



System z Enables Solutions For A Smarter Planet

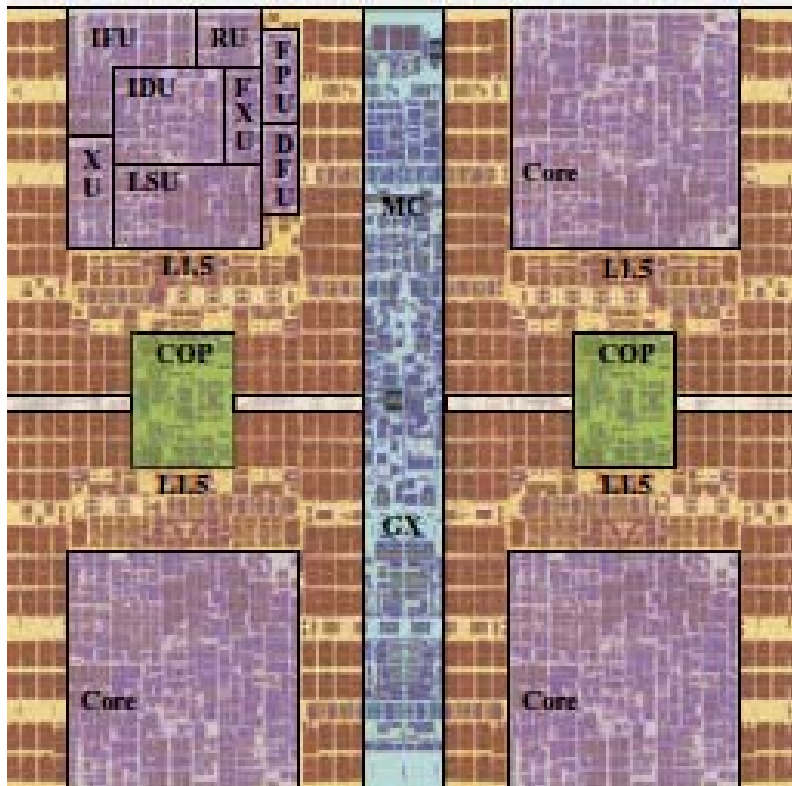
The Smart Platform & System z Strategy

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

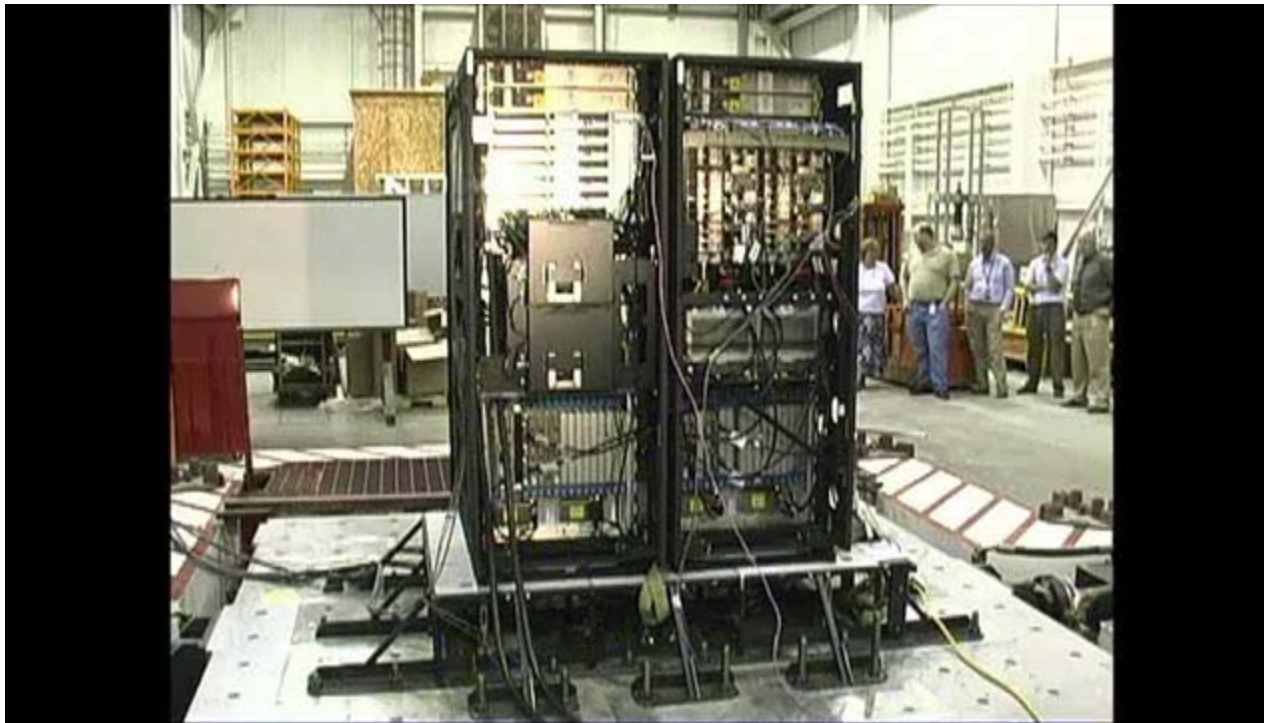


- Chip real estate
 - ▶ Logic units 65%
 - ▶ Redundancy 15%
 - ▶ Checkpoint Maintenance 8%
 - ▶ Error checking 5%
 - ▶ Containment Logic 5%
 - ▶ Recovery Logic 1%
 - ▶ Error Reporting 1%

35% of the chip is dedicated to availability management

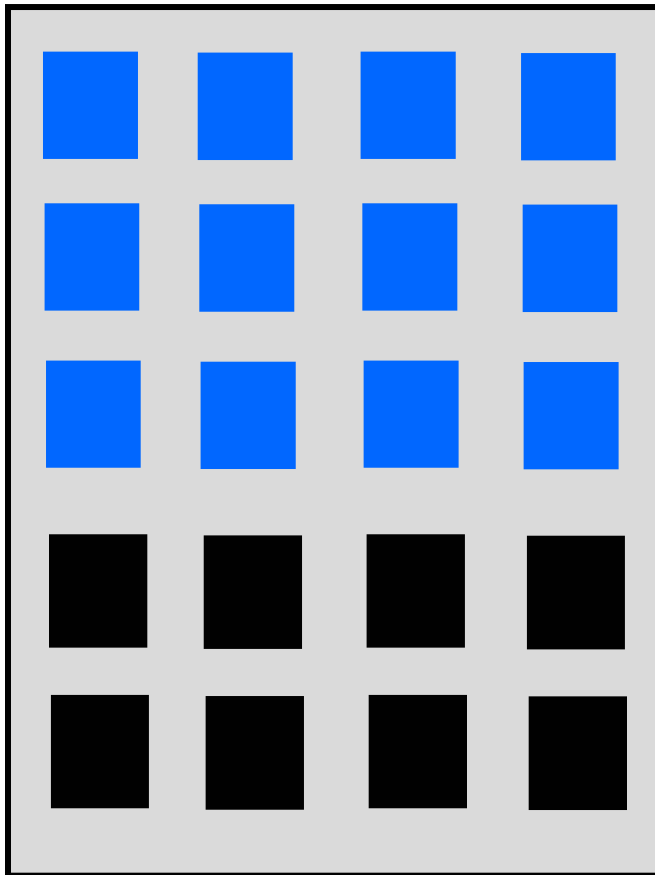
System z - Built To Last

- Hybrid cooling
- Redundant Power
- Thermal protection
- Resists earthquake damage



