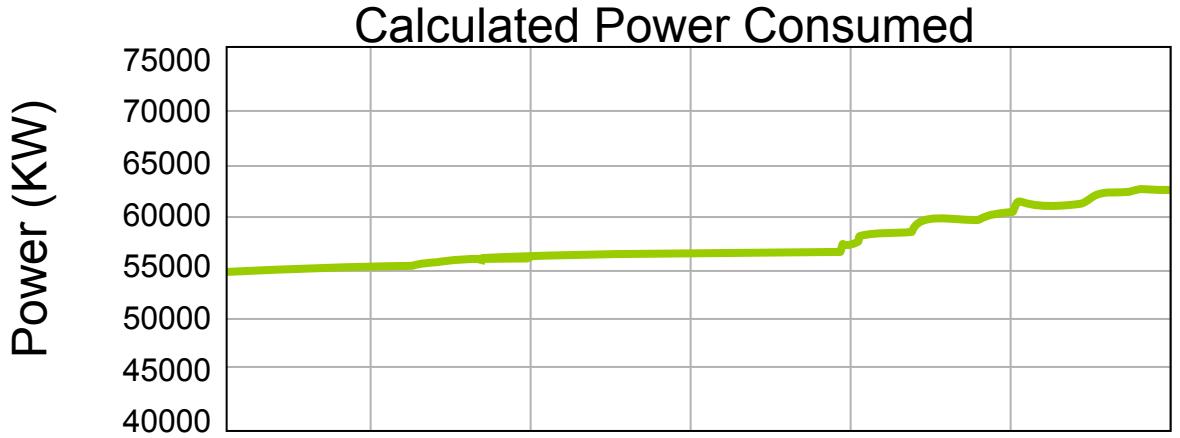
Chart from Microsoft conference on the data center

- Key Messages:
  - The combined cost of the Infrastructure and Energy (I&E) exceeded the cost of the servers in 2001
  - Infrastructure costs alone have already exceeded the cost of the server in 2004
  - Energy costs alone will exceed the cost of the servers in 2008

15 Microsoft Data Centers Today



148,000 servers



63 Megawatts

And it's still not enough …

Source: Promotional Video from Microsoft's Environmental Sustainability Group

Microsoft Abandons HP Commodity Servers

- **Plans to build 24 massive 500,000 square foot facilities (equals 285 acres)**
  - Intended to support Microsoft's web-based software delivery (SaaS) efforts
  - Boulder, Des Moines, Dublin, Northlake, Quincy, Russia, San Antonio…
- **Build** custom designed servers **designed specifically for energy efficiency**
  - Migrate from HP servers
- **Utilize blades and** shipping container **approach**
- **The Chicago center will**
  - House up to 300,000 servers
  - 150-200 shipping containers of data center gear
  - Consume 120 -198 megawatts

Source: Data Center World conference in Las Vegas April 2008

Understand All The Operational Costs

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

Microsoft working on these

Needed: Something that works on these

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

Source: IBM internal study

Challenge

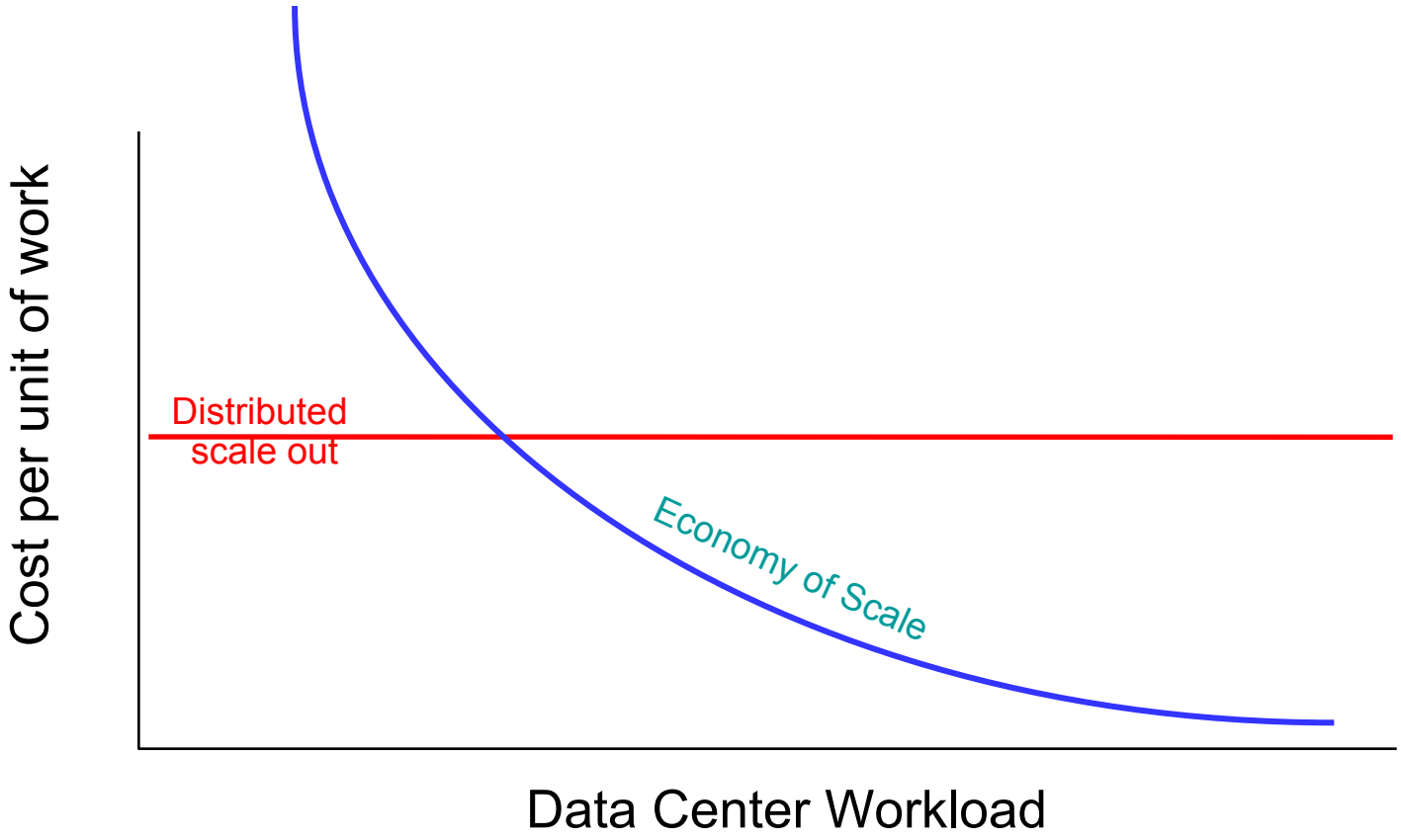
- How can enterprise IT deliver essential computing services, while keeping cost growth in line with business revenue growth?

