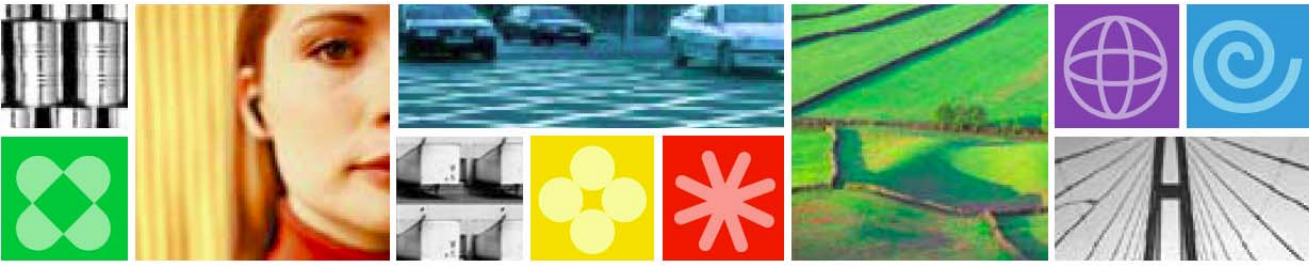
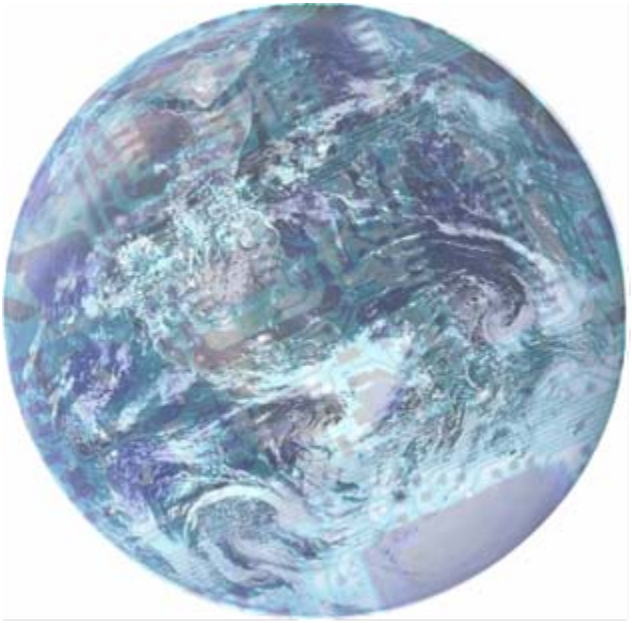
System z: The smart platform for a smarter planet

SWG Competitive Project Office



Something Meaningful Is Happening

"Every human being, company, organization, city, nation, natural system and man-made system is becoming ***interconnected, instrumented and intelligent.*** *This is leading to new savings and efficiency—but perhaps as important, new possibilities for progress."*



The world is getting smarter!

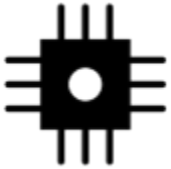
Consider How Our World Is Changing: Our World Is Becoming More…

INTERCONNECTED

- 1/3 of the world's population on Web by 2011
- 4B mobile subscribers globally at end of 2010
- 37K cyber attacks in the US in 2007 (158% increase since 2006)

INTELLIGENT

- 15 petabytes of new information generated every day (8x more than the information in all U.S. libraries)
- 64B credit card transactions/year (up 35% YTY)
- New York Stock Exchange quote messages will be 400B/year by 2012 (up 900% from 2000)



INSTRUMENTED

- 30 billion embedded RFID tags by 2010
- 1/2 of all sensors in transportation, facilities and production equipment are smart sensors

Despite Progress – We Can Do Better

- US healthcare system losing > $100B/year to fraud
- European retail sector wasted nearly €2B in 2006
- US Consumer Packaged Goods businesses lose $40B/year due to supply chain inefficiencies
- $11.5B/year of Indian produce is wasted
- 40% of insurance adjusters time wasted doing routine overhead functions
- For every 1,000 knowledge workers, $5.7M/year worth of productivity is wasted reformatting information between applications

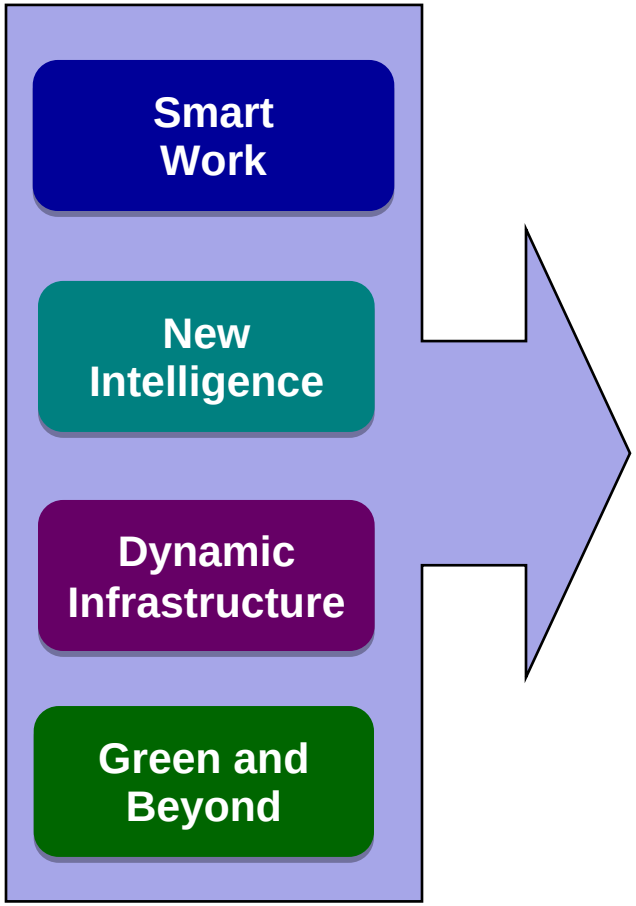
Growth Of IT Energy Usage In Data Centers Continues At An Alarming Rate

- Data centers have doubled in consumed power in the last five years.
  - At this rate, in 20 years (the average life of a data center) there will be 15 additional data centers for every one today
- Data centers consume 30-100 times energy/sq. ft. than typical office building. Many are close to power limits or running out of power. Why?
  - Vast infrastructure is needed to support microprocessors upon which computing is done. Consists of:
    - Power
    - Cooling
    - Floor Space

To Make Sense Of This New World, We Must Address Four Critical Questions

"New business and process demands"	"Data is exploding and it's in silos"	"My infrastructure is inflexible and costly"	"Our resources are limited"
I Need to Work Smart	**I Need Insight**	**I need to respond quickly**	**I Need Efficiency**
How can we work smarter supported by flexible and dynamic processes modeled for the new way people buy, live and work?	*How can we take advantage of the wealth of information available in real time from a multitude of sources to make more intelligent choices?*	*How do we create an infrastructure that drives down cost, is intelligent and secure, and is just as dynamic as today's business climate ?*	*How do we drive greater efficiencies, compete more effectively, and respond more quickly by taking action now on energy, the environment, and sustainability?*
Smart Work	**New Intelligence**	**Dynamic Infrastructure**	**Green and Beyond**

Today's Seminar Will Demonstrate Why IBM Software And System z Are The Smart Platform For The Smarter Planet



Innovation …
State of the art software for smarter planet solutions

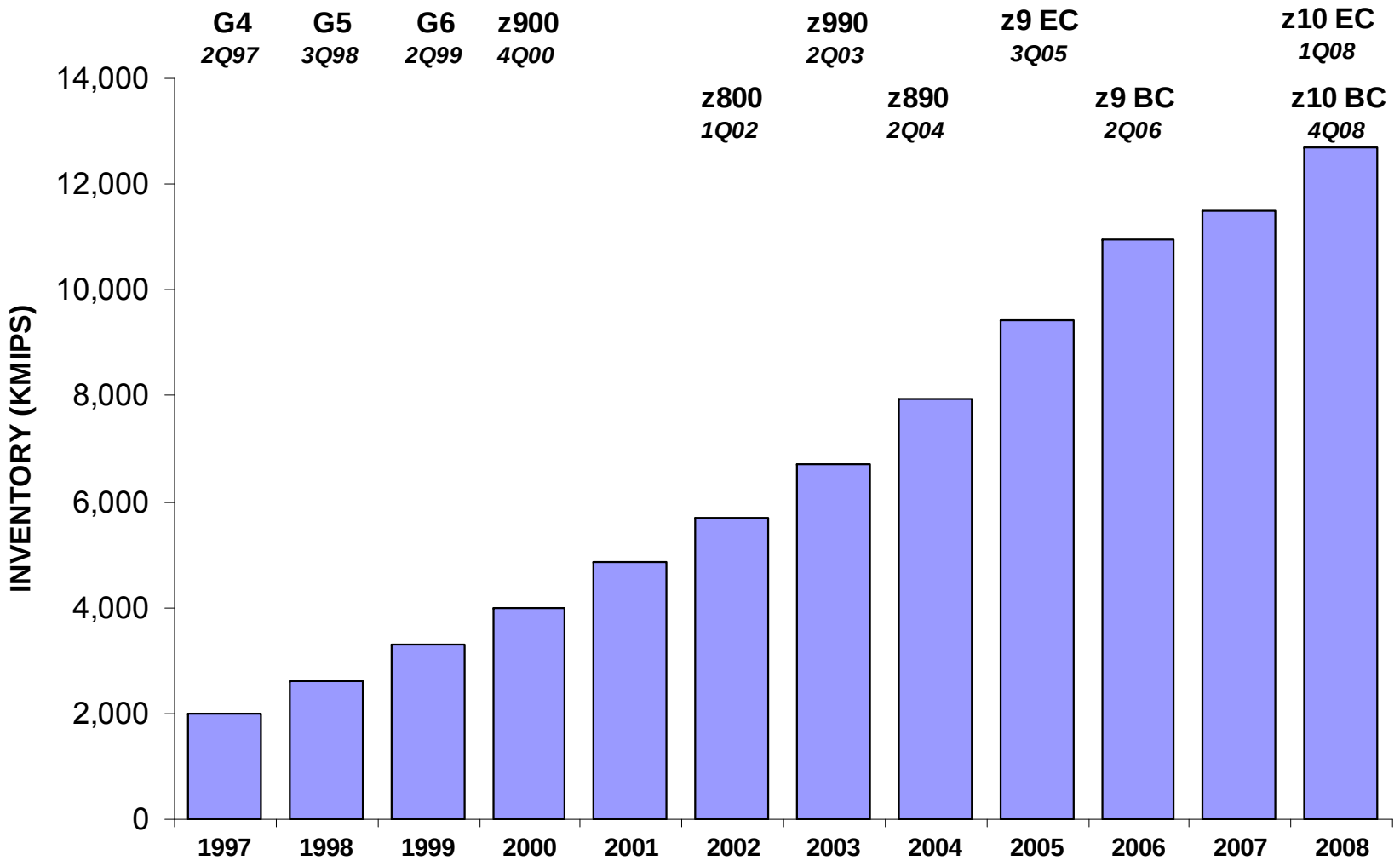
Efficiency …
Lowest total cost of ownership