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

One Book



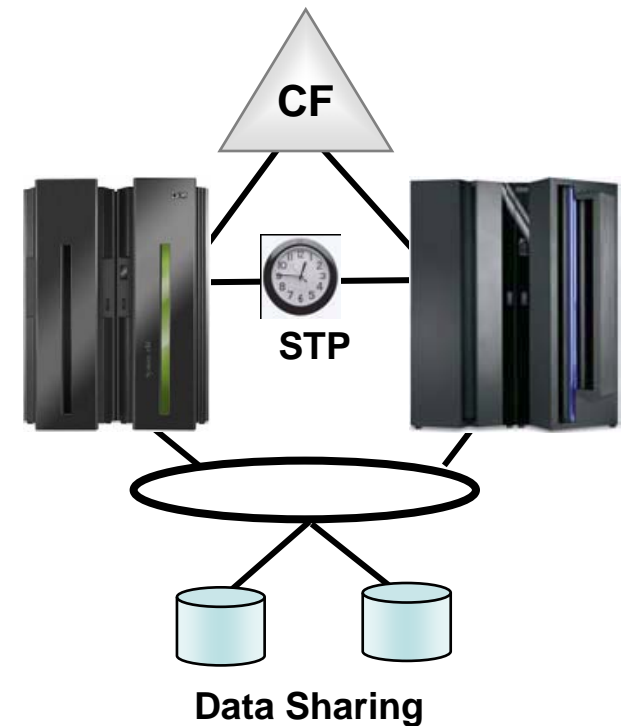
Pay for 12 active processors

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

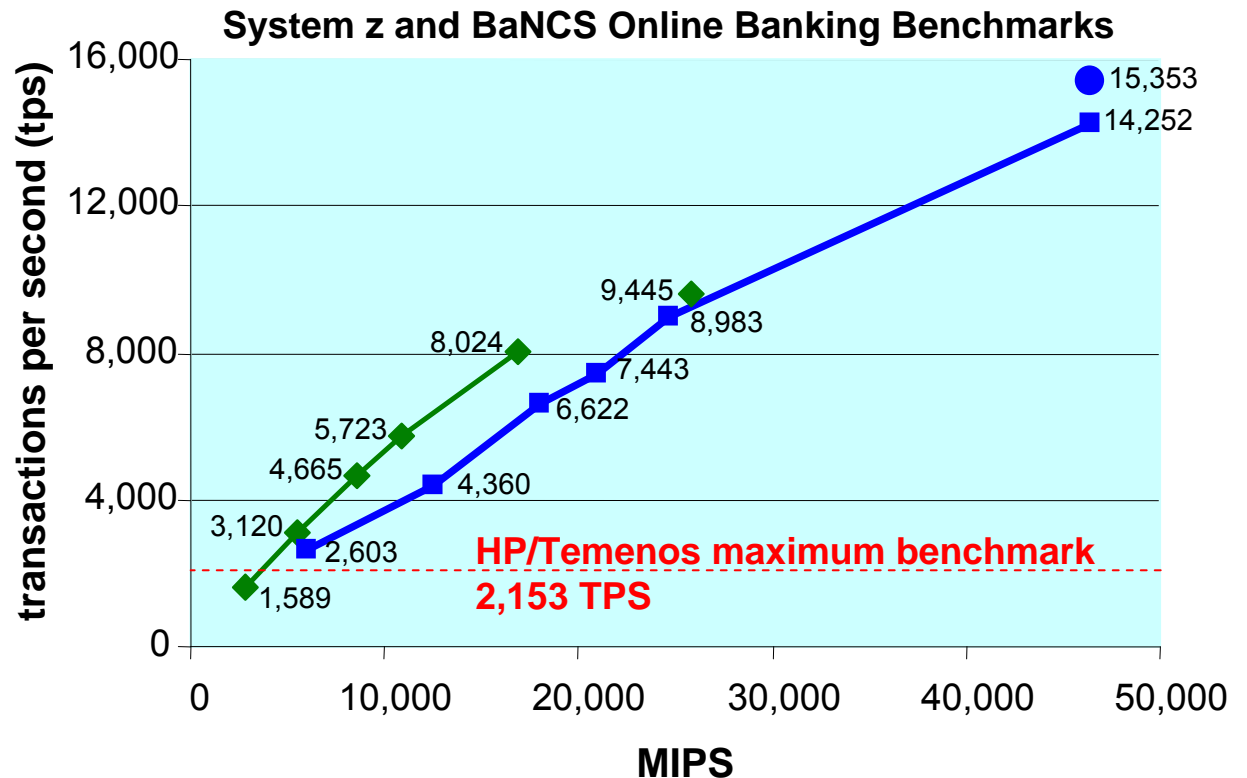
■ Bank of China **

- ▶ 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

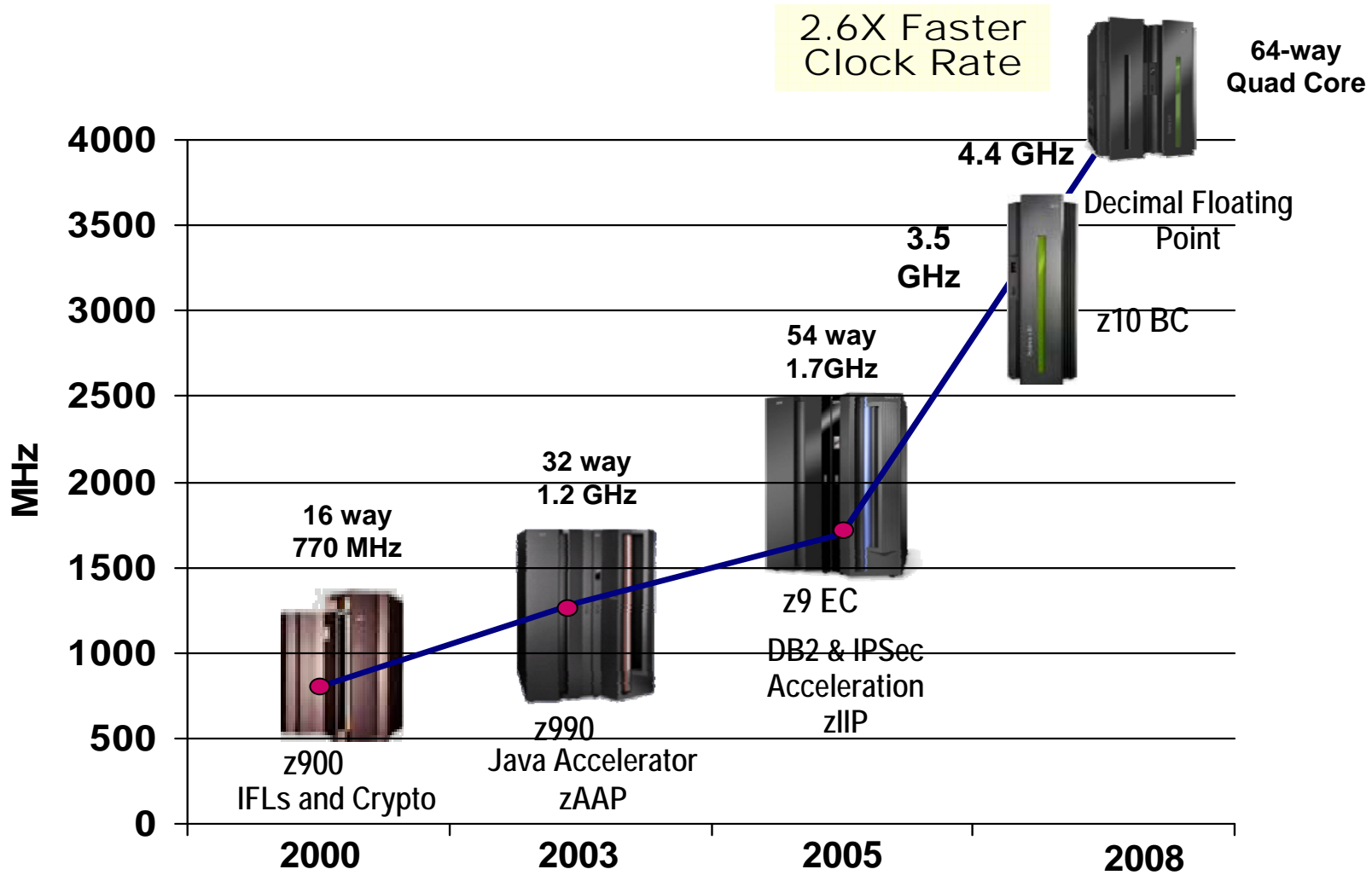


* SOURCE: TEMENOS BENCHMARKS; <http://h71028.www7.hp.com/enterprise/downloads/TemenosBenchmark.pdf>

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

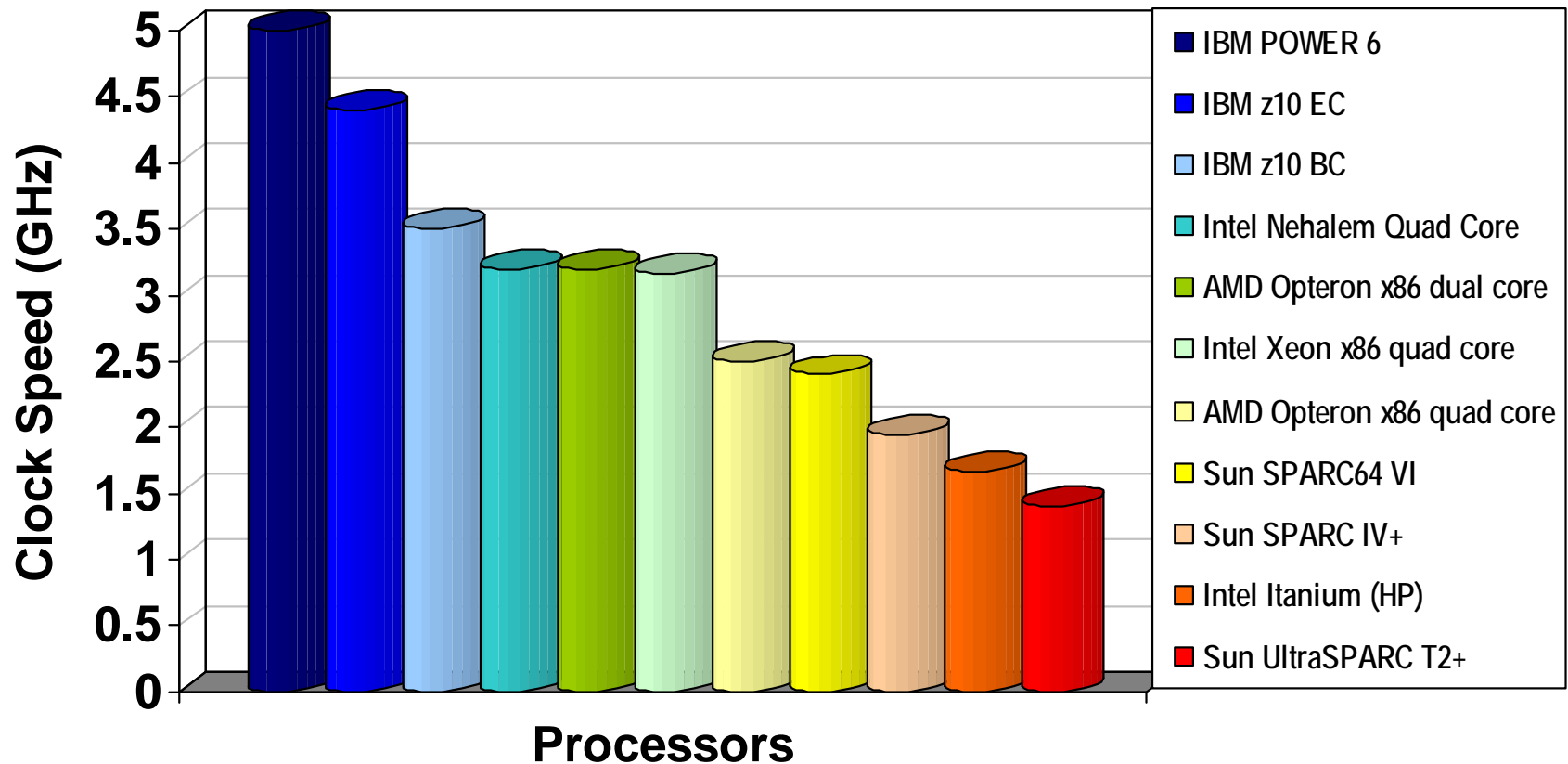
*** Standard benchmark configuration reached 8024 tps, a modified prototype reached 9445 tps