Answer:

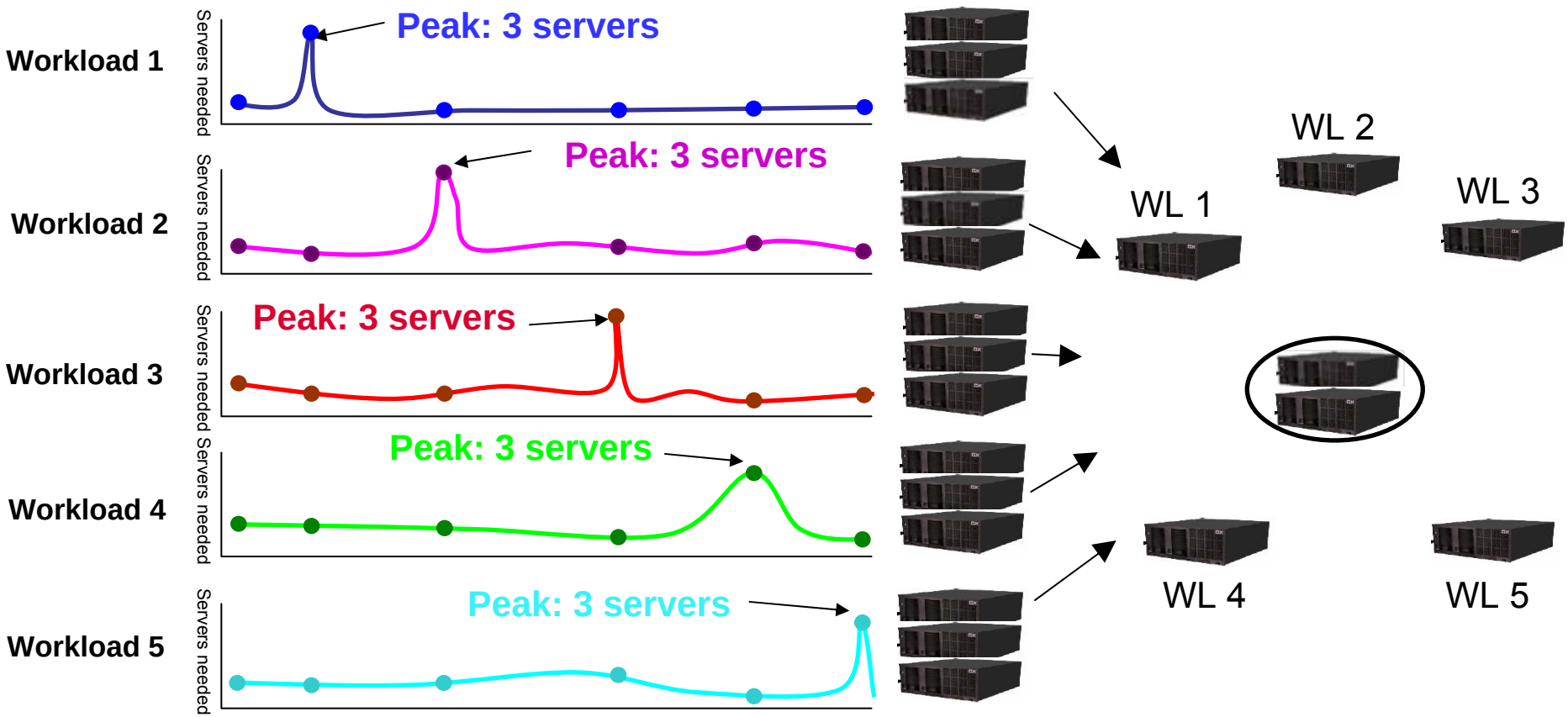
Economy of Scale

- Deliver workload at lower cost per unit of work

Economy Of Scale – Cost Per Unit Of Work Goes Down As Workload Increases



Example:
How To Deliver Workloads at Lower Cost

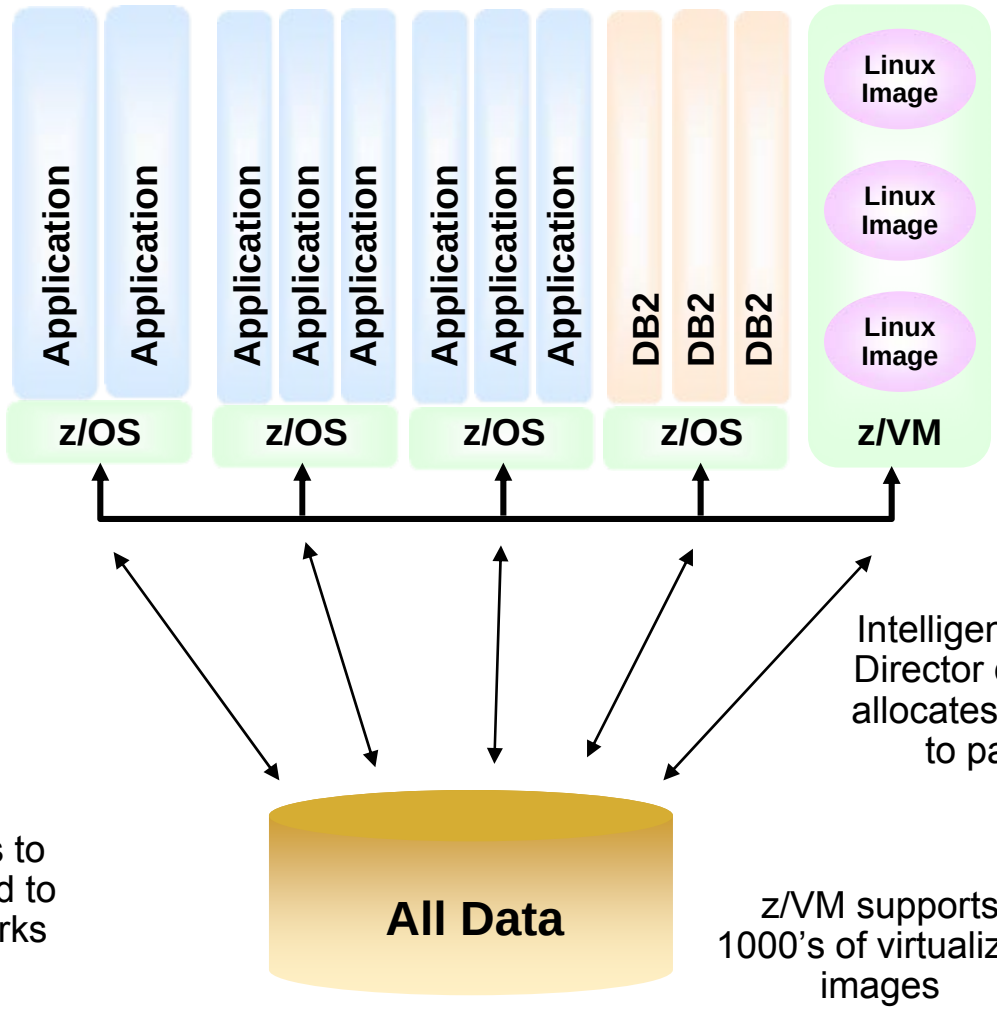


What's Required: Virtualization and intelligent workload management to accommodate shifting workloads – Automatic on IBM Enterprise Systems