Performance …
Delivers unrivaled qualities of service

Key Questions For A Smarter Planet Data Center

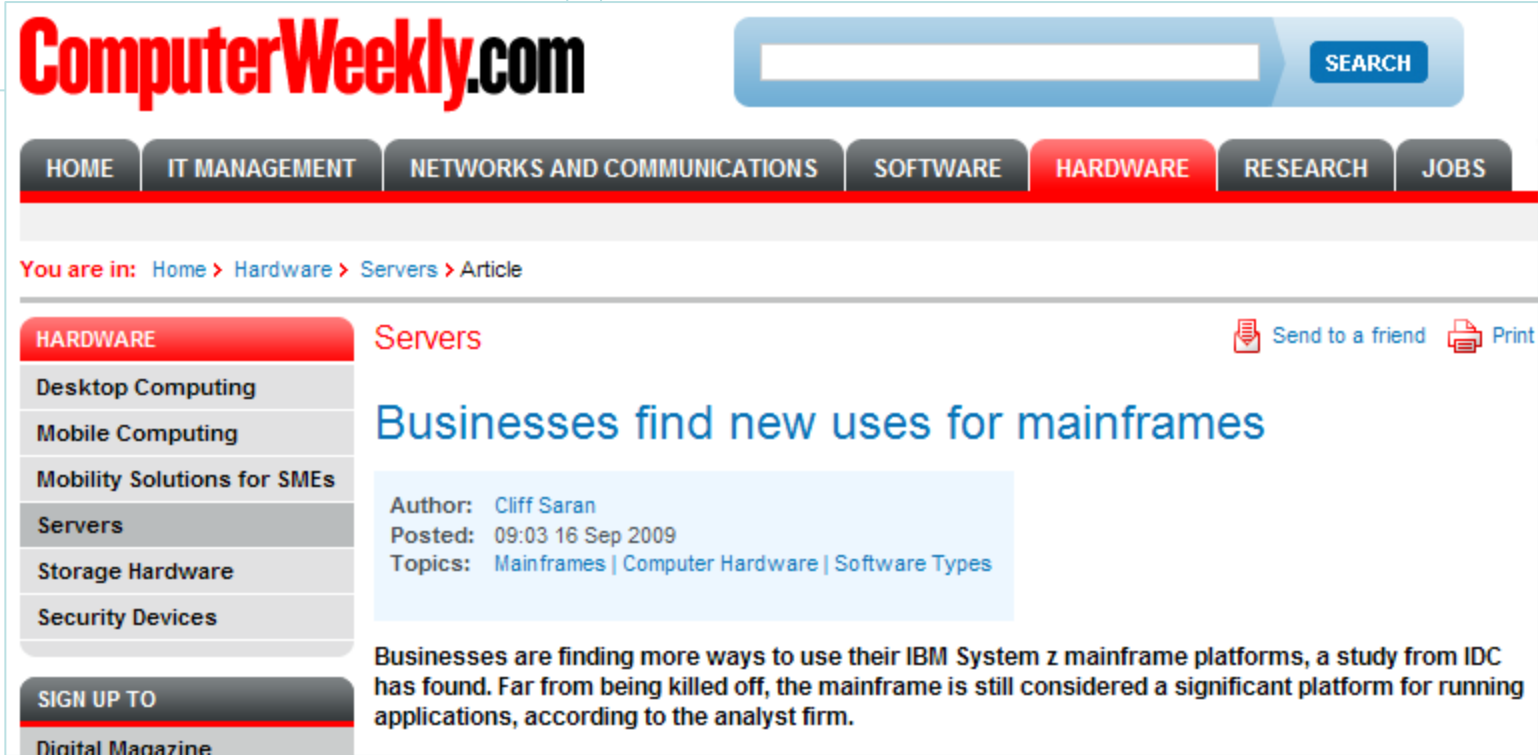
- ✓ *Can you adapt workloads and processes to local conditions?*
- ✓ *Can you make changes to your business processes quickly?*
- ✓ *Are you still working with data on paper?*
- ✓ *Can you provide a consistent, enterprise-wide view of critical customer data?*
- ✓ *Do you operate your data center at the lowest possible cost?*
- ✓ *Are your clients satisfied with their response time for new service requests?*
- ✓ *Are you wasting energy?*
- ✓ *Are you reaching the limit of your data center capabilities?*
- ✓ *Are you monitoring your energy consumption?*

Solid Growth In Worldwide Mainframe Capacity



CAGR 1997-2008 = 18%

Enterprises Virtualize, Consolidate, and Find New Uses For System z



System z Solution Editions Bundle Hardware, Software, And Maintenance At The Best Price

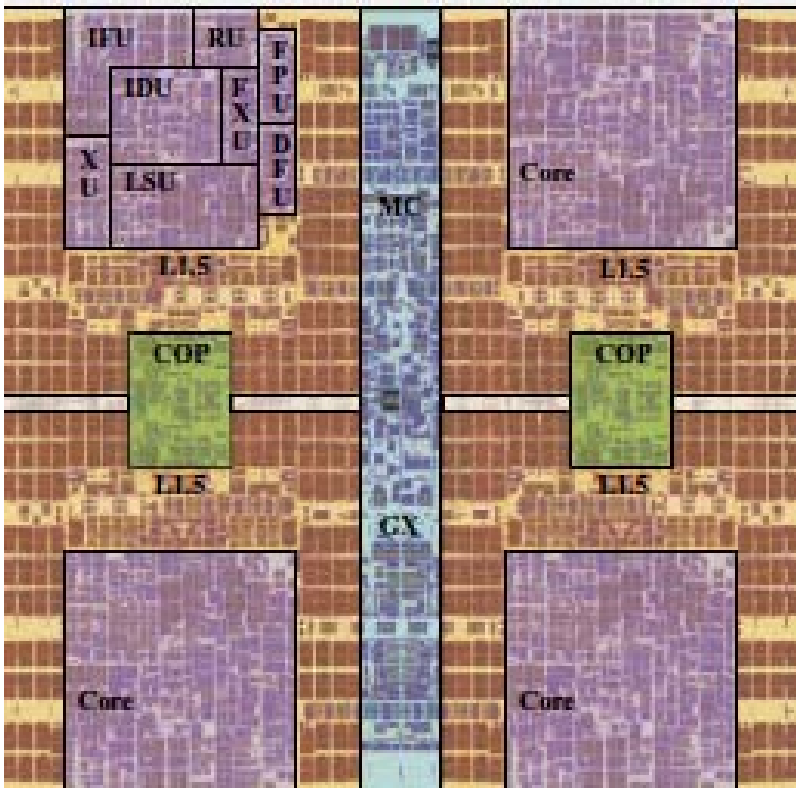
- Integrated System z **hardware, software** and **maintenance**
  - 3-5 year “bottom line” price
- Focus: new System z workload opportunities
- Solution Editions usually include:
  - z10 HW (standalone footprint or capacity upgrade for isolated LPAR)
  - Prepaid HW maintenance
  - Comprehensive middleware stack (including S&S)
  - Services (as needed)
  - Storage (as needed)

Smarter Planet Solutions Need Platforms With The Right Qualities Of Service

- Unprecedented levels of availability to support new services
- On demand capacity to expand and contract as needed
- Scalability to meet the most demanding workloads
- Security to protect processes and information
- Operationally friendly
- Green, lowering energy costs
- Has smart software to enable smarter solutions

