The future runs on System z

System z10 - Performance and Technology that Meet Emerging Business Demands

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Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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Discussion Topics

- **System z: helping to build a smarter planet**
- **What's new :**
  - System z Solution Editions
    - Unmatched value, competitively priced
  - IFL pricing and applications
- **System z Linux Consolidation**
- **System z and Cloud Computing**
- **System z Trends and Directions**
  - Workload Optimized Systems
  - IBM Smart Analytics Optimizer

A mandate for change is a mandate for smart

Our world is becoming

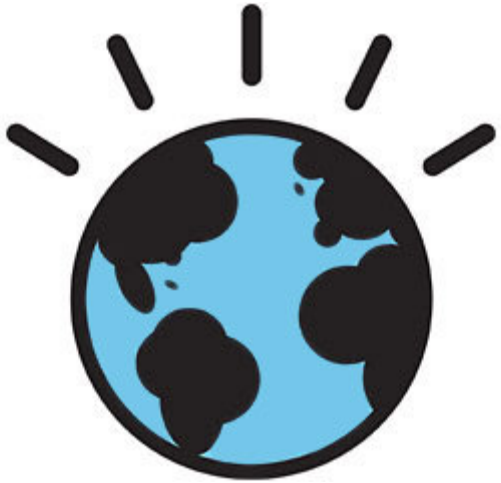
INSTRUMENTED

Our world is becoming

INTERCONNECTED

Virtually all things, processes and ways of working are becoming

INTELLIGENT

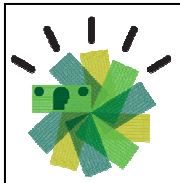
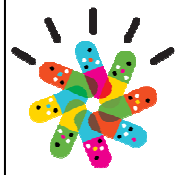


An opportunity to think and act in new ways—

economically, socially and technically.

Industries are re-shaping business models to meet the needs of an intelligent, interconnected and instrumented society

Smart Work for a Smarter Planet

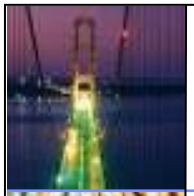
	*Smarter Money: By applying unprecedented computing power such as stream computing software, deep computing visualization and advanced analytics, we can turn a numerical ocean into actionable insight and intelligence.*
	*Smarter Shopping: Web 2.0 capabilities, with the opportunities for bottom-up information exchange and collaboration, offer a tremendous opportunity to strengthen customer loyalty.*
	*Smart Thinking: Businesses are taking advantage of a new wealth of information to be able to make more intelligent decisions and rise to the top.*
	Smarter Healthcare: *Smarter healthcare starts with the individual. Take the Medical Home model, for example. Primary care physicians act as "coaches," leading a team that manages a patient's wellness, preventive and chronic care needs.*
	Smarter Cloud: *Conserve energy. Consolidate resources. Make information secure and available whenever and wherever it's needed. With mandates like these, we have to be smarter about accessing, processing and storing data.*

Consumer behavior and competitive demand is dramatically changing the composition of applications.