Extreme Virtualization In System z

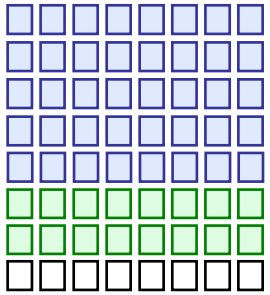
Logical Partitions Share Processors, Common Cache Structures, and I/O

Workload Manager allocates resources as needed by service classes



Internal networking via secure high speed Hipersockets

Intelligent Resource Director dynamically allocates processors to partitions



Shared access to all disk data and to external networks

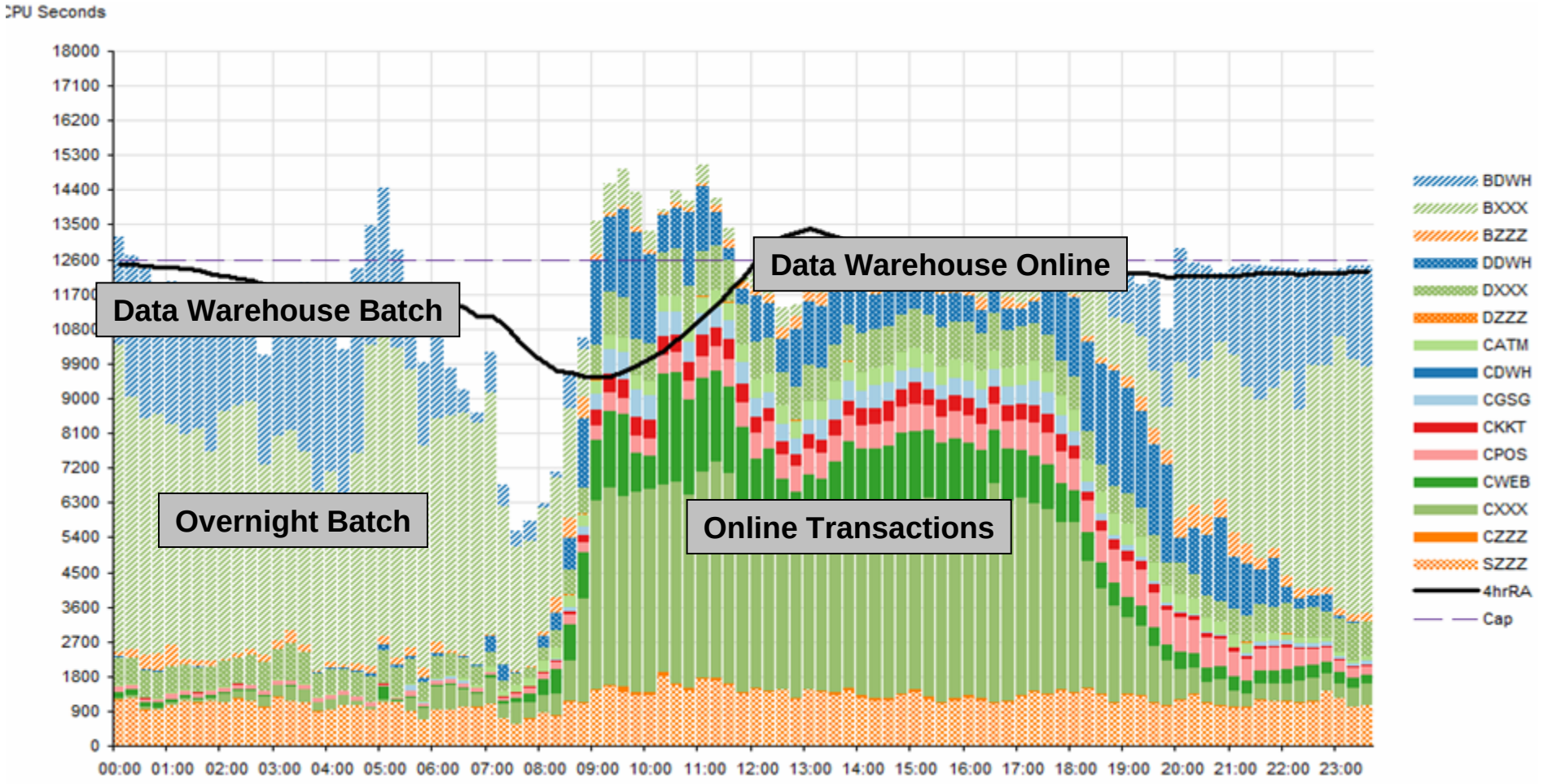
All Data

z/VM supports 1000's of virtualized images

Eligible workload automatically dispatched to zIIP and zAAP specialty processors

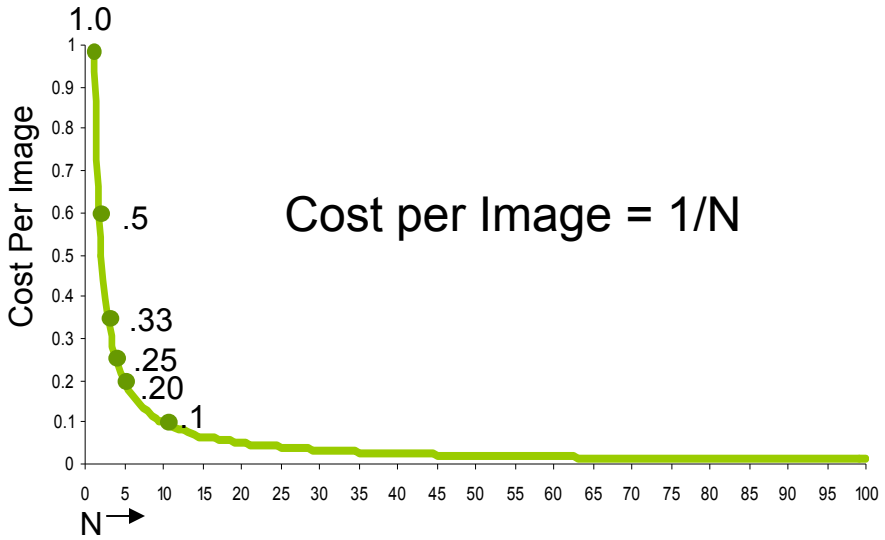
What It Looks Like In Operation

Run many workloads simultaneously with high utilization



Economy Of Scale – Consolidate "N" Workload Images On One Server

- Costs shared by all "N" consolidated images
  - Hardware
  - Software
  - Power
  - Floor Space
  - Local Network Connectivity