Secure and Agile

Good Hardware Designed For Reliability

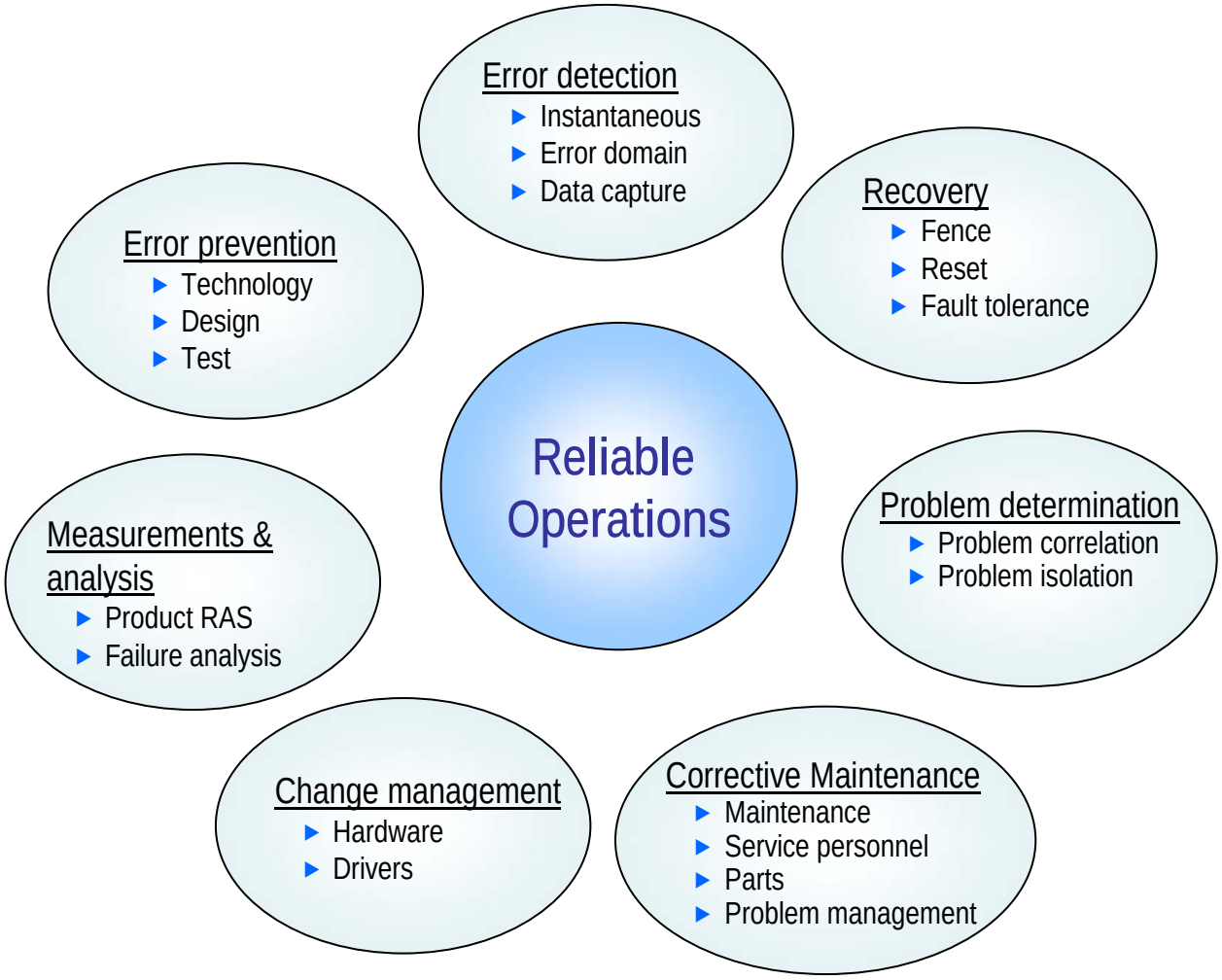


35% of the chip is dedicated to availability management

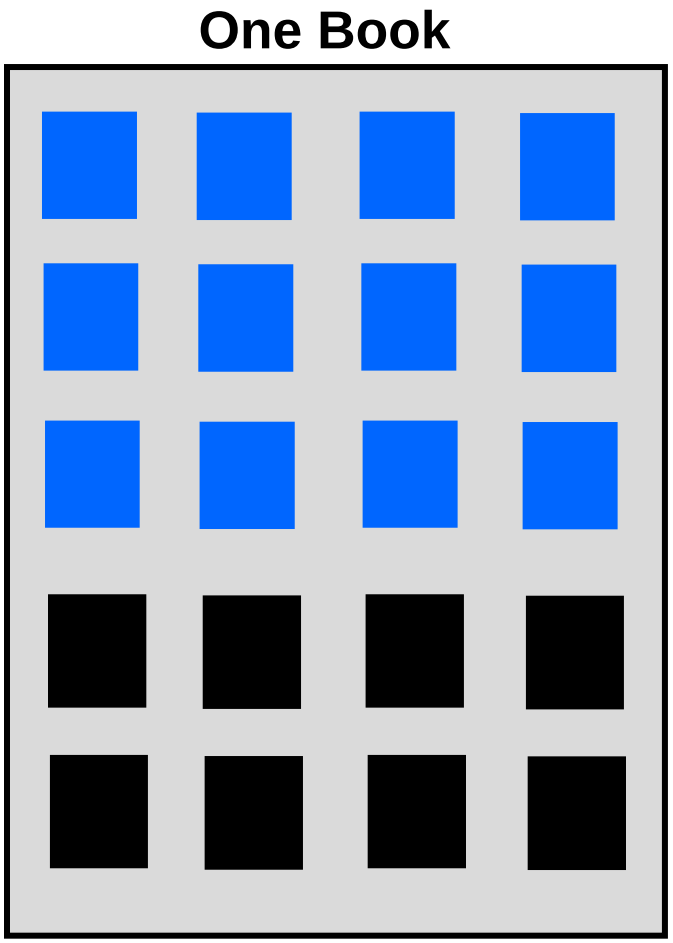
- Chip real estate
  - Logic units 65%
  - Redundancy 15%
  - Checkpoint Maintenance 8%
  - Error checking 5%
  - Containment Logic 5%
  - Recovery Logic 1%
  - Error Reporting 1%

Good Hardware Designed For Reliability

Examples of hardware reliability and serviceability features



Capacity On Demand – Fast Growth To Scale When You Need It

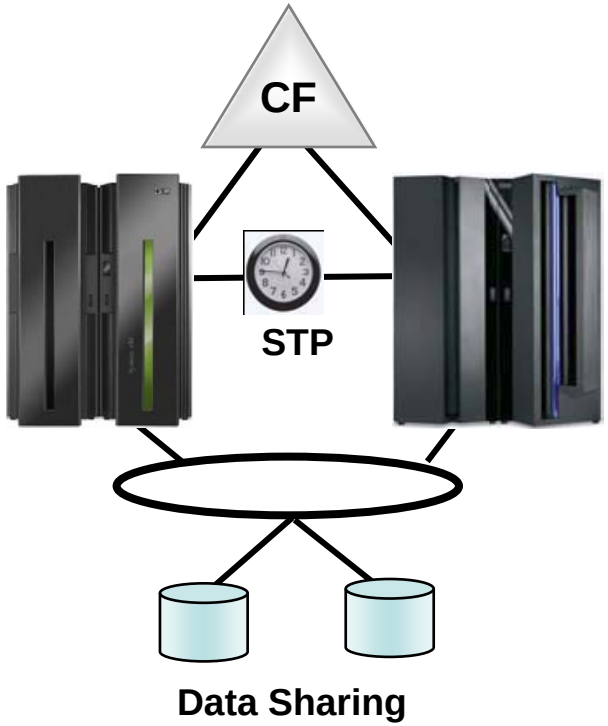


Pay for 12 active processors
Do not pay for 8 dark processors needed

- Each System z can be configured with as many as 64 processors
- Comes with capacity on demand processors already installed
- Ship fully populated books (20 processors per book)
- On-line or remote turn on
- System automatically takes advantage of activated processors

The Parallel Sysplex Design Is Unique

- Unique combination of hardware and software designed for clustering
- Systems can be clustered up to 32 nodes
- Entire cluster functions as a single system image
- Middleware designed to use coupling facility hardware



- Resulting in:
  - **Unmatched linear scalability**
  - **Superior 99.999% availability**
  - **Business-driven workload management across cluster**

No other vendor offers this!

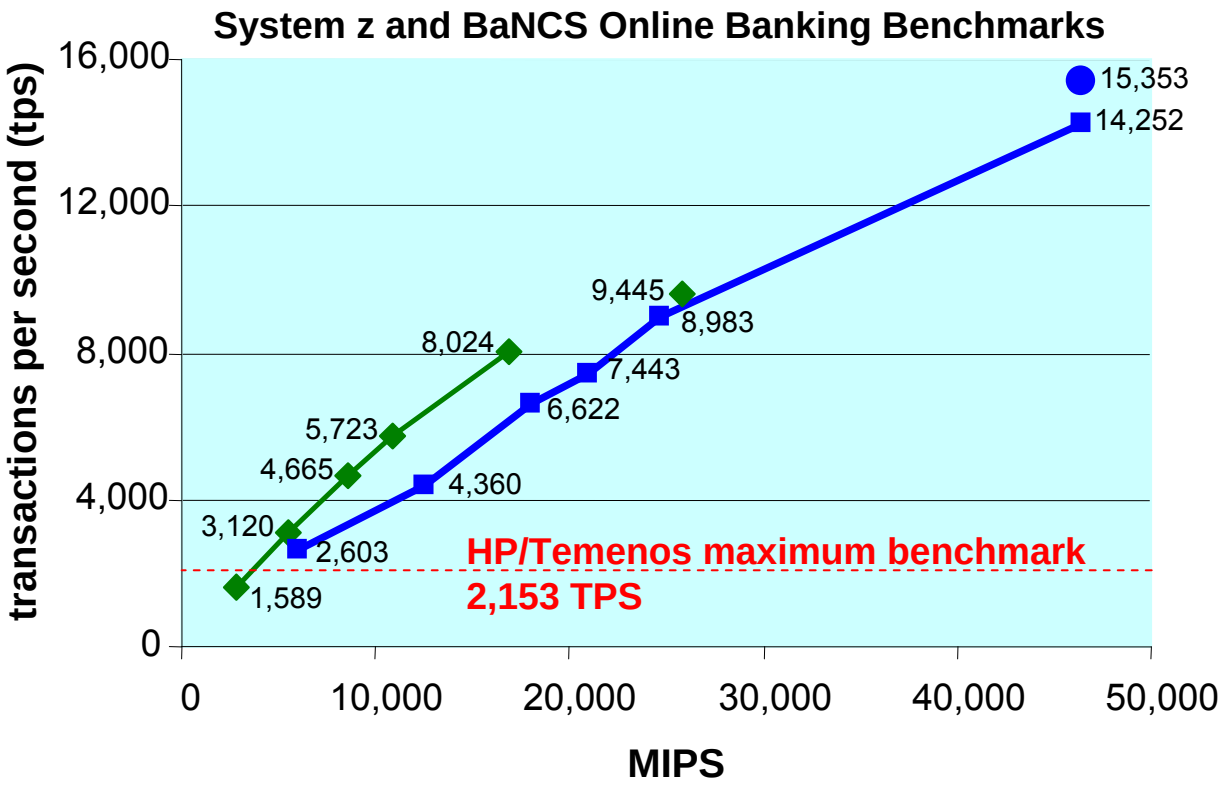
System z Parallel Sysplex With DB2 Scales Further Than The Best HP Superdome Banking Benchmark