IBM System z10 Scalability Extends Mainframe Leadership Even Further



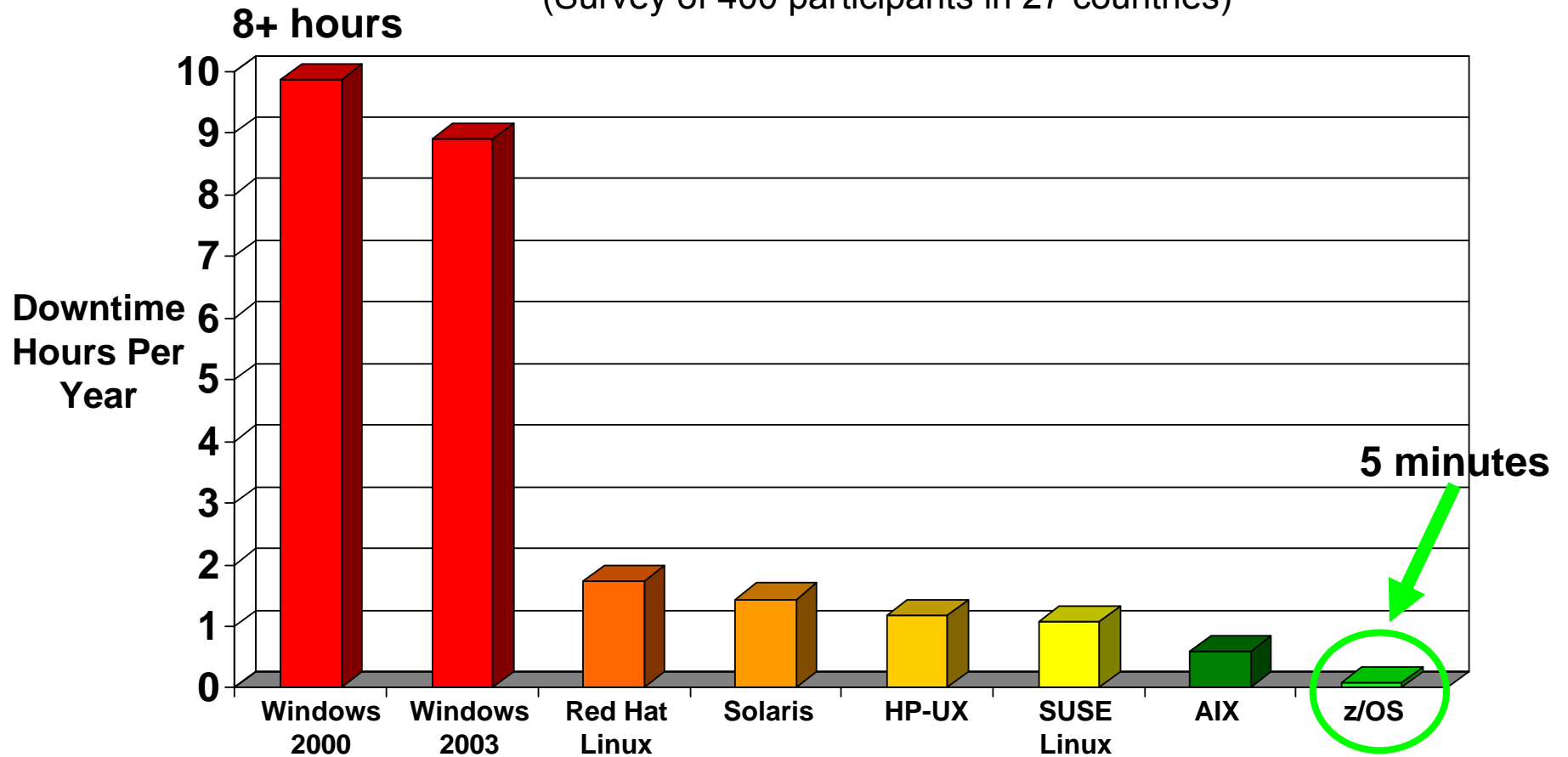
IBM Clock Speed Eclipses All Others

Fastest Processor Technology



System z Has The Best Availability

(Survey of 400 participants in 27 countries)



Source: 2007-2008 Global Server Operating Systems Reliability Survey, Yankee Group, March 2008. As quoted in "Windows Server: The New King of Downtime" by Mark Joseph Edwards at www.windowsitpro.com/article/articleid/98475/windows-server-the-new-king-of-downtime.html, March 5, 2008 and in <http://www.sunbeltsoftware.com/stu/Yankee-Group-2007-2008-Server-Reliability.pdf>. Measured in hours per year.

Source: IBM Internal Study

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



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

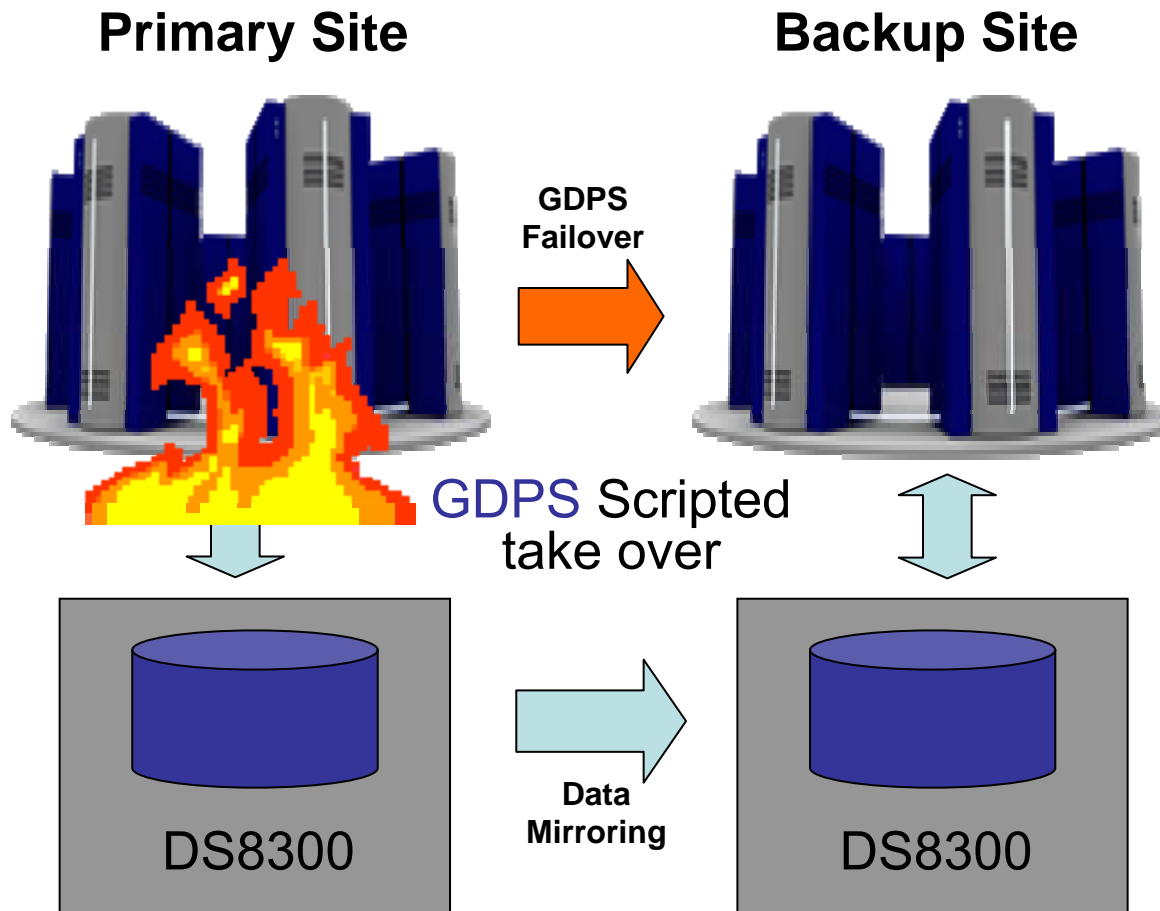
Estimated opportunity loss of about RM450,000

“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 Dungal, 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

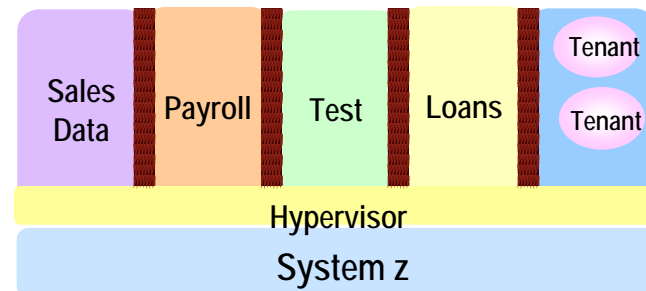
■ Workload isolation

- ▶ 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



Authentication



Administration

RACF



Auditing



Access

* 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



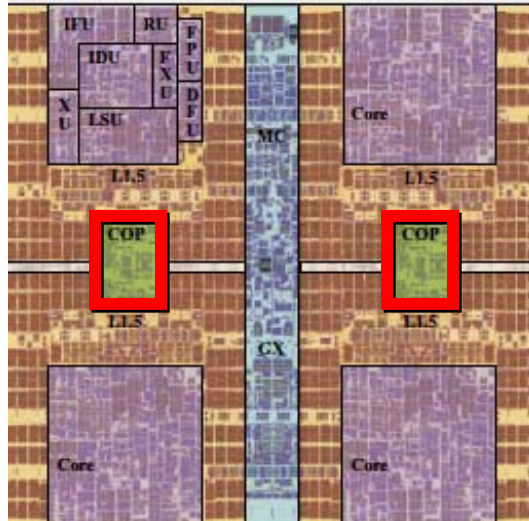
Highly secure crypto cards

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

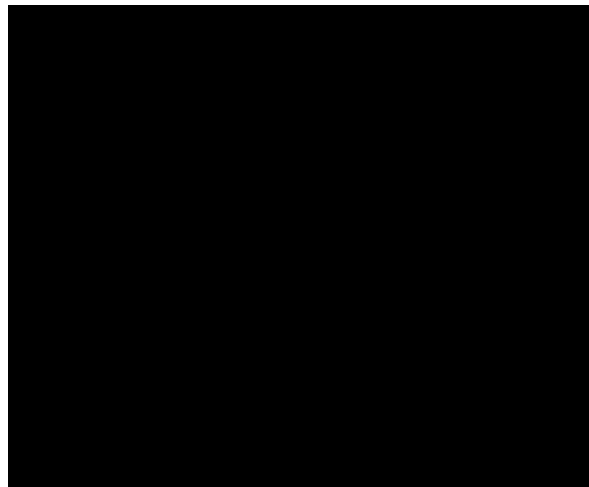
- System z keeps running during repairs and upgrades optimizing operational ease
 - ▶ Memory can be upgraded when system runs
 - ▶ Books can be replaced without disruption
 - ▶ Patches can be applied online without taking systems down
 - ▶ Parallel sysplex enables rolling release upgrades, one node at 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