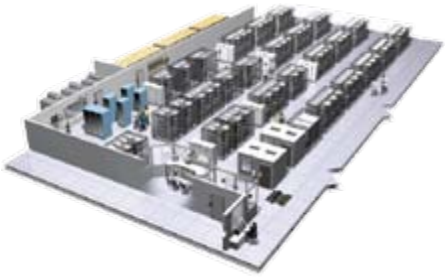
- Costs not shared by consolidated images
  - Migration cost per image — Fixed cost per image
  - Off premise network cost
  - Labor cost per image — Fixed cost per image, but typically less than unconsolidated labor cost

The more workloads you can consolidate, the lower the cost per image

Dynamic Infrastructure

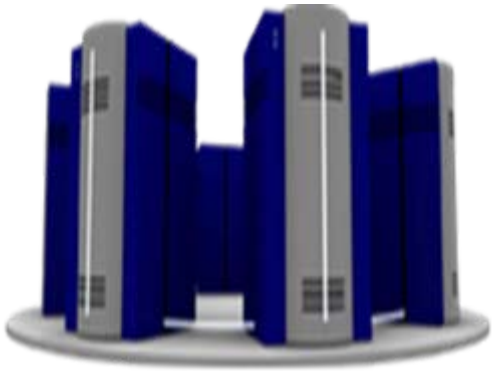
Economy of scale
Workload consolidation
Structured management
Handle all workloads
Cloud service delivery

Evolution of service delivery



Scale Out
Mixed Environment

Dynamic Infrastructure



Dedicated resources

Case Studies

- The IBM Software Group z evangelist team conducts **free** TCO evaluation engagements with customers
- Topics addressed
  - Total Cost of Ownership/Acquisition
  - Typical scenarios
- 53 projects since 2007
  - Contact Craig Bender

Getting To A Dynamic Infrastructure

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

Typical Scenarios

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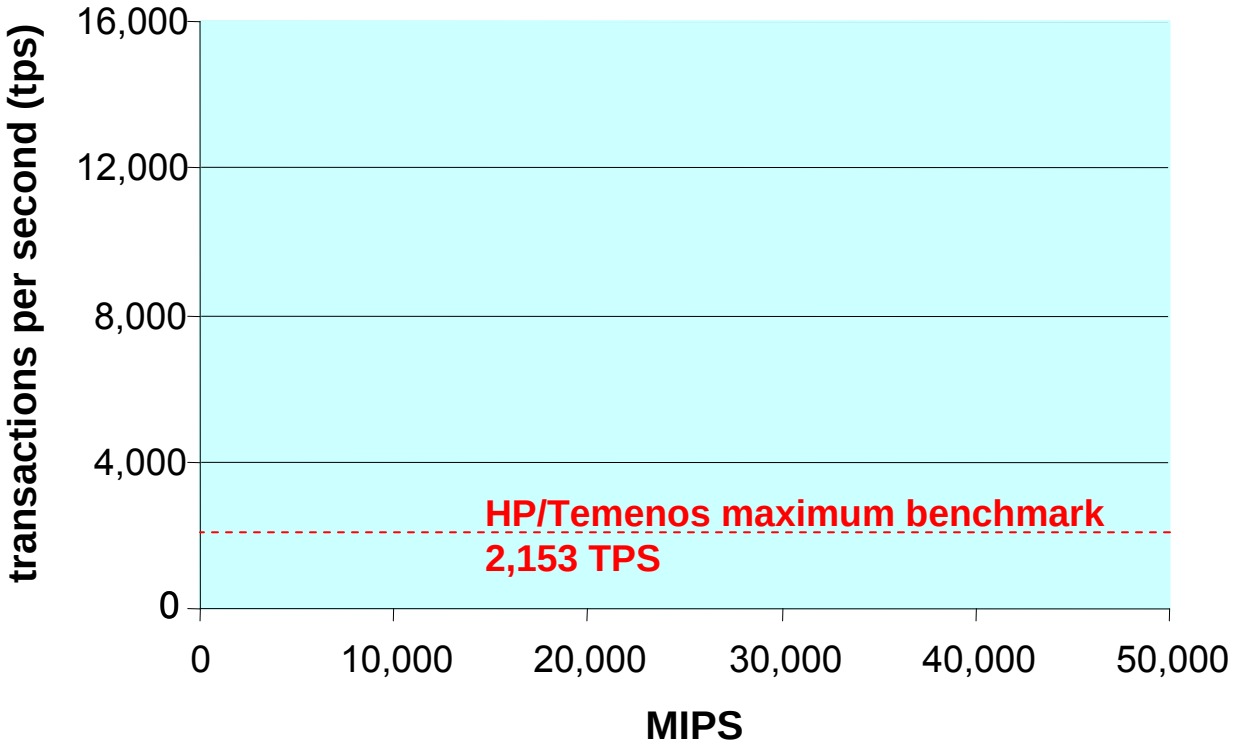
HP Superdome Best Online Banking Benchmark

- **HP/Temenos** **
  - HP Itanium
  - **Temenos T24**
  - **2,153** Transactions/second
  - **13** Million Accounts
  - Largest banking benchmark performance claimed by HP



* **SOURCE**:http://www.enterprisenetworksandservers.com/monthly/art.php?2976 **Source**: InfoSizing FNS BANCS Scalability on IBM System z – Report Date: September 20, 2006
** Standard benchmark configuration reached 8024 tps, a modified prototype reached 9445 tps
*** **SOURCE**: TEMENOS BENCHMARKS; http://h71028.www7.hp.com/enterprise/downloads/TemenosBenchmark.pdf

System z With DB2 Scales Further Than Best HP Superdome Banking Benchmark

- **Asian Bank**
  - IBM System z9 and DB2
  - TCS BaNCS
  - **15,353** Transactions/second
  - **50** Million Accounts
  - IBM benchmark for customer

- **Bank of China** *
  - IBM System z9 and DB2
  - TCS BaNCS
  - **9,445**** Transactions/second
  - **380** Million Accounts
  - IBM benchmark for customer