- **Kookmin 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

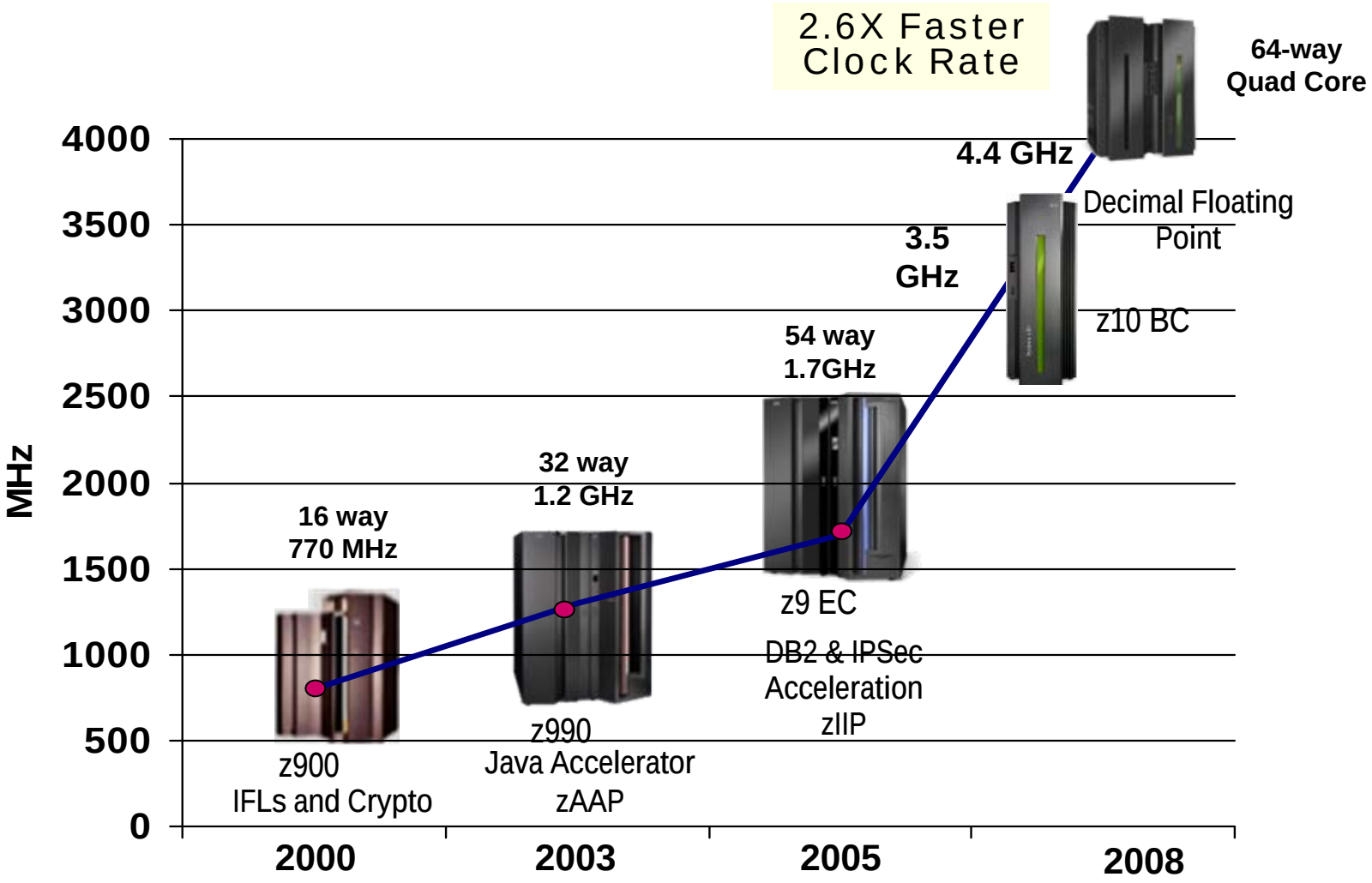
- **HP/Temenos** *
  - **HP Itanium**
  - **Temenos T24**
  - **2,153** Transactions/second
  - **13** Million Accounts
  - Largest banking benchmark performance claimed by HP

System z can process over 55M transactions/hour, and 380M accounts

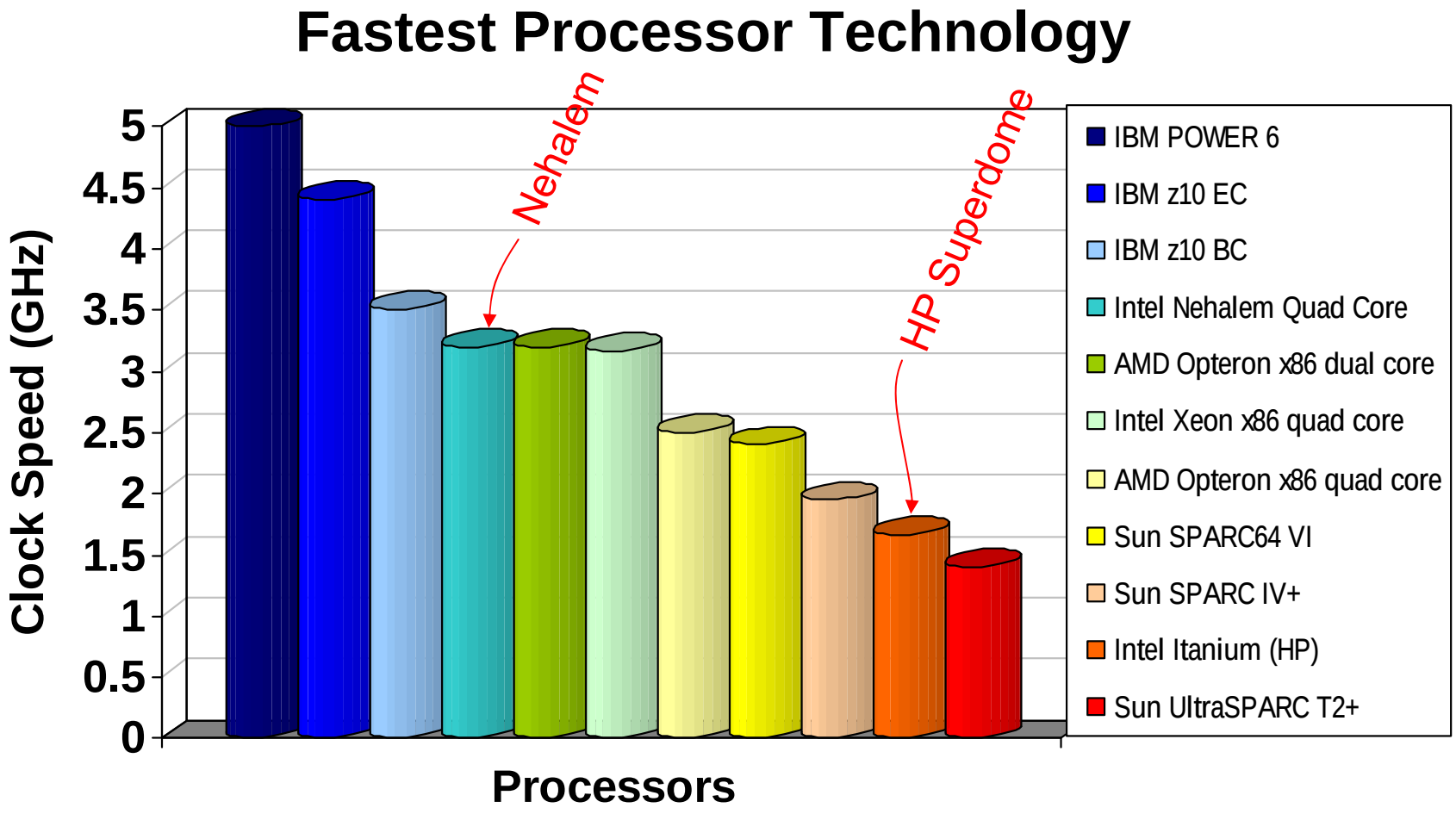


* **SOURCE**: TEMENOS BENCHMARKS; http://h71028.www7.hp.com/enterprise/downloads/TemenosBenchmark.pdf
** **SOURCE**:http://www.enterprisenetworksandservers.com/monthly/art.php?2976 **Source**: InfoSizing FNS BANCS Scalability on IBM System z – Report Date: September 20, 2006
*** Standard benchmark configuration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

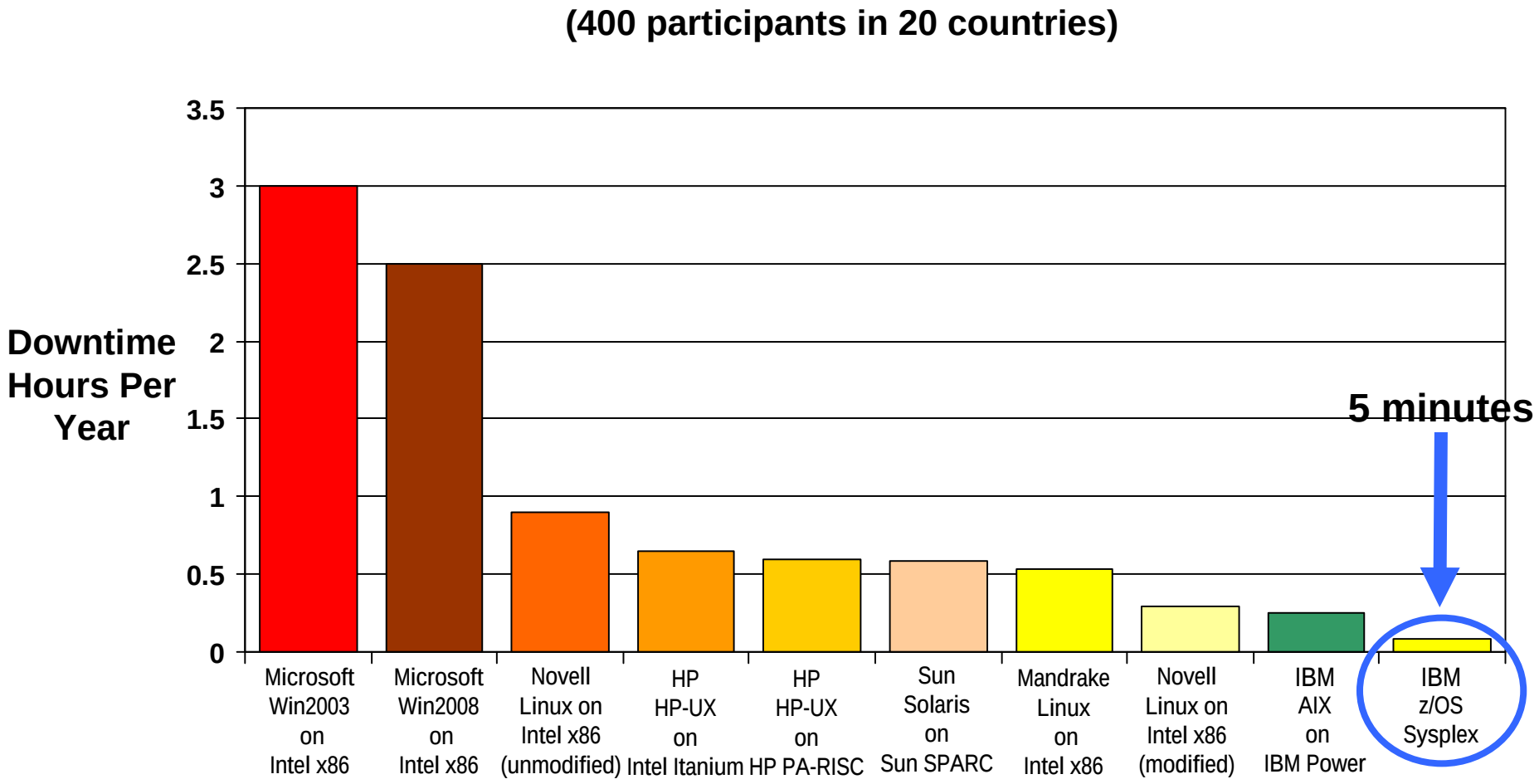
IBM System z10 Scalability Extends Mainframe Leadership Even Further