Concurrent Operations With Hardware Repair And Upgrade Helps Protect Against Outages

Capability	System z10 EC
ECC on Memory Control Circuitry	Transparent While Running
Oscillator Failure	Transparent While Running
Core Sparing	Transparent While Running 2 Pre-installed per System
Microcode Driver Updates	While Running
Book Additions, Replacement	While Running
Memory Replacement	While Running
Memory Bus Adaptor Replacement	While Running
I/O Upgrades	While Running
Concurrent Driver Maintenance	While Running
LPARS Added, Removed	While Running
Redundant Service Element	2 per System

DEMO: How Does Hardware Repair And Upgrade Work?

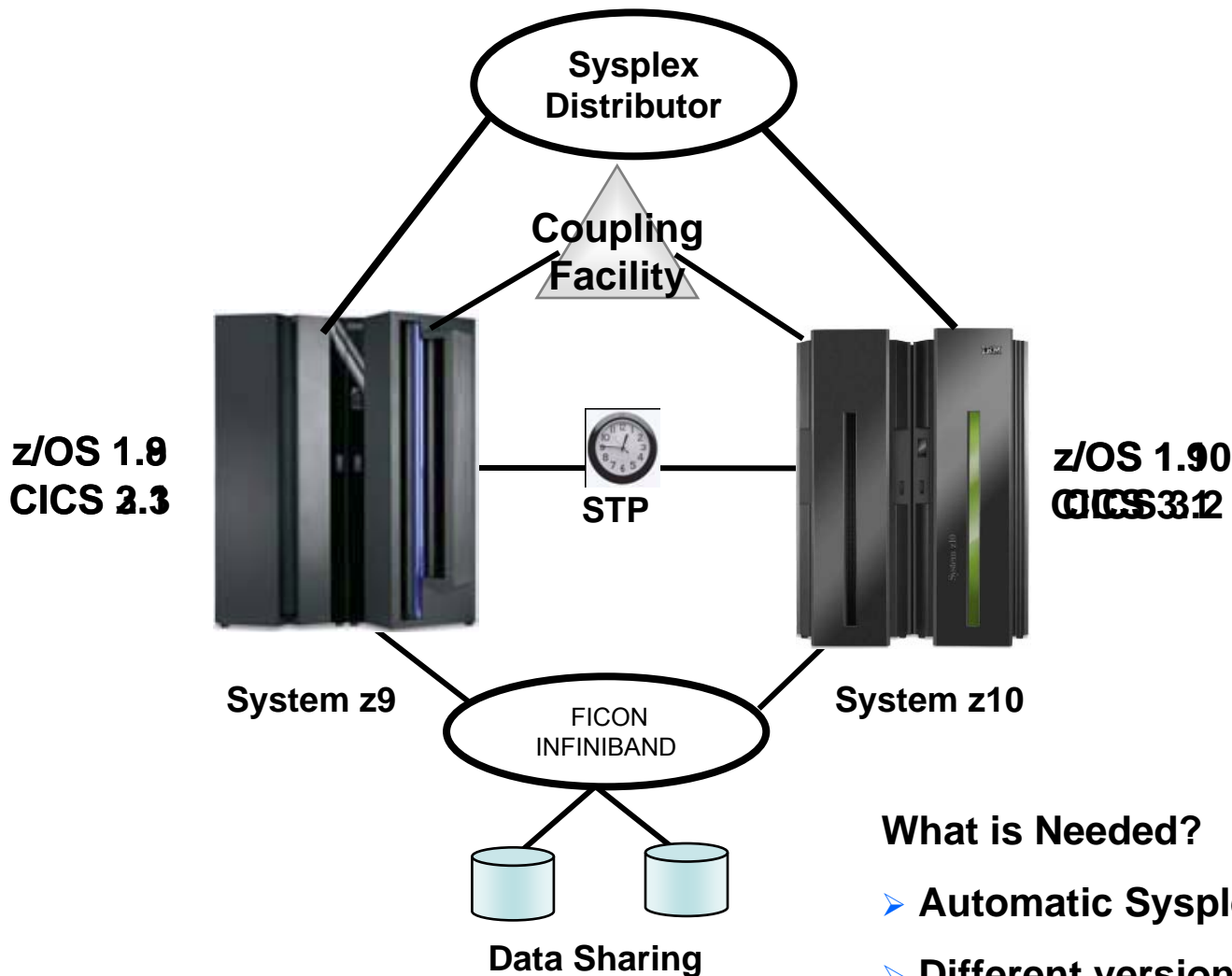
- ▶ Perform a memory upgrade while the system continues to run
- ▶ Service engineer dispatched automatically through “phone home”
- ▶ Parts already ordered through IBM global parts replacement program
- ▶ The book is removed while the system is operational
- ▶ Memory cards can be added easily similar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



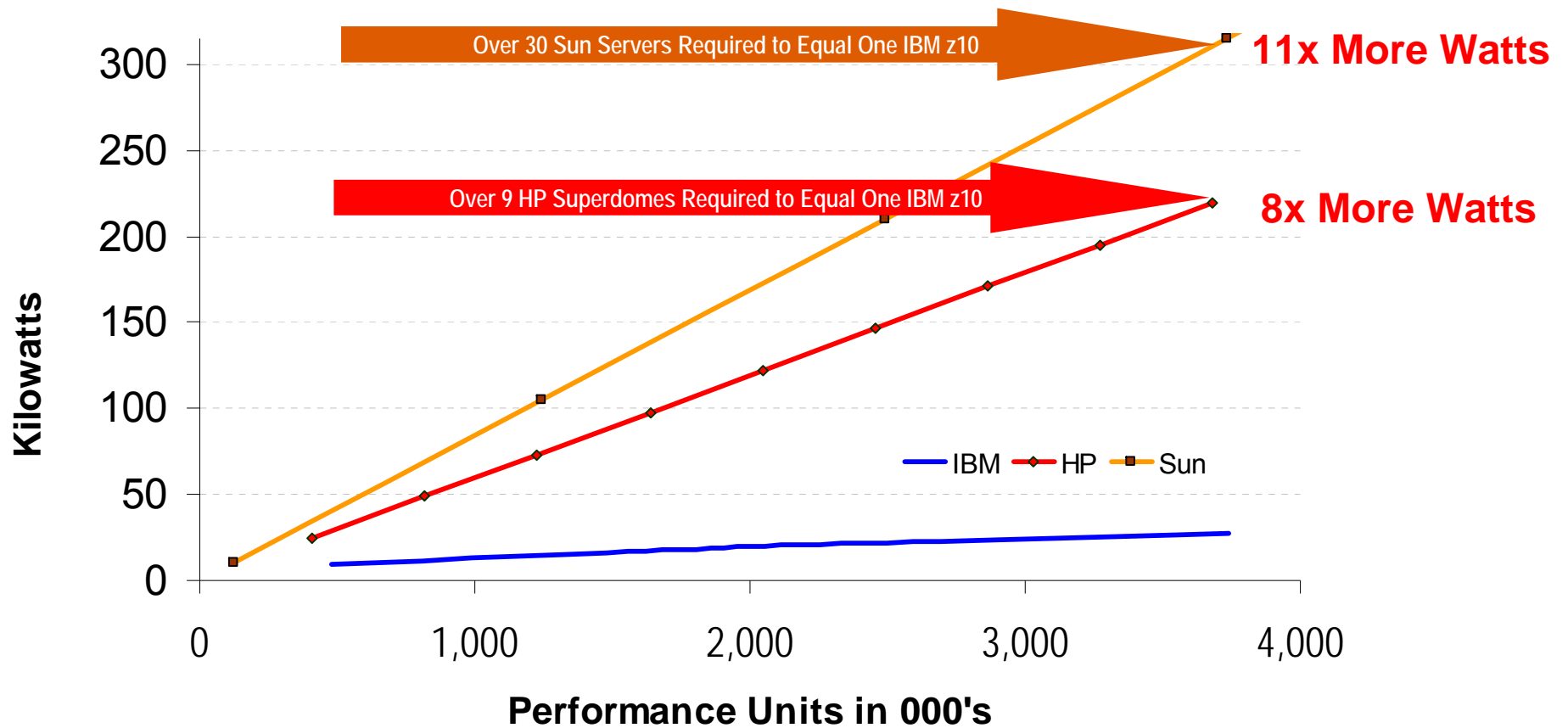
- Shutdown LPAR on z9 for maintenance
- Upgrade OS and middleware on LPAR
- IPL LPAR on System z9
- Shutdown LPAR on System z10 for maintenance
- Upgrade middleware on LPAR
- IPL LPAR on System z10