- Real-Time Event Driven
- Richer in Content
- Secure

CEOs see dramatic change ahead

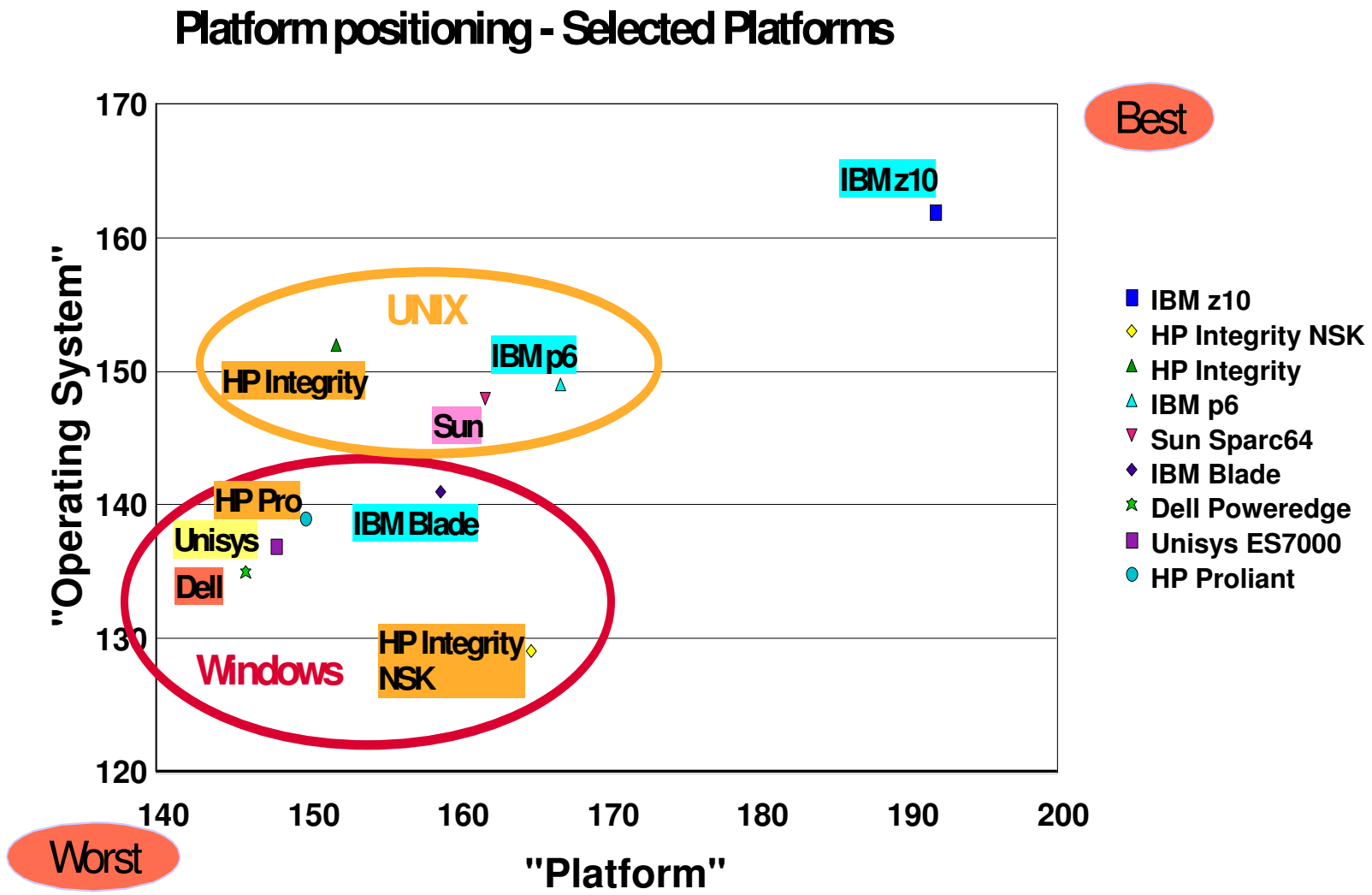
2008 Global CEO survey

	*83% expect substantial change in the next three years*
	*76% see opportunity in more informed and collaborative customers*
	*75% are actively entering new markets*
	*69% are planning some type of business model innovation over the next three years*
	*69% believe rising customer expectations of corporate social responsibility will positively impact their business*