IBM Clock Speed Eclipses All Others



System z Has The Best Availability*



Source: ITIC: ITIC 2009 Global Server Hardware & Server OS Reliability Survey; July 2009; http://itic-corp.com/blog/2009/07/itic-2009-global-server-hardware-server-os-reliability-survey-results/; Results are measured in minutes per year.

*Note: All operating systems included in the survey are not included in this chart. Fifteen operating systems on various processor architectures were included in the survey. The chart will be updated when the full report is available.

TD Bank Achieves 99.999% Availability

- **Background**
  - TD Bank has been running Parallel Sysplex
    - No Sysplex-wide outage for **13 years**
  - System z is used for Customer Account Data for applications supporting Tellers, Internet Banking and ATMs

- **TD Bank Recommendations**
  - Keep sysplex up – do not bring it down
  - Practice Rolling IPLs
  - Exploit concurrent hardware upgrades
  - Use automation
  - Configure your sysplex for availability
    - IMS/DB2 Data-sharing
    - Transaction routing
    - Sysplex Distributor for TCP/IP
    - Online database reorganizations
    - Clone each image
    - Ensure applications exploit parallel sysplex

- Client Environment
  - **System z**
  - **z/OS**
  - **DB2**
  - **IMS**
  - **WMQ**
  - **GDPS**

Parallel Sysplex Deployment consists of five System z across two sites running 42 M business transactions a day

TD Bank Financial Group

HP “Non-Stop” Delivers Nine Hours Downtime At Bursa Malaysia

Sequence of events	
5:30 am	One hard disk fails
5:35 am	Faulty disk replaced
6:00 am	Replacement disk faces problems; triggers failure of other disk and CPU
6:30 am	System restarts; several brokers unable to connect to central trading system
8:00 am	Over 50% of brokers fail to connect
8:30 am	Suspends trading; activates back up site
1:00 pm	Back-up site start-up process takes longer than expected
1:20 pm	Decides to start afternoon session from primary site
3:15 pm	Pre-opening orders keyed-in; connectivity problem crops up
3:30 pm	Unable to resolve connectivity with brokers in time; extends trading suspension

BURSA MALAYSIA

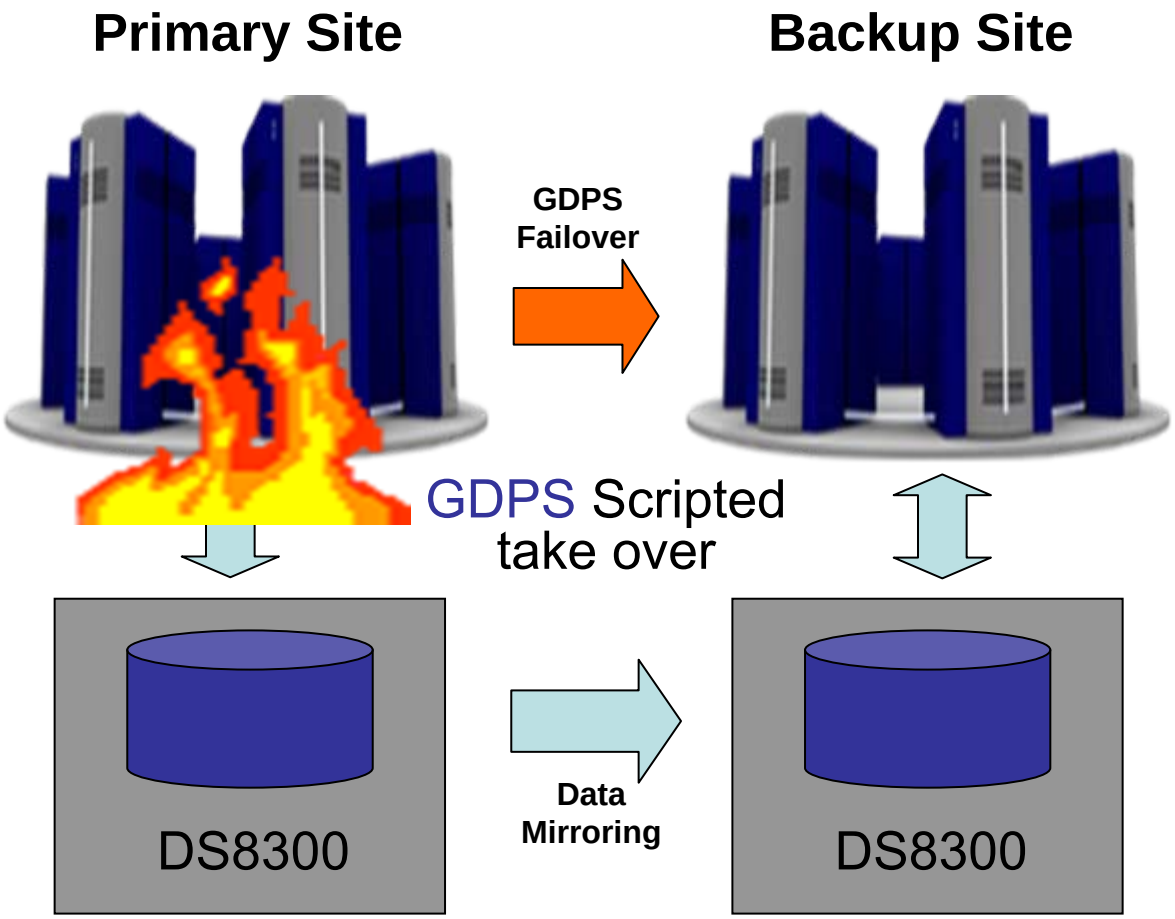
Estimated opportunity loss of about RM450,000

“After spending millions of Ringgit, their information technology (IT) people still haven't got their act together. The IT system should be fail-safe but (in this case) the back-up system also failed.”

Jimmy Vong
EquitiesTracker Founder

http://biz.thestar.com.my/news/story.asp?file=/2008/7/4/business/21738638&sec=business
http://biz.thestar.com.my/news/story.asp?file=/2008/7/5/business/21748124&sec=business

The Mainframe Keeps The Business Running Even In the Event Of Data Center Disaster



- Site Failover
  - Failover to secondary site in case of complete site failure
- Data Mirroring
  - Protect data in the event of a disk system failure

Disaster Recovery Solution Helps Achieve Continuous Availability

- iT-Austria is Austria's largest data processing center
  - Three data centers running System z9s located 10 km apart
- Objectives
  - Recover from an outage within an hour, with no data loss
  - Under 5 minutes disruption for unplanned outages
  - Preserve business continuity for online transactions
- Results
  - Used HyperSwap for near continuous availability and no data loss
    - Planned disk recovery of 12-19 seconds with no application outage
    - Unplanned disk recovery was under 8 seconds
  - Automated mirroring dramatically simplified recovery time
  - Leveraged parallel sysplex for high redundancy and availability

".. Using the GDPS/PPRC HyperSwap technology is a significant step forward in achieving continuous availability…"

" Without HyperSwap, planned and unplanned reconfigurations had resulted into a service outage of almost 2 hours. …"

Wolfgang Dungl, Manager of Availability, Capacity and Performance Management

Security Is Becoming A Critical Issue

consumeraffairs.com
knowledge is power!

TJX to Pay Mastercard $24M for Data Breach

Will set aside money to provide restitution for victims

CHICAGO SUN-TIMES
suntimes.com Member of the Sun-Times News Group

June 28, 2008 Associated press

Hackers breach Wards.com

A established Chicago retailer experienced a hack of credit card numbers but did not inform customers, despite notification laws

AXcess News
News for the X generation

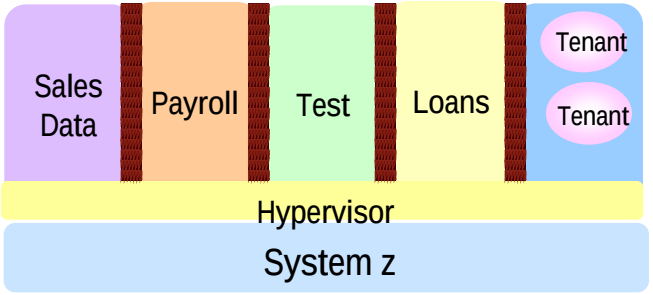
USDA admits data breach, thousands of social security numbers revealed

17 April 2007- (AXcess News) Washington

The US Department of Agriculture admitted a security breach allowing 63,000 social security numbers to be made available on a public website