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

Comparing Energy Use and Performance

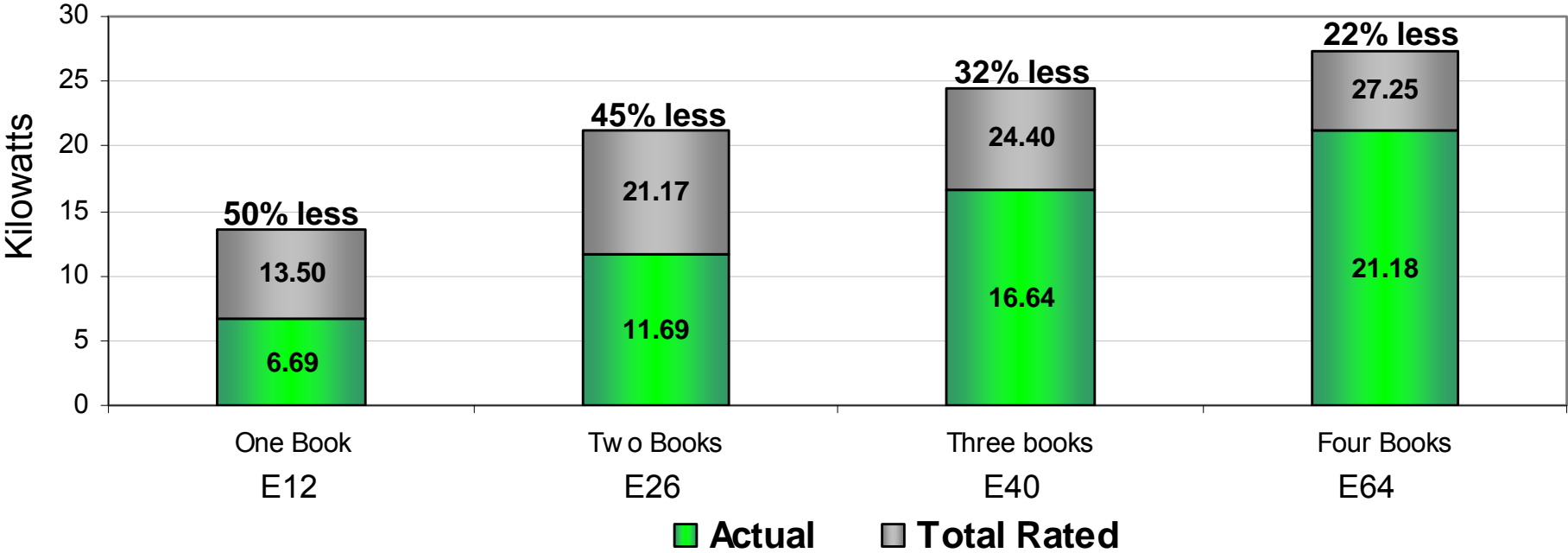


*HP Integrity Superdome Itanium 2 9050 64/128

**Sparc Enterprise M8000 16/64

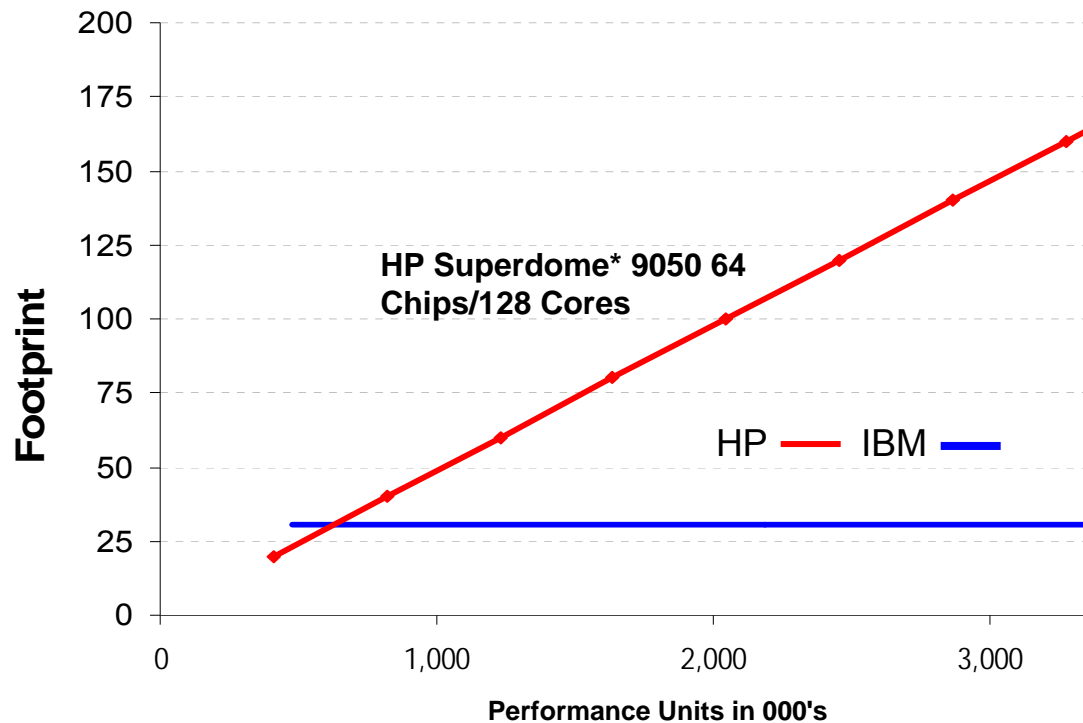
Actual System z10 Energy Consumption Is Often Better

Actual energy consumption experienced by 243 customers compared to rated value



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

Computing Density of Mainframe Helps Avoid Costly Facilities Upgrades



HP Superdome* 9050 64 Chips/128 Cores

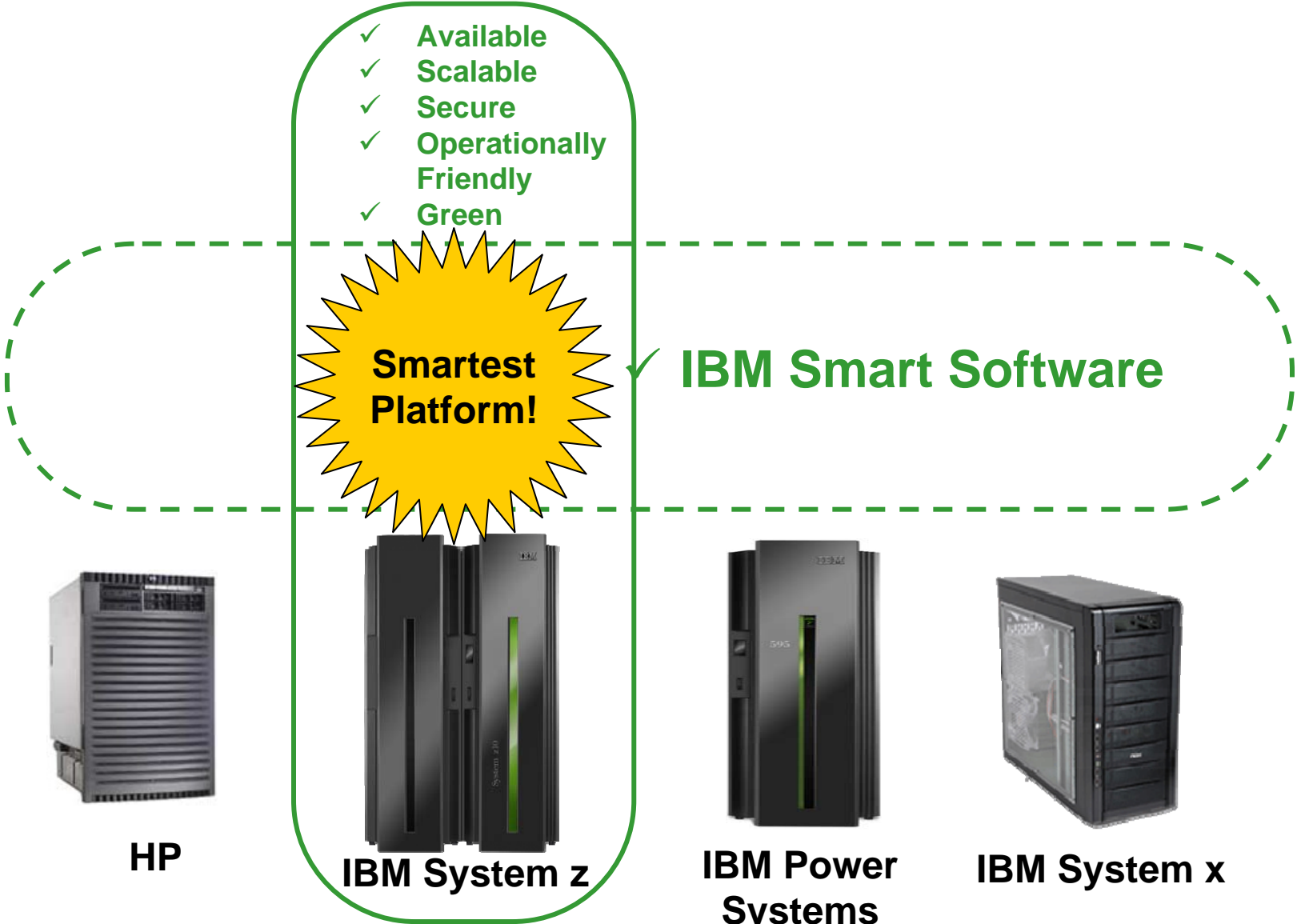
9 HP Superdomes equivalent performance to one IBM System z10 EC at 6X the floor space

One IBM z10 – 6 times less floor space than equivalent HP's

*HP Integrity Superdome Itanium 2 9050

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

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



Mario P. Araujo Santos
Program Director, WW Sales zPO
IBM Systems and Technology Group

presentation based on a material developed by/for Karl Freund

Italy Seminars – Milan and Rome – December/2009



IBM System z

A strategic and dependable platform for difficult times and when growth returns



System z: The right platform for recession and recovery

- System z capabilities for Recession
 - Reduce the cost of supporting existing operations
 - Maximize utilization of resources
 - Deploy any new resources “just in time”
 - Run existing IT operations with fewer staff

- System z capabilities for Recovery
 - Rapid deployment of new applications
 - Reuse and rebalance IT resources “on the fly”
 - Respond rapidly to new business requirements
 - Low cost of capacity growth for new workloads

Underpinned by exceptional security and availability

Unequaled investment protection in technology, skills and applications

Industry perspectives

Growth and Innovation

*"...IBM has reinvented the mainframe. The **pursuit of new workloads** has been a critical aspect of the resurgence, while at the same time protecting and nurturing the installed base. The introduction of **specialty engines** has been a catalyst to the growth but represents only the first step toward a significant change in architecture during the next five years."*

Source: Gartner Data Center Conference, Dec. 2008 (Gartner The IBM Mainframe Platform Ongoing Challenges, New Opportunities)

*"Enterprises seeking to build the industry's **most cost effective service-oriented datacenters** need to look closely at IBM's hardware platforms, software products, and professional services offerings in particular -- and IBM's z10 in specific. -- serves as the ideal platform for service-oriented data centers of the future".*

Joe Clabby, Clabby Analytics, Feb 2008

Cost Effective and Modern

Simplifying IT

*"For those IT organizations that have seen the light and are moving their emphasis from the never-ending challenge of trying to optimize their IT infrastructure to the more important **optimizing of the delivery of IT services, nothing beats the mainframe,**"*

Mike Kahn, The Clipper Group, February 2008

Manage Risk

System z remains a growing product line for IBM because, during the past decade, it has morphed historical strengths into new forms aligned with today's languages, operating environments, and computing standards. And, in fact, **System z strengths such as mitigating business risk** in many forms have once again shoved their way to the fore of many IT departments' priorities. This includes protecting against hardware and site failures, managing a company's security policies and credentials, acting as a focal point for integrating the myriad applications that make up a business process, and being able to adapt to sharp spikes in load.