- **HP/Temenos** **
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  - **2,153** Transactions/second
  - **13** Million Accounts
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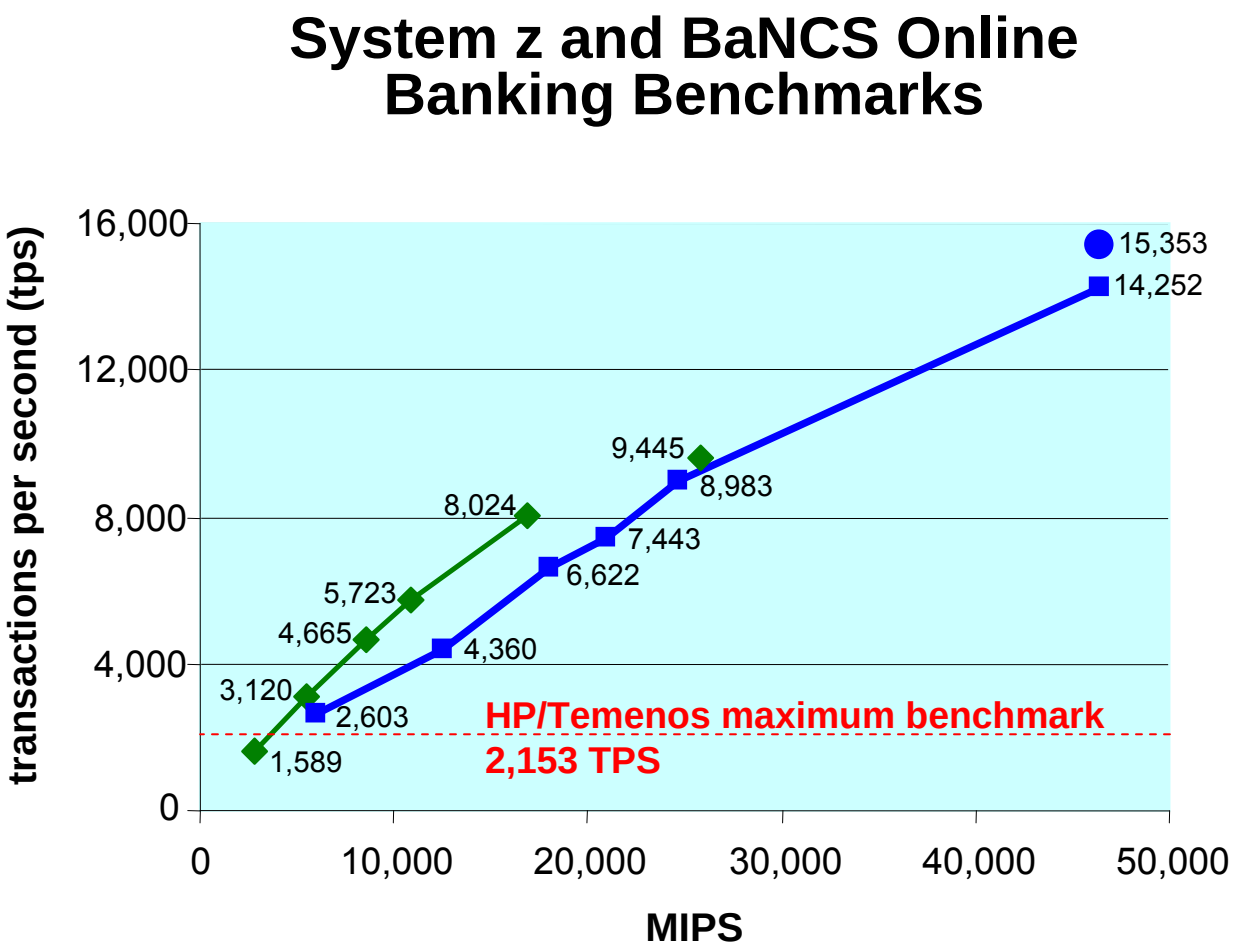

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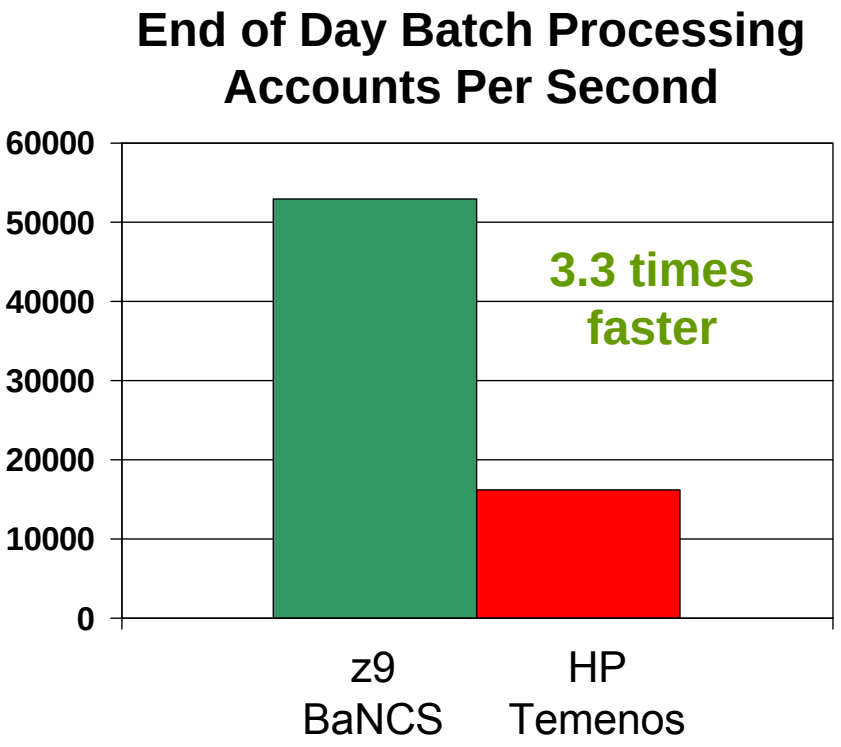
System z Batch Processing Performance

- **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)