System z Provides A Secure Foundation

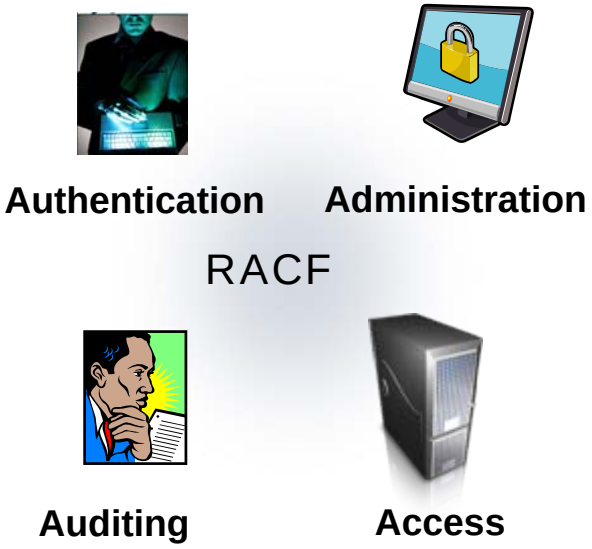
- Workload isolation
  - Processing integrity with LPAR separation
  - Isolation of users in separate address spaces
  - Storage protect keys to isolate system programs from user programs and memory
  - Virtual machine cannot circumvent system security features and access controls
  - Hipersockets provides secured communications between z/OS partitions
- Highest Common Criteria ratings of all commercial operating systems
  - PR/SM certified at EAL 5
- Isolation protects against malware



Isolates each workload for protection

Integrated Access Control Eliminates Loopholes

- RACF* controls authorization and authentication
  - Identity management and user authorization
  - Controls access to resources
  - Authentication
  - Centralized auditing and logging
- Can reduce security complexity
  - Centralized administration and management
  - Consistent policies across workloads
- RACF protection enforced automatically
  - System blocks unauthorized attempts
  - You cannot bypass RACF
- RACF is integrated with System z Middleware
  - DB2 CICS, IMS, WebSphere
  - Multi level security provided



*** Resource Access Control Facility**

Encryption Protects Data At Rest And In Motion

Protect operational data with data masking

Protect integrity of data read by business partners

Protect tapes leaving your enterprise* with Tape Encryption (TS1120, TS1130)

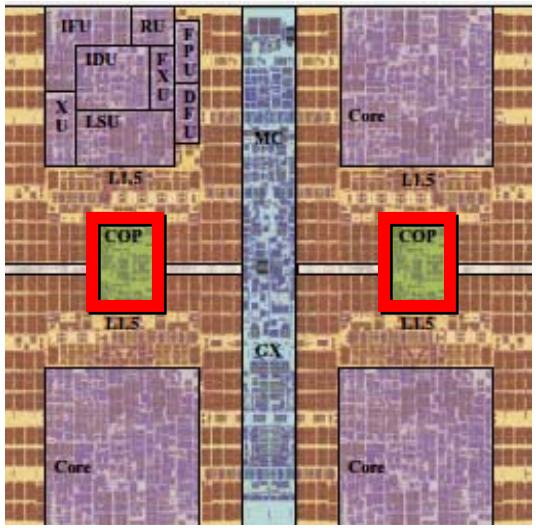
Secured key serving

Highly secure crypto cards

Protect data on the wire with network encryption

Protect archived data with storage encryption

System z Provides Built In Encryption



- **CPACF- Central Processor Assist For Cryptographic Function**
  - Each two cores share a CP Assist for Cryptographic Function (CPACF)
  - Provided free of charge
- **Crypto Express2 Card**
  - High performance cryptography
    - 10,000 SSL handshakes per second
  - Tamper proof
  - Secure key cryptography – key never exposed
  - Dynamically configurable as either a co-processor or accelerator
  - Supports automatic tape encryption
  - FIPS 140-2 Level 4 compliant

The Mainframe Provides Defense Against Network Intrusions

- Many vulnerabilities come from network attacks
- Preventative intrusion defense with z/OS Communications Server
  - Determines network intrusions in real time
    - Integrated firewall filtering functions
    - Detects port scans and suspicious access patterns
    - Helps prevent denial of service attacks
    - Blocks future intrusion attempts from suspect sites
- Automatically applies defensive mechanisms
  - Policy controls limit number of connections
  - Issues notifications to take corrective action
    - Shut down ports, send alerts, discards packets
- Network encryption options using industry standards
  - SSL, IPSec for VPNs
  - AT-TLS for transparent application access to transport level security reduces maintenance costs

Operationally Friendly

- System z keeps running during repairs and upgrades optimizing operational ease
  - Memory can be upgraded when system runs
  - Books can be replaced without disruption
  - Patches can be applied online without taking systems down
  - Parallel sysplex enables rolling release upgrades, one node at a time
    - Allows for non intrusive upgrades of systems
  - Operations enables coexistence of multiple versions of systems software
    - Useful for testing of new system software versions

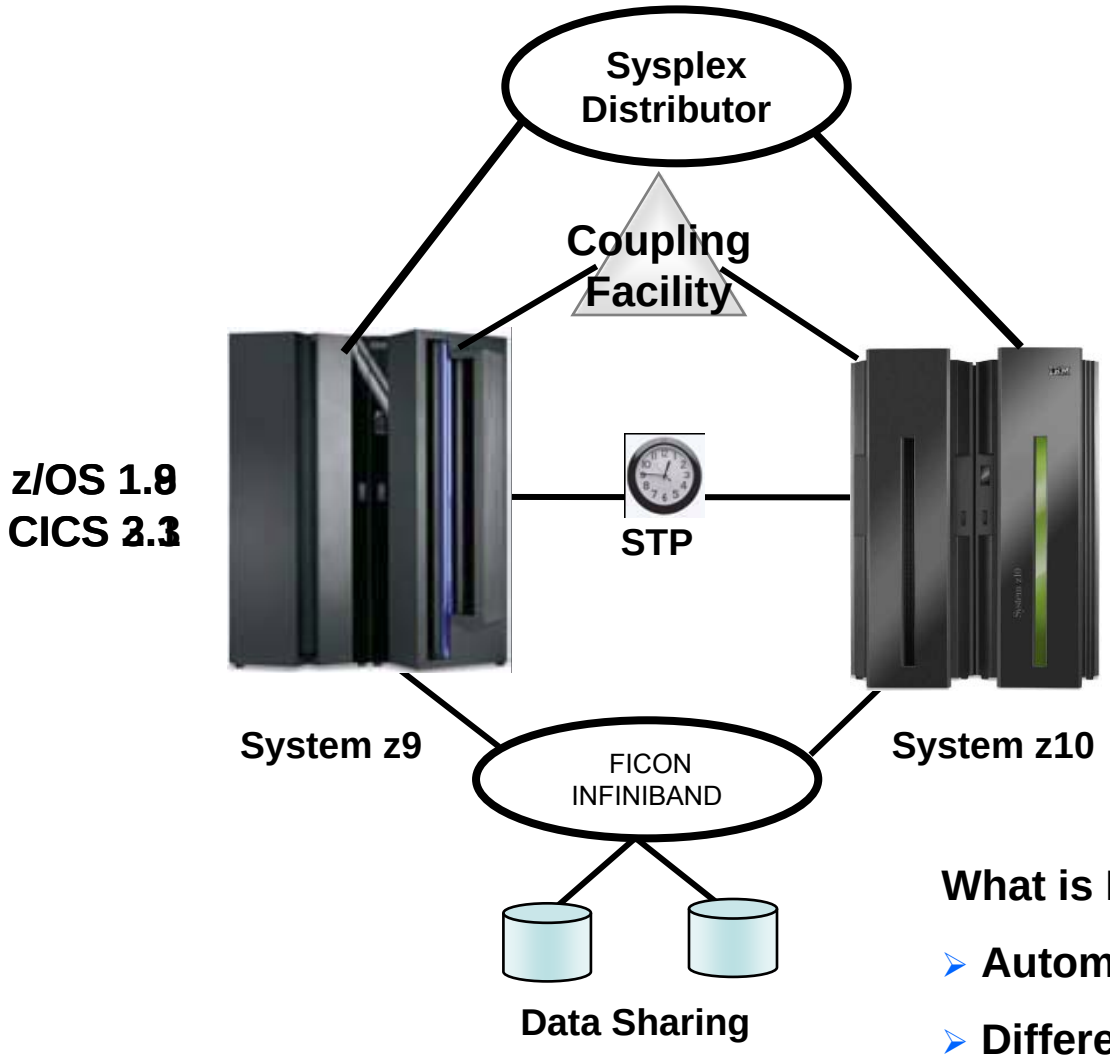
DEMO: How Does Hardware Repair And Upgrade Work?

- Perform a memory upgrade while the system continues to run
- Service engineer dispatched automatically through “phone home”
- Parts already ordered through IBM global parts replacement program
- The book is removed while the system is operational
- Memory cards can be added easily similar to servicing a PC
- Even the service tray is included

Types of Replacements:

1. In z10 EC, add a single book for processors, memory, and I/O Connections
2. Remove and replace a book
3. Allocate physical resources on other books