Gordon Haff, Illuminata, January 2009

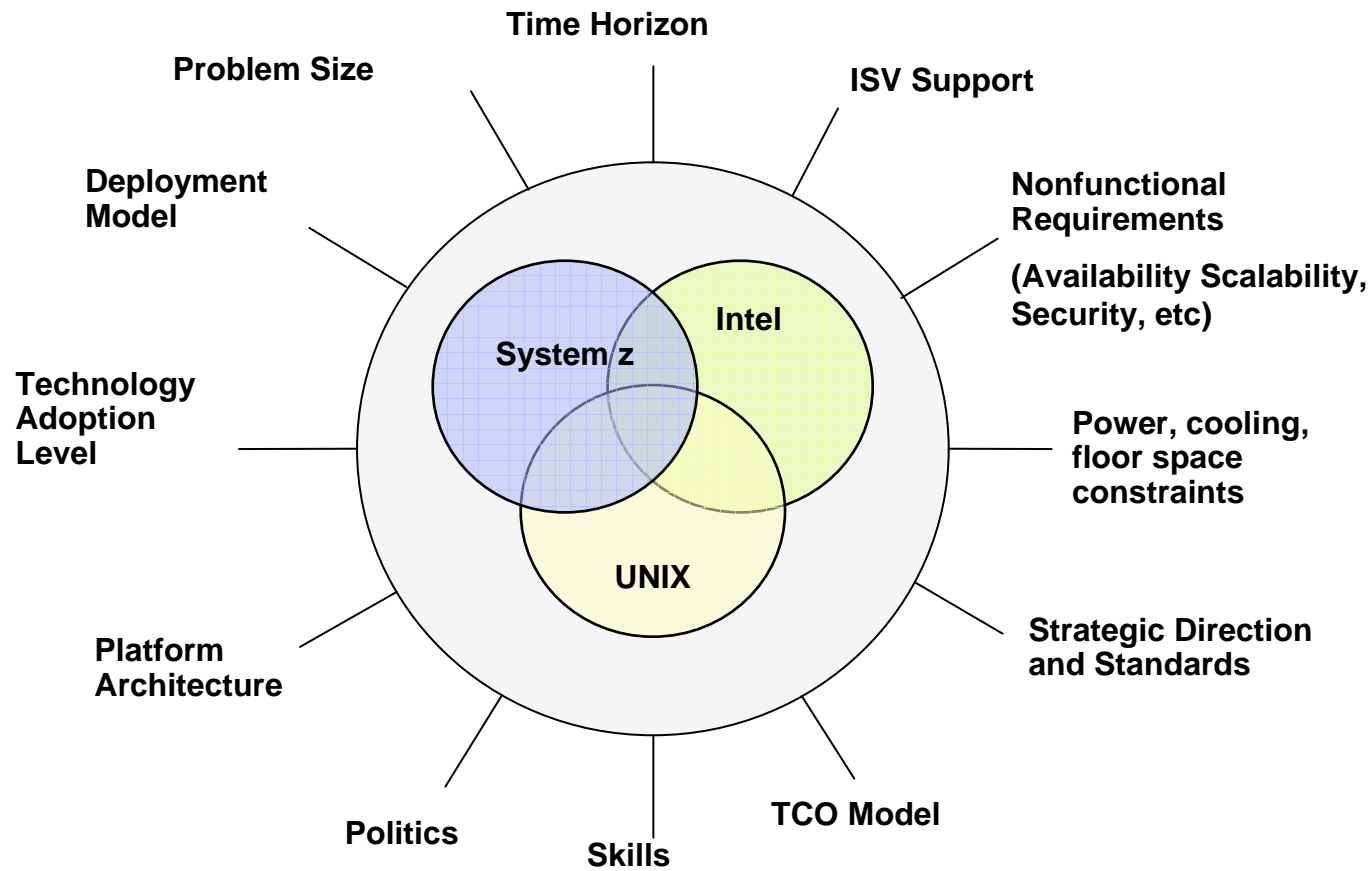
But, don't all platforms claim similar advantages and savings?

What makes a platform right, and fit for a purpose?

How do you exploit Fit for Purpose AND reduce complexity??

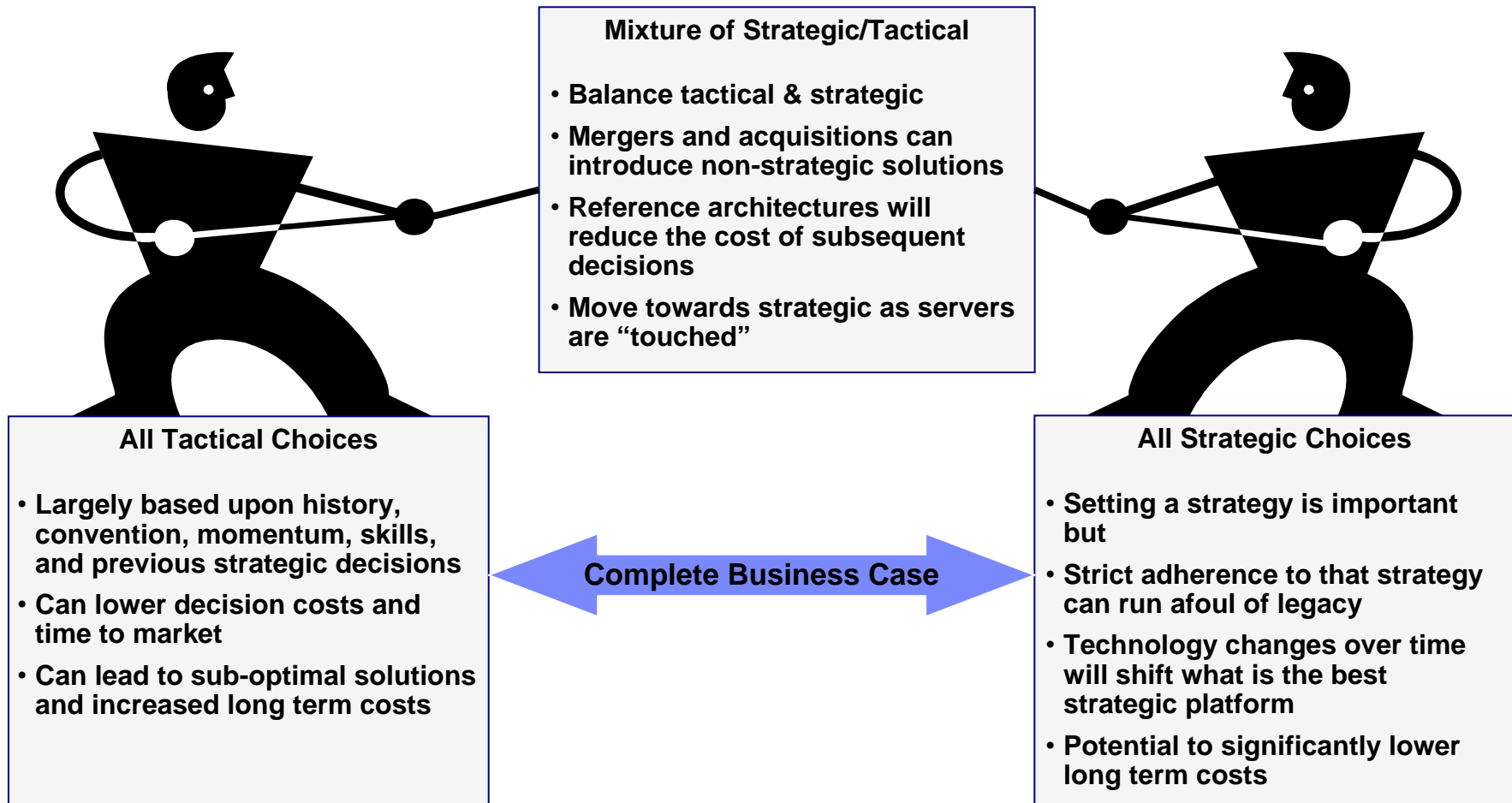
Platform choice – Fit for purpose

Many factors influence a platform selection, making it difficult to present a simple selection matrix.



Some factors are specific to each business, others are common to all and can be generalized

Strategic and Tactical Platform Choices



Your IT decisions will usually be some combination of both

Application Performance Characteristics – what fits on which platform?

Workload performance varies by application and can be best served by different platforms or the right mix of multiple platforms.

10. **CPU Intensive** – e.g. numerically intensive, etc.

9. **Protocol Serving** – e.g. static HTTP, firewall, etc.