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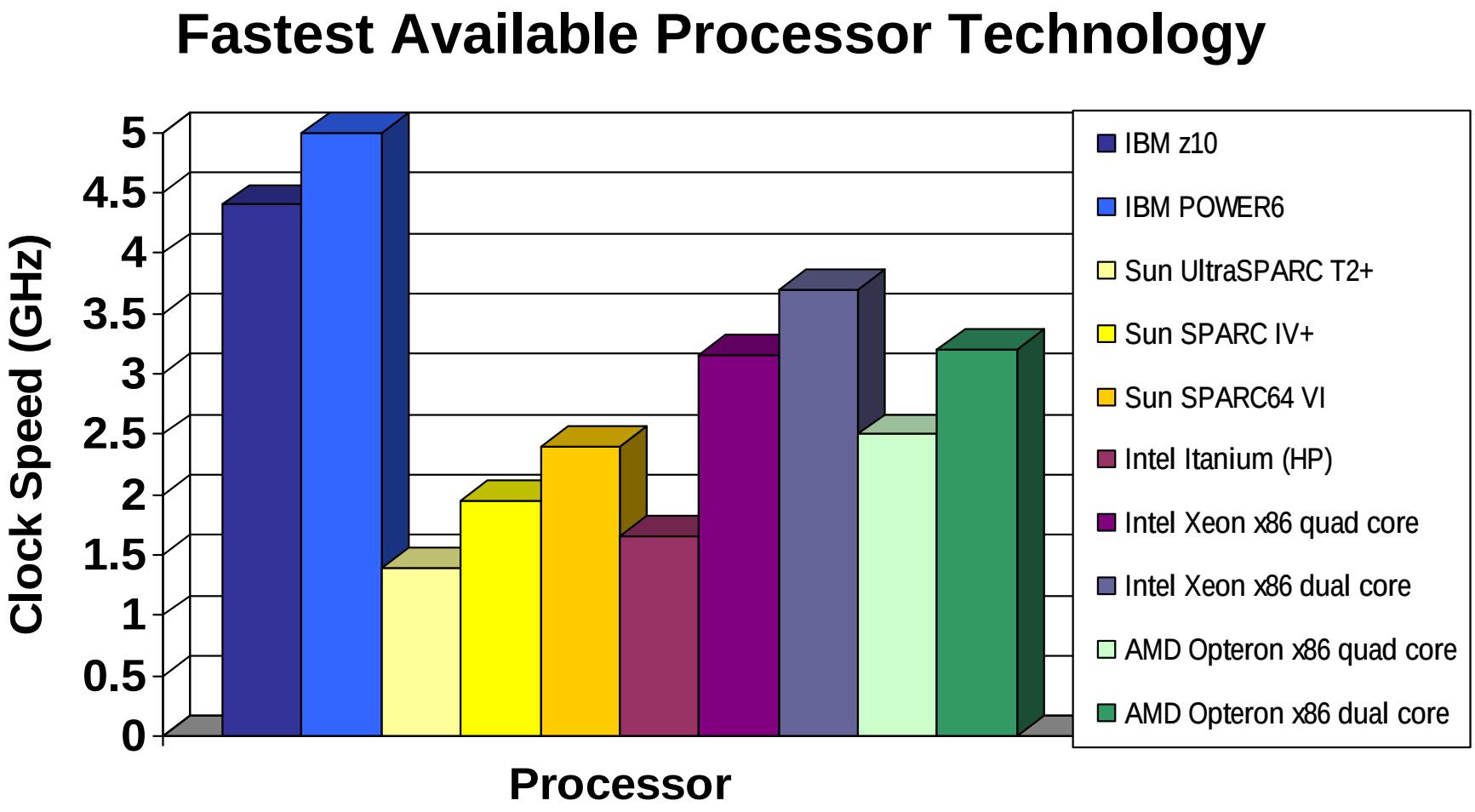
Case Studies: Lessons Learned

- Unique parallel sysplex design enables this scale
  - Specialized hardware for clustering up to 32 systems
  - Exploitation by operating system and software subsystems
  - Enables large transaction processing workloads against a single data base
  - *May be the only practical solution for these workloads*
- New system z10 extends scale further
  - Quad core 4.4 GHz processors, up to 77 in a frame (30,361 general purpose MIPS in a frame)
  - More I/O bandwidth (up to 384 GBps)

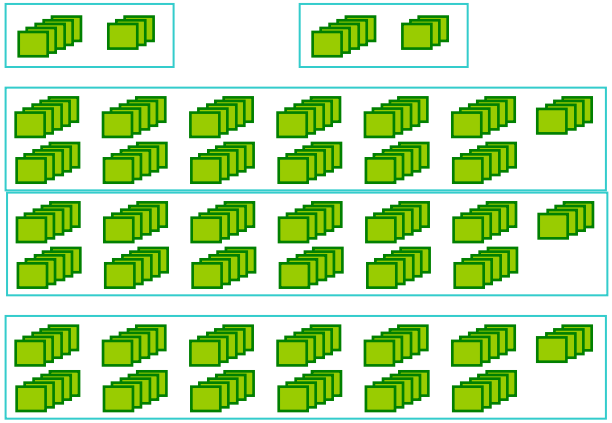
System z10 And Power Systems Clock Speeds



Compare The Processors Needed To Achieve 2,200 Transactions Per Second (with System z10)

Online Injector -1x HP RX7620

Temenos T24 Servers:
2x HP RX7620
3x HP Superdome



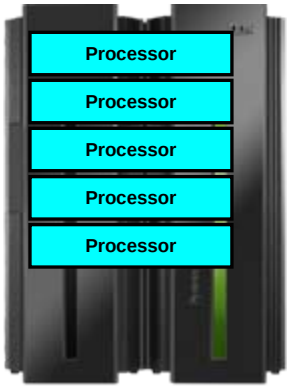
5 z10 processors

(3,906 MIPS)*

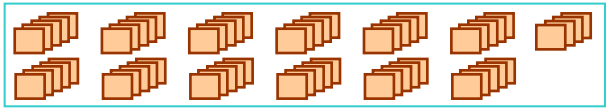
280 HP processors

(457,762 Performance Units)

TCS BaNCS
1x z10 2097-705



Oracle 10g – 1x HP Superdome



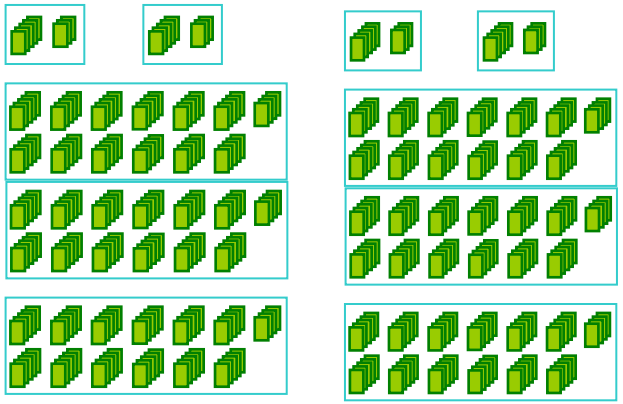
117 Performance Units per MIP

* MIPS scaled to achieve the same 2,200 TPS

Compare The Processors Needed To Achieve 2,200 Transactions Per Second (With Dev/QA)

Online Injector: 2x HP RX7620

Temenos T24 Servers:
4x HP RX7620
6x HP 9000 Superdome



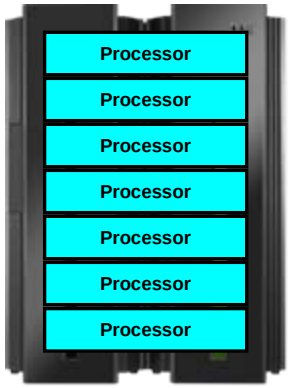
7 z10 processors

(4,906 MIPS)

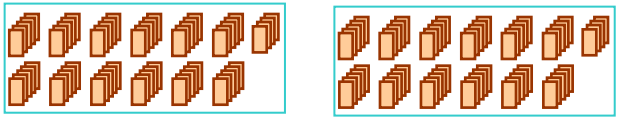
560 HP processors

(915,524 Performance Units)