System z Supports Rolling Software Updates

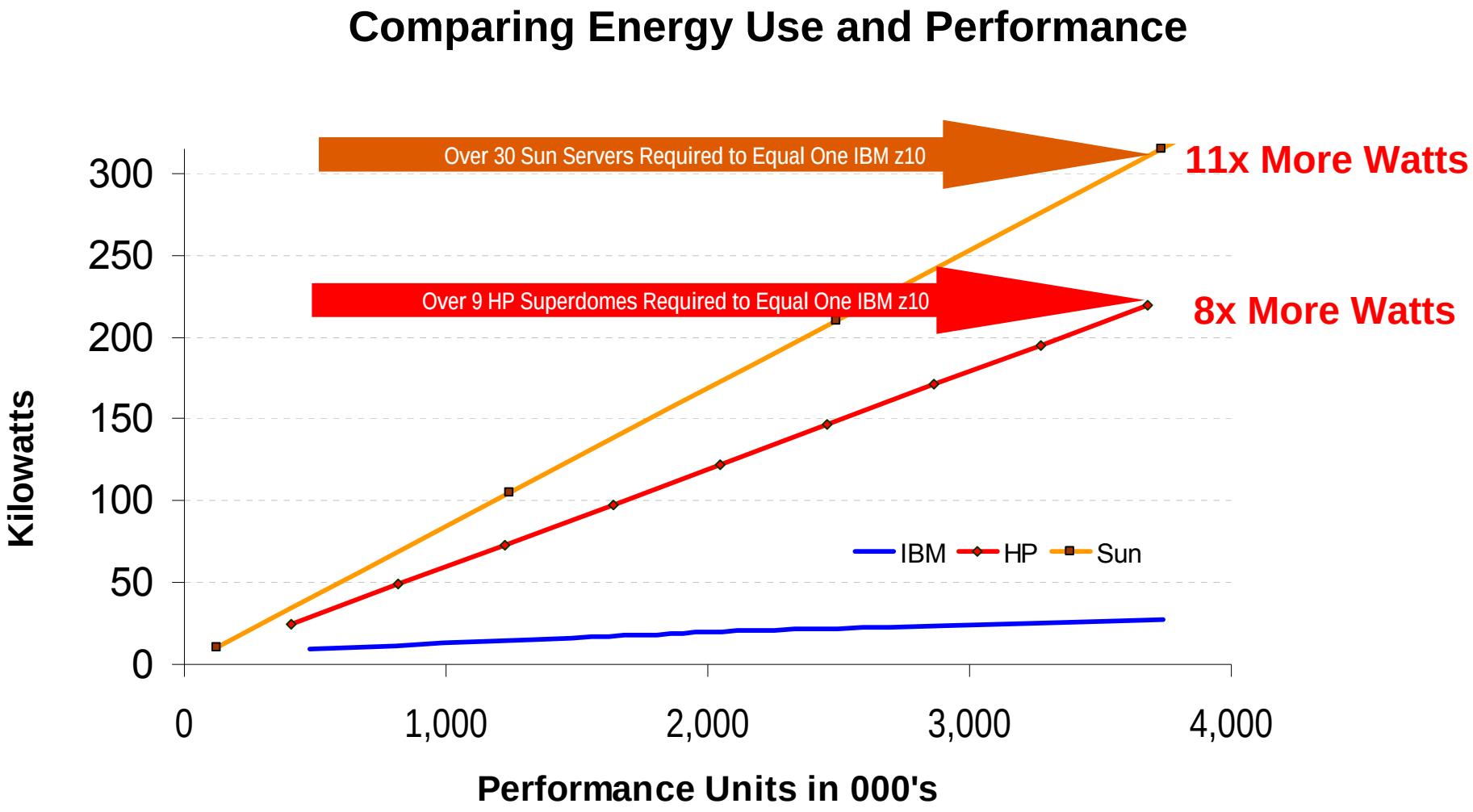


- Shutdown LPAR on z9 for maintenance
- Upgrade OS and middleware on LPAR
- IPL LPAR on System z9
- Shutdown LPAR on System z10 for maintenance
- Upgrade middleware on LPAR
- IPL LPAR on System z10

What is Needed?

- **Automatic Sysplex Failover**
- **Different versions of Operating System and middleware can coexist in a Sysplex**