8. **Skewless OTLP** – e.g. simple and predictable transaction processing

7. **Java Heavy** – e.g. cpu intensive java applications

6. **Java Light** – e.g. data intensive java applications

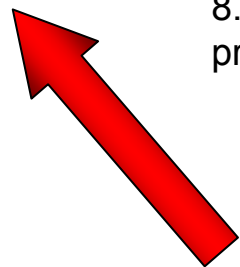
5. **Database** – e.g. Oracle DBMS or dynamic HTTP server

4. **Mixed High** – e.g. multiple, cpu-intense simple applications

3. **Mixed Low** – e.g. multiple, data-intense applications or skewed OLTP, MQ

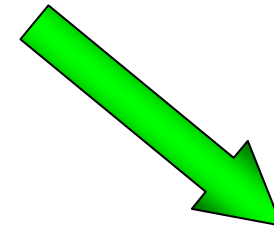
2. **I/O Bound** – e.g. high I/O content applications

1. **Data Intensive** – large working set and/or high I/O content applications



Optimal for other platforms

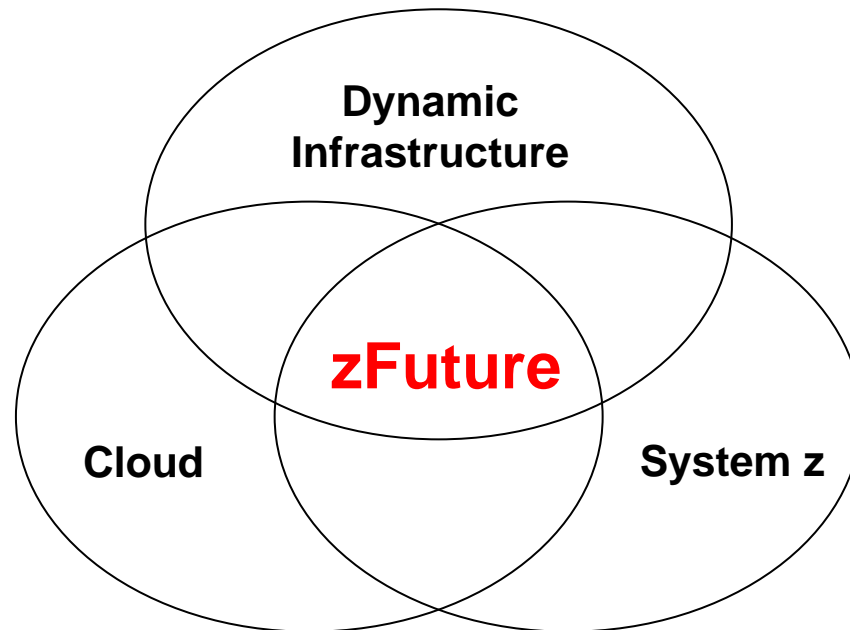
Optimal for System z



So, what is the right platform for a dynamic infrastructure?

Golden Rule: A Dynamic infrastructure is heterogeneous

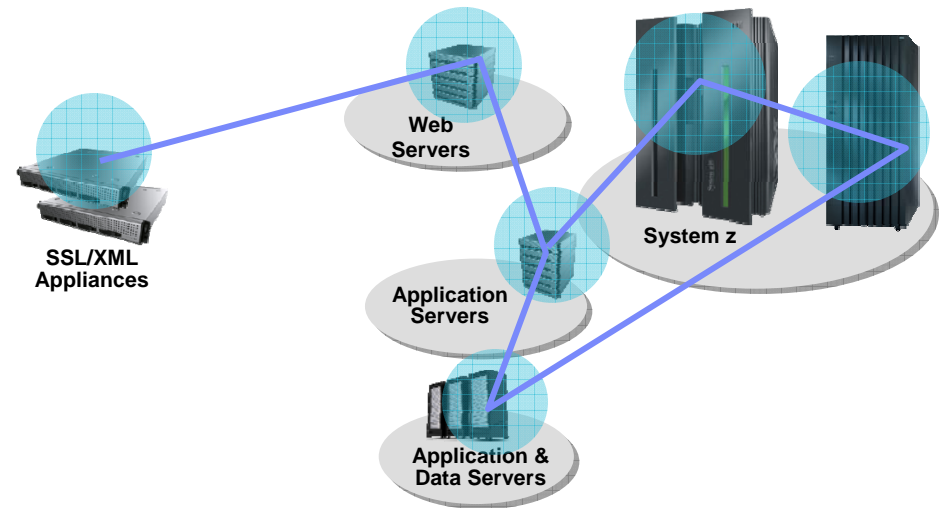
- A “one size fits all solution” will be sub-optimized
- Optimized infrastructures
 - multiple technologies
 - best “fit for purpose”
 - Appropriate cost and service
- Technology requirements
 - Highly virtualized
 - Integrated management
 - End to End control of applications
- Cloud computing is a model for a Dynamic Infrastructure
- The next generation System z is an intersection point of:
 - The leading enterprise computing platform
 - Cloud services
 - Capabilities for a dynamic infrastructure



System z dramatically improves composition of today's data center

Relating IT Resources to Business Objectives...

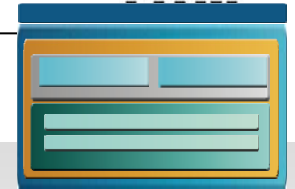
- Reducing:
 - Complexity and fragility
 - Management (labor) costs
 - Power/cooling costs
- Increasing
 - Flexibility and responsiveness
 - Quality of service
 - Asset Utilization
 - Security



In the future, System z will further extend its value in the data center

- Enhance function to further simplify, consolidate, and reduce the costs of managing the IT infrastructure
 - Extend management capabilities to heterogeneous architectures
 - e.g. workload, resource, energy, and hardware management
 - Extend processing capabilities to serve a broader set of enterprise workloads
- Continue to strengthen the core capabilities of the z platform

System z Future



Next Gen System z Mainframe HW & SW



Integrated Systems Management firmware

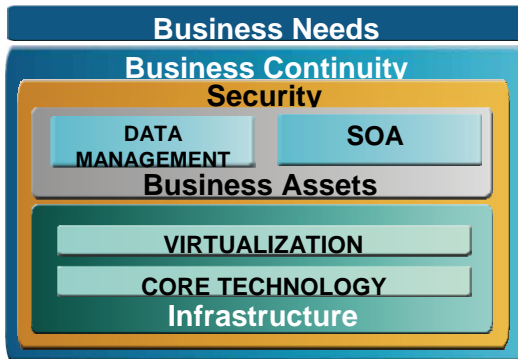


Accelerators

- Extend and accelerate System z workloads
- Lower cost per transaction while improving application response time for CPU intensive applications

Application Serving Blades

- Logical device integration between System z resources and application serving commodity devices
- Providing competitive price-performance and improved QoS for applications with a close affinity to mainframe data

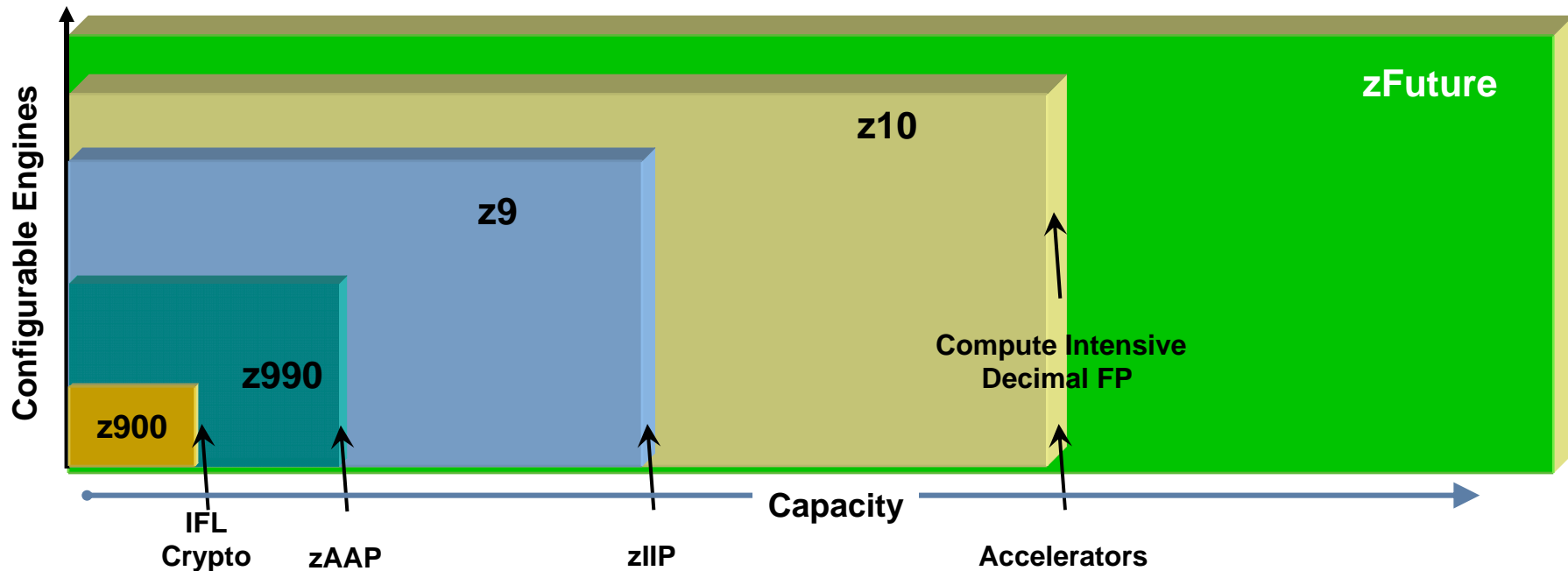


- Integrate, monitor, and manage multi-OS resources as a single, logical virtualized system
- Single WLM, Security, and System Management interface across all resources

Processor performance and future scalability

System z continues to evolve and grow

- Performance increase with additional engines
 - 50% more CEC capacity vs. z10
- Sub-capacity engines available for smaller configs
- Larger z/OS image size will grow with Hardware
- Performance objectives for equivalent n-ways
 - Traditional workload = 1.3x z10
 - New workload = 1.6x z10



System z Energy Efficiency Roadmap



2007 z9

- Power Calculator
- Mainframe Gas Gauge
- Energy Efficiency Credits/Certificates
- Published typical energy numbers