TCS BaNCS and DB2
1x z10 2097-707



Oracle 10g: 2x HP 9000 Superdome



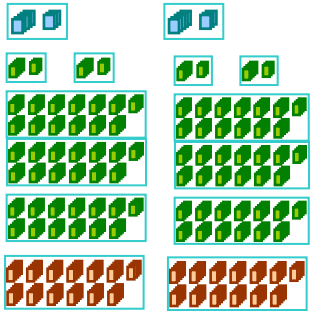
187 Performance Units per MIP

HP Integrity rx7620 - (10U) 1.5GHz 6MB (8ch/8co)

HP 9000 Superdomes - 32W 1GHz 32MB (32ch/64co)

NOTE: Double Distributed Servers, add 1000 MIPS to System z for Dev/QA

Compare The 3-Year Green Field Acquisition Costs Of The Platforms



	HP Superdome Servers with Temenos T24	**IBM z10 with TCS BaNCS**
Servers	14 (560 cores)	1 (7 cores)
OS, Database	HP-UX, Oracle	z/OS, DB2
3 Year TCO	**$43.3M**	**$18.2M** Costs 58% Less
	Scalability Not Demonstrated	*Excellent Scalability*

Note: Cost of packaged application software not included

Typical Scenarios

- Most data centers are not green field projects
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- Adding new workload to an existing System z
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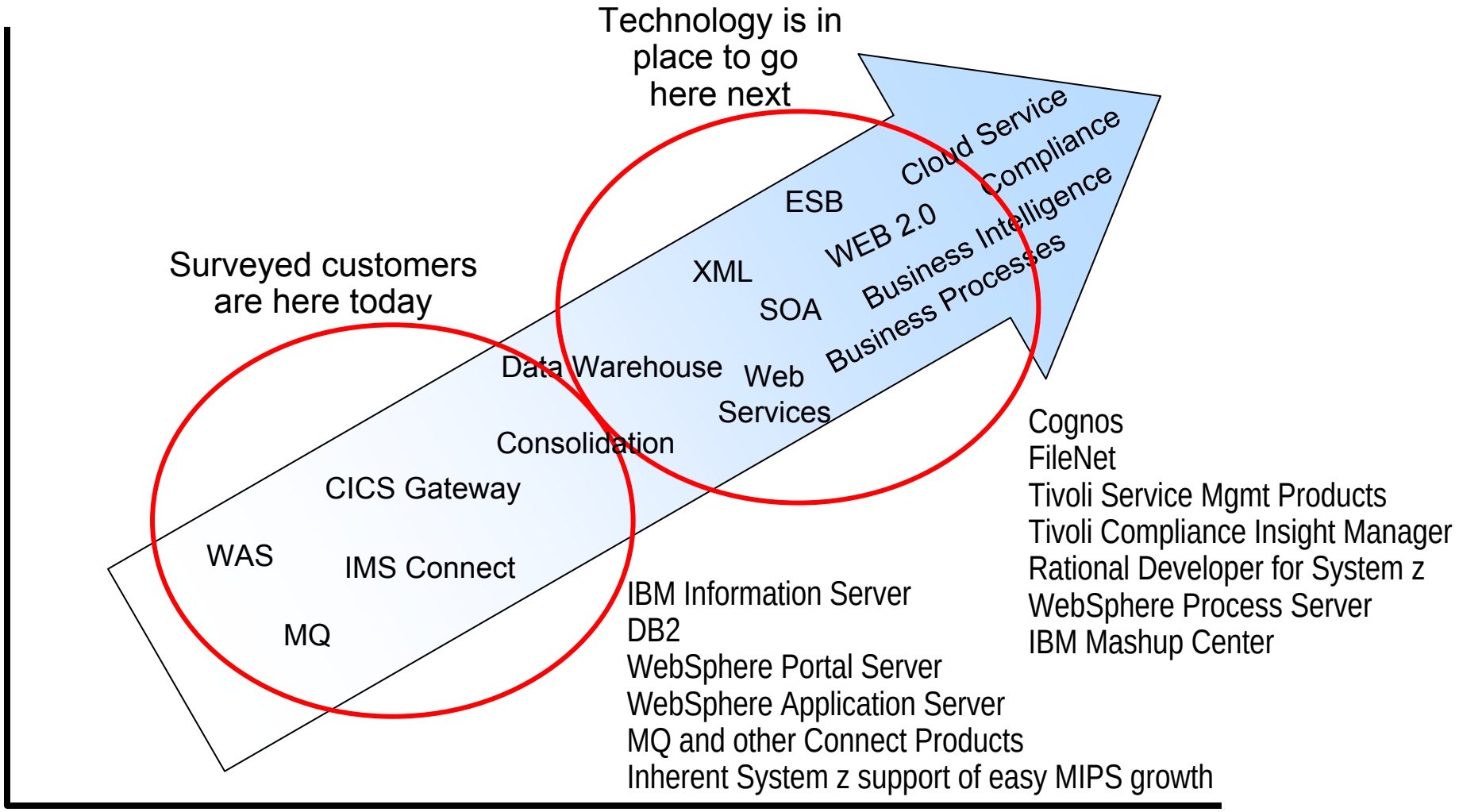
Technologies Are In Place For New Workloads On The Mainframe



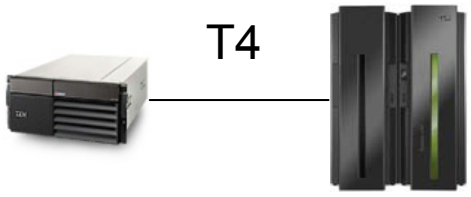
Performance Benefits Of Co-location (On-line Banking Benchmark)

Separate Machines

150 tps

4 CPUs | **4 CPUs**

WAS 6.1 Linux | DB2 8.1 z/OS



Power System | **System z**

Separate LPARs

160 tps

8 CPUs in shared pool

WAS 6.1 z/OS | DB2 8.1 z/OS

System z

Same LPAR

243 tps

8 CPUs

WAS 6.1
DB2 8.1
z/OS

System z

z Series Server : z9-EC, 8 X 1.7 GHz, 64 GB RAM

Case Studies Demonstrate Consistent TCA Advantage For Adding New Workload

Scenarios	Cost of Distributed vs. z	Distributed Cost Ratio	Cores vs. z Processors	Core Ratio
Deploy New Applications on Mainframe				
– WebSphere Application	$7.4M vs $5.0M	2.4x	132 vs 4	33 : 1
– SAP Database Server	$6.4M vs $3.0M	1.3x	60 vs 4	15 : 1
– Data Warehouse	$8.4M vs $4.7M	1.8x	120 vs 6	20 : 1
– Data Warehouse Analytics	$13.4M vs $8.4M	1.6x	160 vs 8	20 : 1
– Communications Backbone				
– SOA Solution	$5.5M vs $4.2M	1.3x	64 vs 4	16 : 1
– SOA Solution vs Sun	$17.2M vs $3.5M	4.9x	132 vs 4	33 : 1
– Spatial Data Base	$34.2M vs $3.5M	9.8x	252 vs 4	63 : 1
– Major Retailer	$6.9M vs $5.0M	1.4x	120 vs 6	20 : 1
	$8.3M vs $7.0M	1.2x	22 vs 5	4.4 : 1
		2.9x		**25 : 1**