Consumes Less Power Than HP And Sun For The Same Work

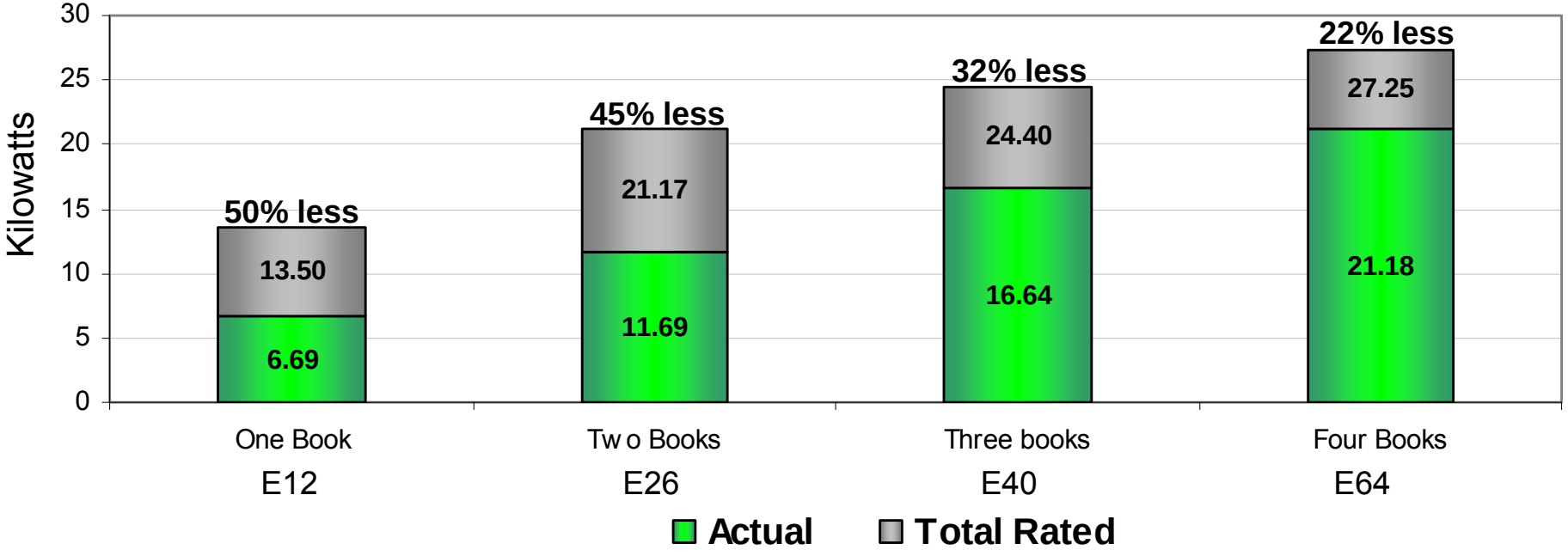


*HP Integrity Superdome Itanium 2 9050 64/128

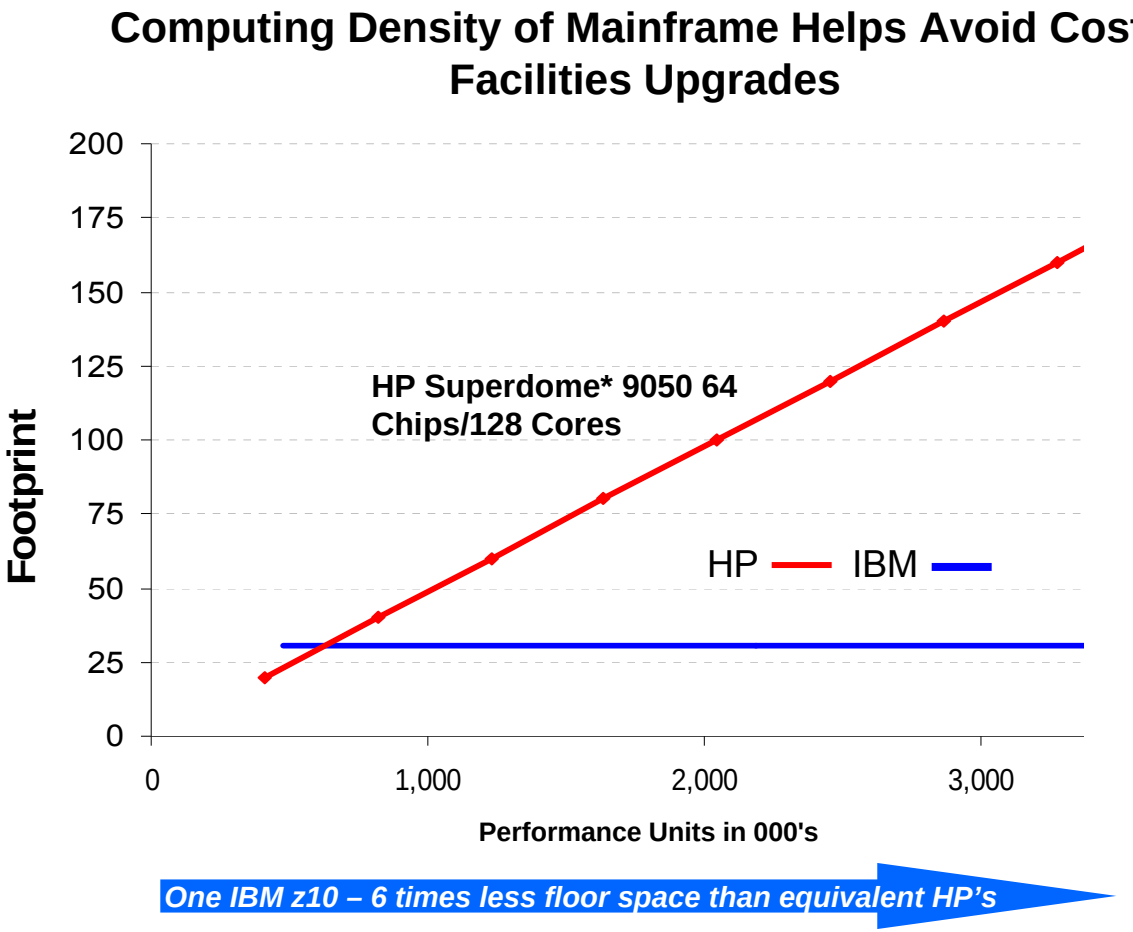
**Sparc Enterprise M8000 16/64

Actual System z10 Energy Consumption Is Often Better

Actual energy consumption experienced by 243 customers compared to rated value



The Mainframe Also Delivers More Compute Power Per Unit Of Floor Space

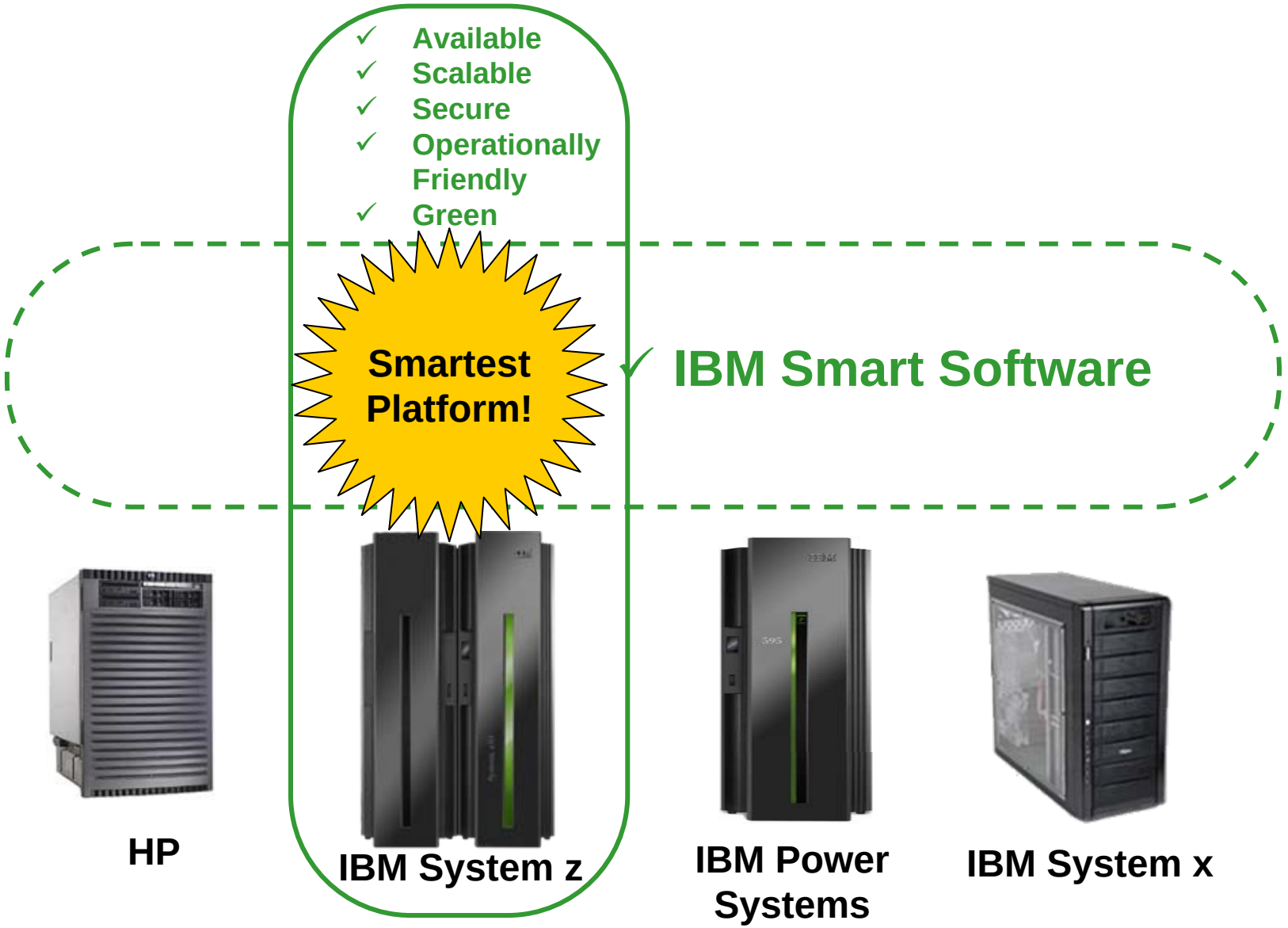


9 HP Superdomes equivalent performance to one IBM System z10 EC at 6X the floor space

Source for HP, Sun Server calculations
Source IBM : IBM customers

*HP Integrity Superdome Itanium 2 9050

The Combination Of Hardware And Software Is The Smartest Platform For A Smarter Planet



Introducing Service Oriented Finance

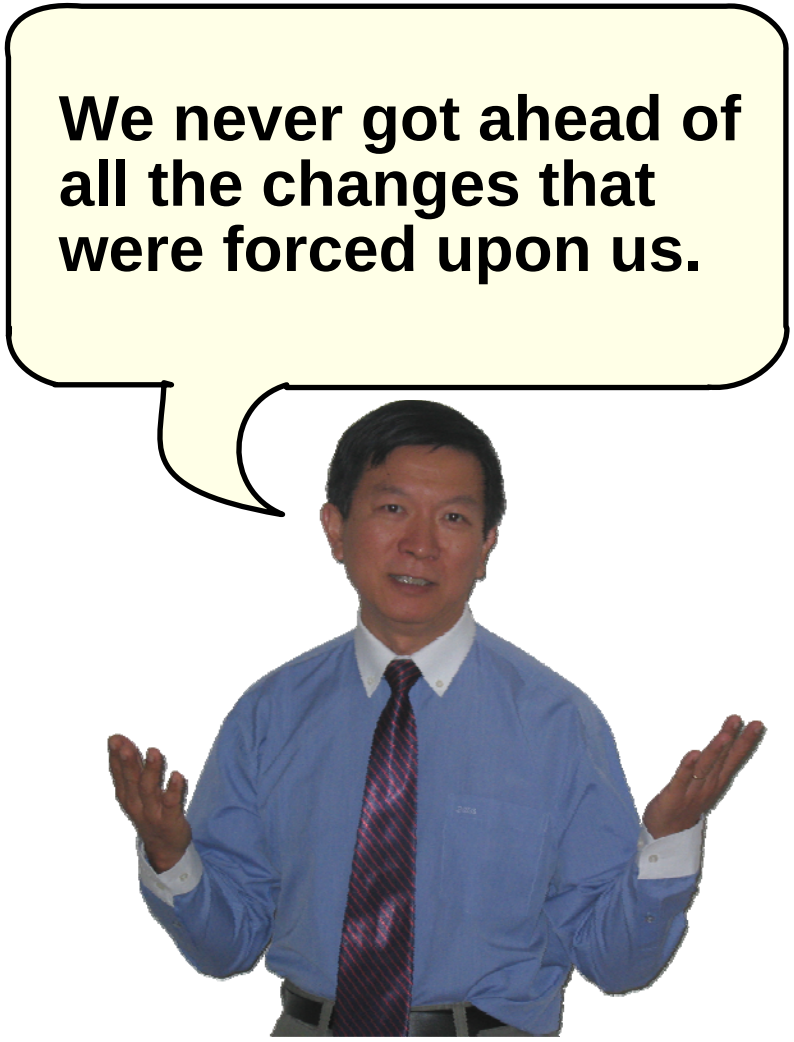
We are a traditional bank with branch offices throughout the country.

This has been a difficult year. Survival is our a top priority.

We need to cut costs!

Service Oriented Finance CEO

Service Oriented Finance



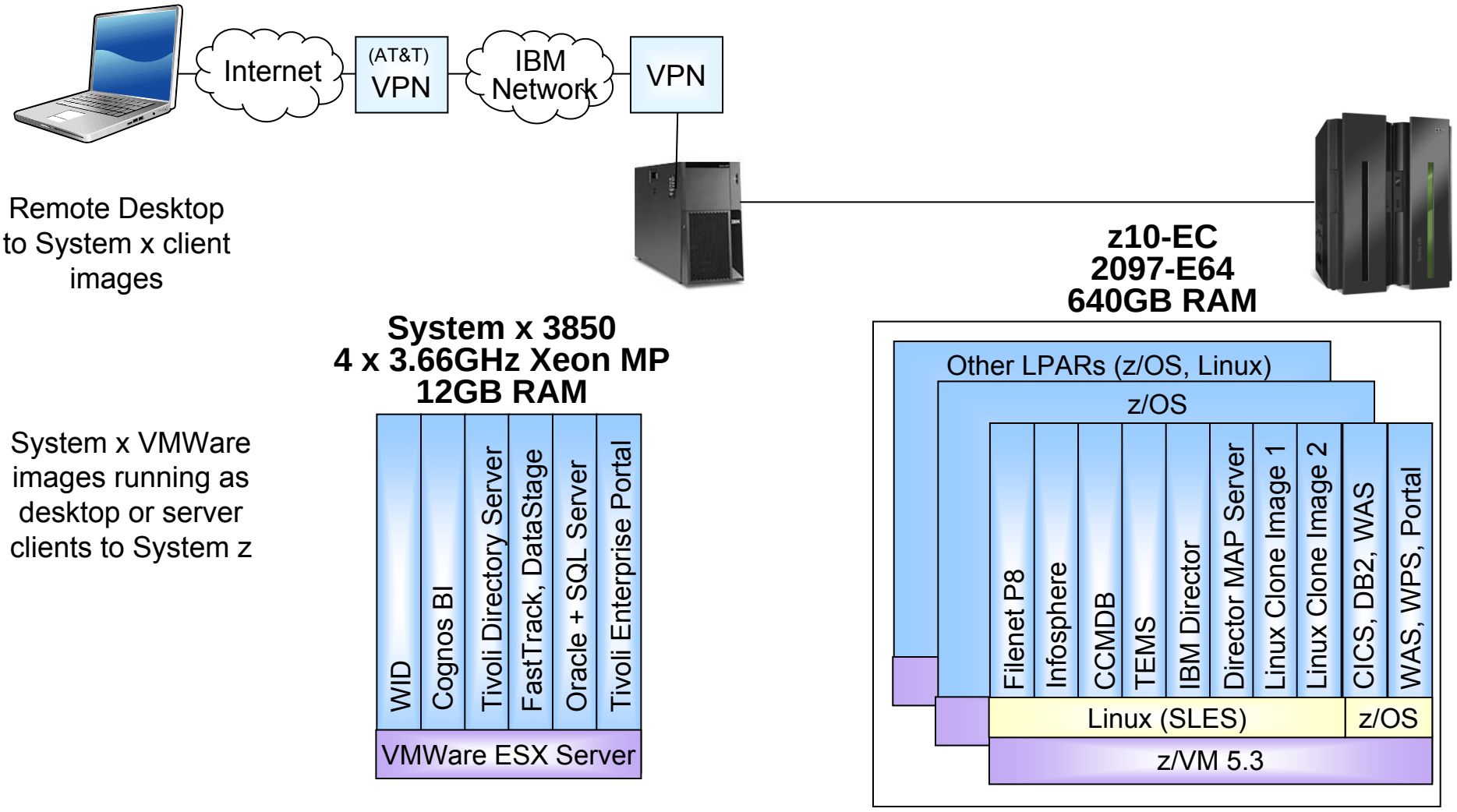
Service Oriented Finance

We had to cut staff.

So how can we make changes, while maintaining our current operations?

Service Oriented Finance
CIO

DEMO: Architecture



Our Agenda Today

60 Minutes	System z: The smart platform for a smarter planet
10 Minutes	**Break**
60 Minutes	Smart work on System z
10 Minutes	**Break**
60 Minutes	Handling the information explosion to make smarter decisions
60 Minutes	***Lunch***
60 Minutes	Dynamic infrastructure with System z
10 Minutes	**Break**
60 Minutes	Introducing new skills to System z for operations and application development
10 Minutes	***Break***
60 Minutes	The Rule of Three
10 Minutes	Close