2008 z10

- Advanced power & thermal trending via Active Energy Manager
- Improved power-savings mode for unused and idle processors

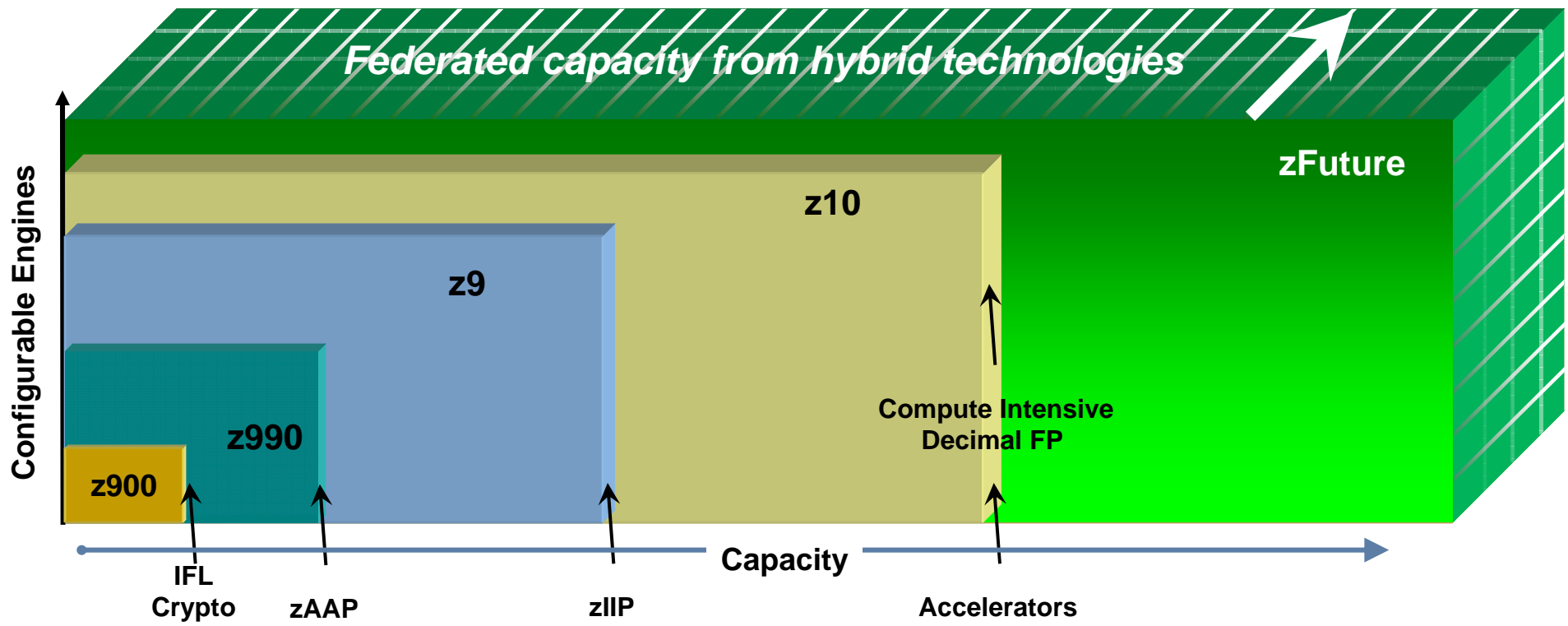
Future

- HV DC input power
- Water Cooled Option
- Enhanced Power Savings for processors & IO chips
- Add reporting of humidity and heat load to water vs. air
- Query Max Potential Power
- Static Power Saving mode
- Platform Manager advanced energy

Hybrid technologies extend available capacity

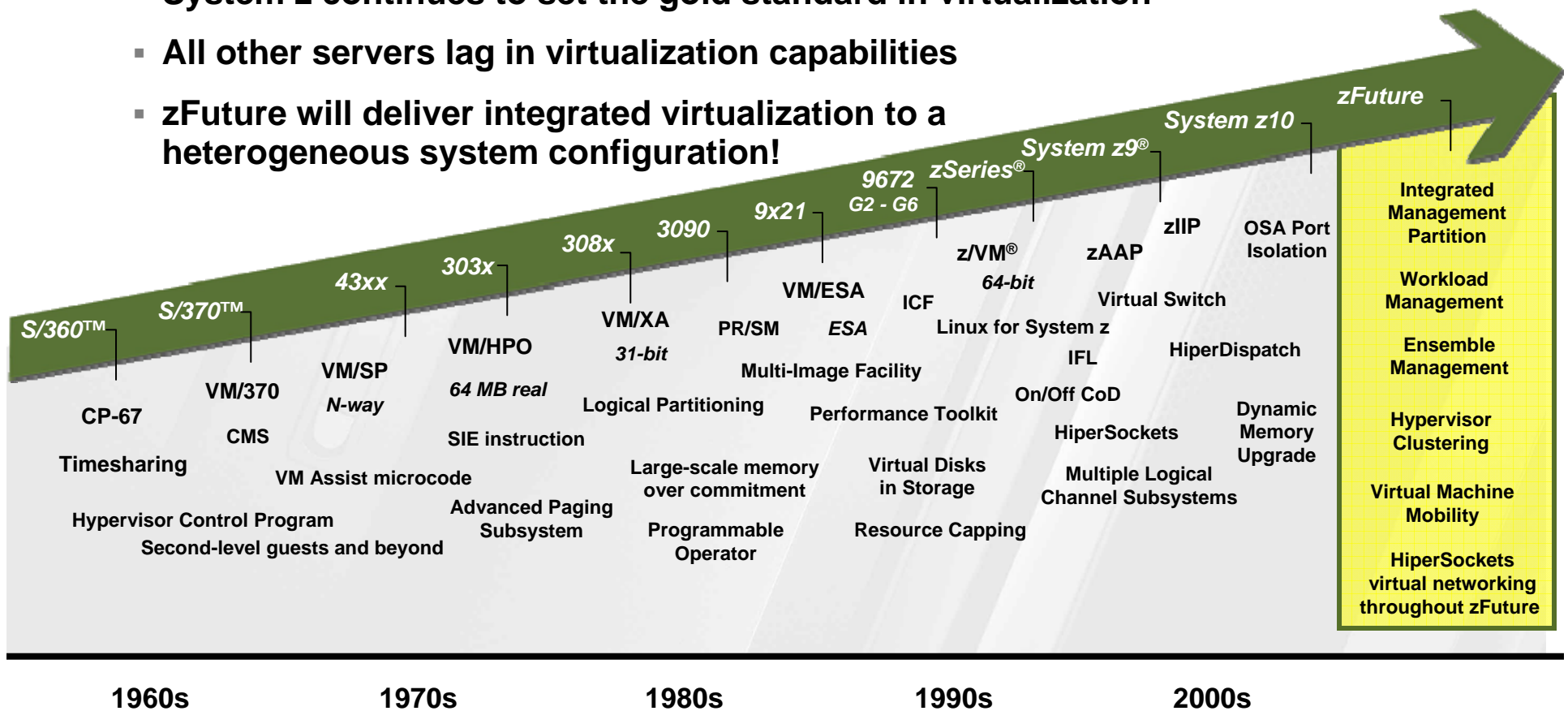
The business capabilities from leveraging the “z” dimension

- Hybrid technologies increase overall capacity under control of system z
- Deploy optimized solutions across z/OS, specialty engines and Blades
- System z management extended across end-to-end applications



zFuture: The next leap in virtualization

- Virtualization was pioneered and perfected on IBM mainframes
- System z continues to set the gold standard in virtualization
- All other servers lag in virtualization capabilities
- zFuture will deliver integrated virtualization to a heterogeneous system configuration!



System z roadmap: A natural evolution, and a Virtualization Revolution



Application specialty engines

- Dedicated processors for key environments (eg: Linux, JAVA)
- Improved price / performance for new workloads
- Very low cost of large scale consolidation



Expanding the specialty engine concept to enable more applications

- Integrated / networked attached resources to optimization for cost, performance and quality of service
- Take advantage of innovative new technologies



Next Generation: Integrated Virtual Server Management

- Integrated Platform Management across diverse platforms from a single control point to lower cost and improve service
- Workload management of enterprise applications across virtual servers to improve quality of service

An example of workload-optimized systems:
Introducing the IBM Smart Analytics Optimizer.



For an integrated business intelligence solution,
The future is here today.

IBM Smart Analytics Optimizer.

Delivering powerful analytics to existing System z customers.

A statement of direction.

High Performance Extension.

- Order-of-magnitude faster, predictable analytic response times.
- Less Administration & Lower Operating Costs.

Application Transparency.

Extends System z QoS:

- Availability.
- Security.
- Skills to Smart Analytics Workloads.



Creates New Opportunities for Existing Systems By Using New Technology Approaches

- *Exploits In-memory techniques.*
- *Employs new scanning strategies.*
 - *Leverages vector processing.*
 - *Evaluates predicates in parallel.*
- *Minimizes need for indexes and related administration.*

* Based on IBM Laboratory Tests. Actual results may vary depending on specific environment and configuration.

The Next Generation System z: Delivering Exceptional Business Value to help our clients....



Compete: Accelerate Insight & Results

- Accelerate critical transactions and queries
- Gain insights from critical operational data with real time analytics

Respond: Increase Business Agility, Security, and Resiliency

- Automated policy based platform management for the entire application stack
- Simplified infrastructure speeds change and recovery

Save: Lower capital and operating expenses

- Heterogeneous simplification and virtualization reduces hardware, software, and operational costs
- Mainframe class utilization reduces datacenter energy usage
- Enjoy the mainframe experience at a fraction of the cost for thousands of applications, without any software changes

Smart is:

Bringing the strengths of System z to multi-tier workloads



Building trust through the highest level of centralized security to protect online banking from the end user through to core data



Improving employee productivity by delivering new levels of availability for ERP applications covering both data and application modules



Protect corporate assets with centralized disaster recovery solution for content management applications and data



Optimize costs by delivering integrated logistics solution across multiple technologies while maintaining appropriate service at all stages