Distributed deployment costs 3 times as much
Co-location performance benefits, better quality of service

TCA = Total Cost of Acquisition (HW, SW, plus 3 years of annual charges)

Remember 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**

“Specialty Engines” Reduce Cost For New Workloads

- Special assist processors for System z
  - For Java workloads (zAAP), up to 85% offload
  - For selected data workloads (zIIP), up to 80% offload
  - For Linux workloads (IFL), 100% offload

- Attractive pricing
  - $125K for a 920 MIP processor (92% discount)
  - No charge for IBM software running on zAAP/zIIP
  - IBM software running on IFL costs 120 PVU’s
  - Free upgrade to next generation!

Customers Are Taking Advantage Of Specialty Processors And Software Pricing

- Mainframe customers have installed
  - 13,073,889 Total MIPS
  - 2,720,477 Specialty MIPS (21.0%)
  - 1,680,466 IFL MIPS (12.9%) 20% growth
  - 445,009 zAAP MIPS (3.4%) 42% growth
  - 595,002 zIIP MIPS (4.6%) 227% growth

- Of customers with 80% of the installed MIPS
  - 60% have installed IFL processors
    - Biggest has 150,724 IFL MIPS
  - 31% have installed zAAP processors
    - Biggest has 25,410 zAAP MIPS
  - 46% have installed zIIP processors
    - Biggest has 22,452 zIIP MIPS

Getting To The New Enterprise Data Center

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Introducing Service Oriented Finance

We are a traditional bank with branch offices throughout the country.

Banking competitors and non-bank specialists are taking away our customers.

Service Oriented Finance CEO

Service Oriented Finance

Our customers demand greater choice, and personal security and control in their banking relationships.

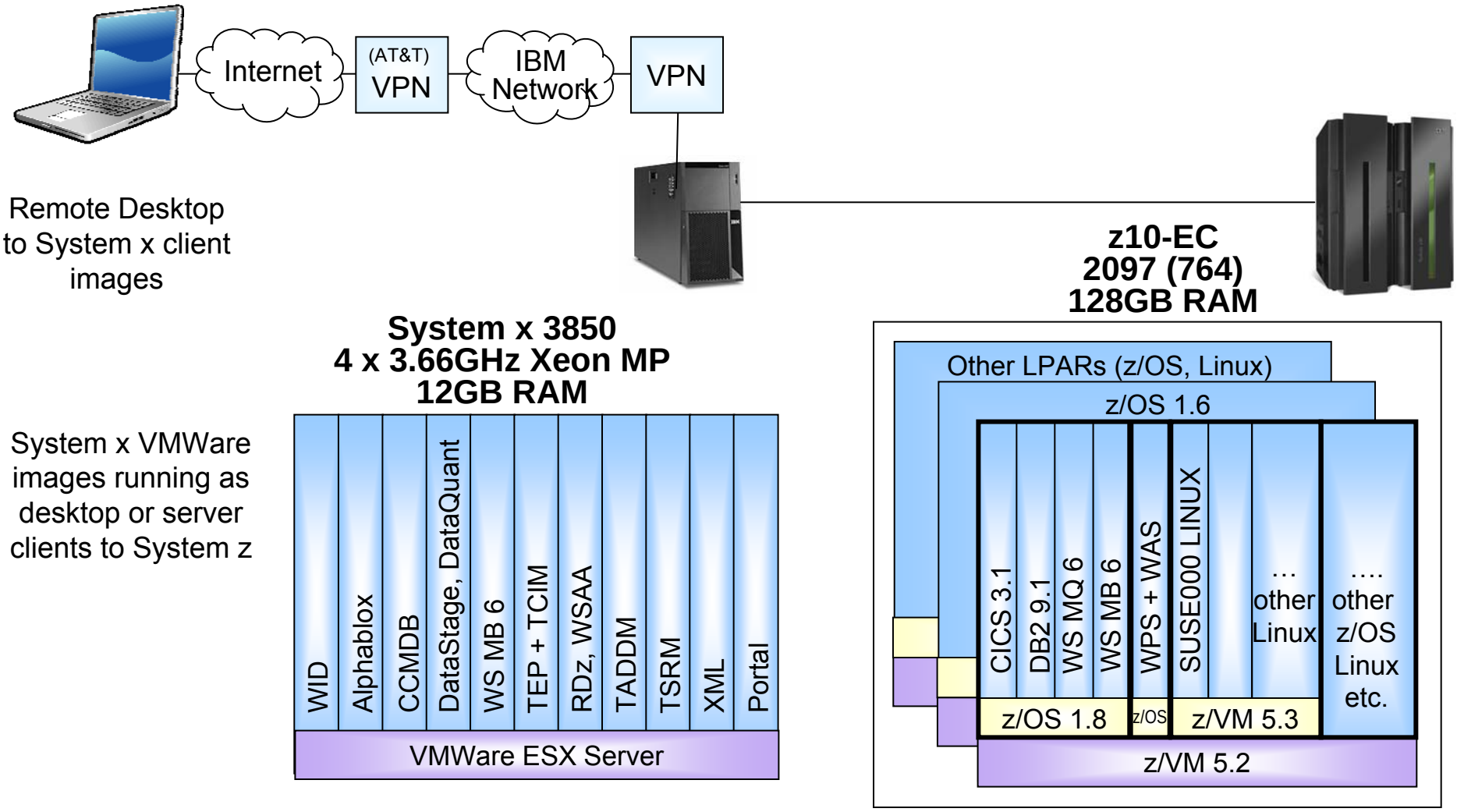
We need a next generation banking system!

Marketing

Service Oriented Finance

Service Oriented Finance CIO

DEMO: Architecture



Our Agenda Today

Agenda	
45 minutes	Affordable Business Growth with System z
45 minutes	Add New Workload - Extend Access Channels with SOA
15 minutes	*Break*
30 minutes	Add New Workload – Data Servers on System z
30 minutes	Add New Workload - Data Warehouse on System z
30 minutes	Add New Workload - Communications Backbone
60 minutes	*Lunch*
45 minutes	Server Consolidation to Linux on IFLs
35 minutes	Extend IT Service Management
15 minutes	*Break*
25 minutes	Extend Development Team Productivity with Eclipse and Web 2.0
45 minutes	The Truth About Offloading