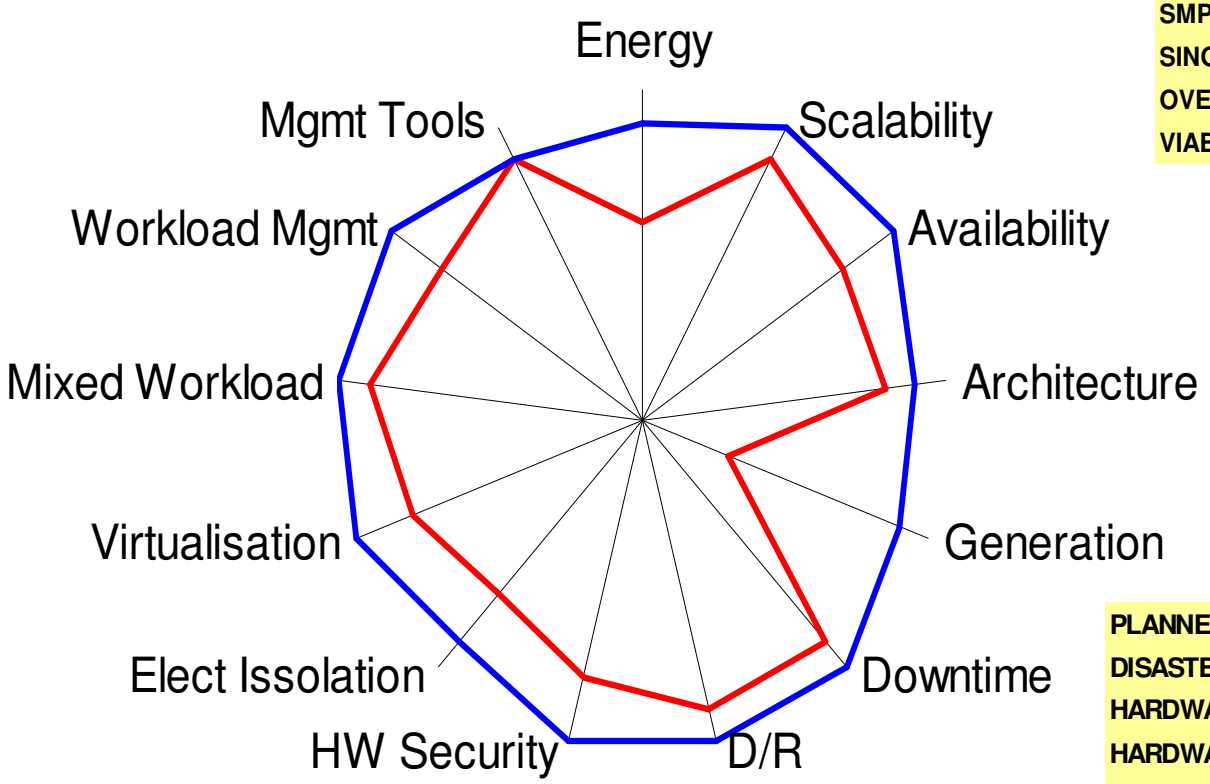
IBM's Dynamic Infrastructure strategy is designed to help clients address some of these key challenges, by helping clients to:

- Improve service
- Manage Risk
- Reduce Cost

Gartner's platform positioning 4Q08 – Platform Summary



Platform Differences – HP Integrity Superdome vs IBM z10

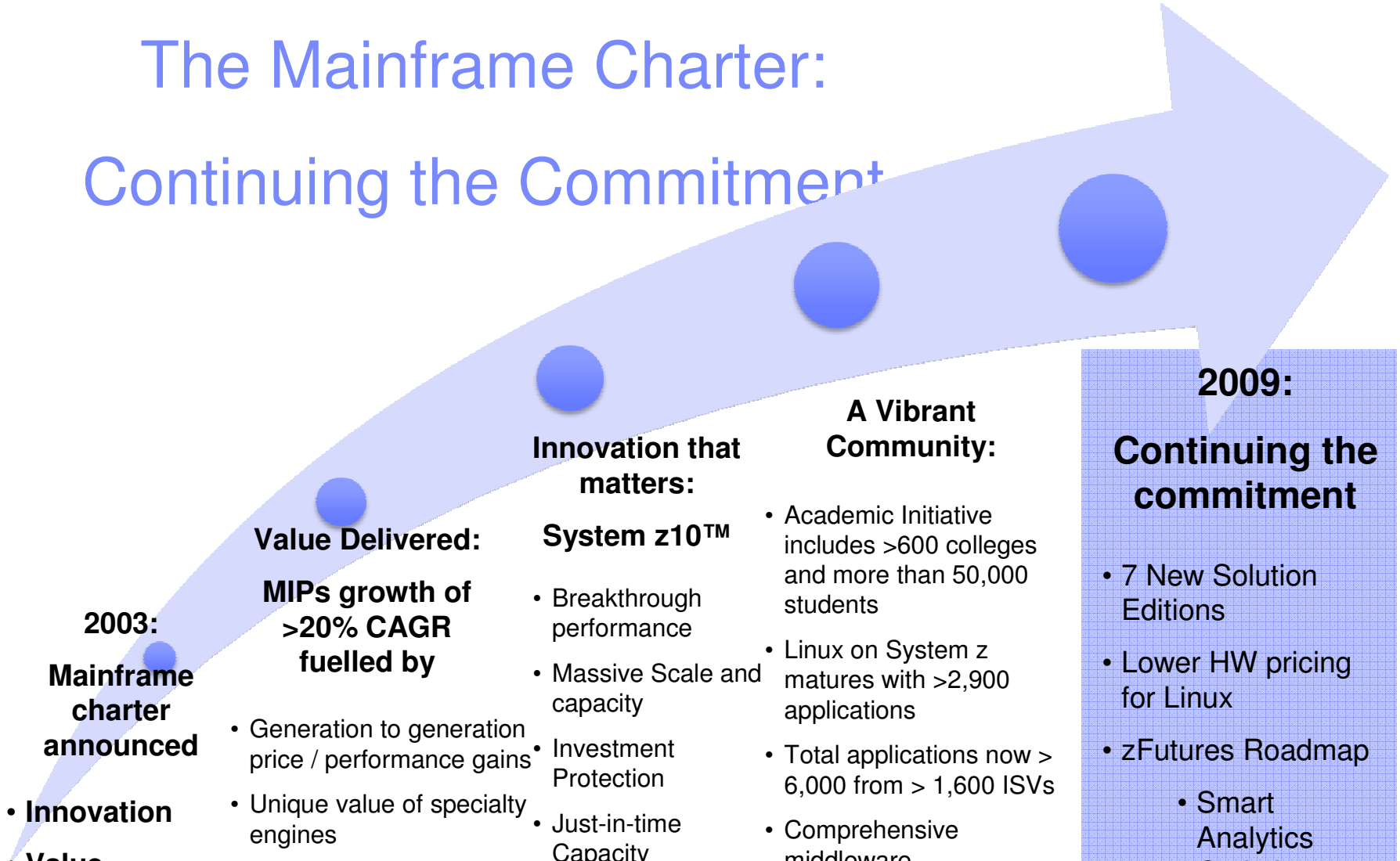


PLATFORM ENERGY EFFICIENCY
SMP/MPP SCALABILITY
SINGLE SYSTEM AVAILABILITY
OVERALL ARCHITECTURAL VIABILITY
VIABILITY OF CURRENT GENERATION

PLANNED DOWNTIME
DISASTER TOLERANCE/RECOVERY
HARDWARE PROTECTION AND SECURITY
HARDWARE/ELECTRICAL ISOLATION
VIRTUAL MACHINES (HYPERVISORS/LPARS)
MIXED WORKLOAD/OS HOSTING
MIXED WORKLOAD/OS MANAGEMENT
SERVER MANAGEMENT TOOLS

The Mainframe Charter:

Continuing the Commitment



2003:

Mainframe charter announced

- **Innovation**
- **Value**
- **Community**

Value Delivered:

MIPs growth of >20% CAGR fuelled by

- Generation to generation price / performance gains
- Unique value of specialty engines
- Ability to reduce energy costs by up to 80%

Innovation that matters:

System z10™

- Breakthrough performance
- Massive Scale and capacity
- Investment Protection
- Just-in-time Capacity
- Unprecedented resiliency and security

A Vibrant Community:

- Academic Initiative includes >600 colleges and more than 50,000 students
- Linux on System z matures with >2,900 applications
- Total applications now > 6,000 from > 1,600 ISVs
- Comprehensive middleware
- IBM Destination z, hub of the community

2009:

Continuing the commitment

- 7 New Solution Editions
- Lower HW pricing for Linux
- zFutures Roadmap
  - Smart Analytics Optimizer
- New ISVs

Announcing the new System z Solution Editions:

Legendary Mainframe quality, security, availability, and scale…..
priced to be competitive with UNIX alternatives

- **Building on the popularity of the Solution Edition for SAP**
- **Special package pricing for our most popular solutions**
  - z10 HW (standalone footprint or isolated LPAR)
  - Prepaid HW maintenance
  - Comprehensive middleware stack (including S&S)
  - Services and Storage (as needed)
- **Legendary Mainframe quality:**
  - Unparalleled quality, security, availability and scale
  - Integration of applications with corporate data
  - Industry leading virtualization, management and resource provisioning
  - Unparalleled Investment protection

- **Competitive acquisition prices, leadership TCO**

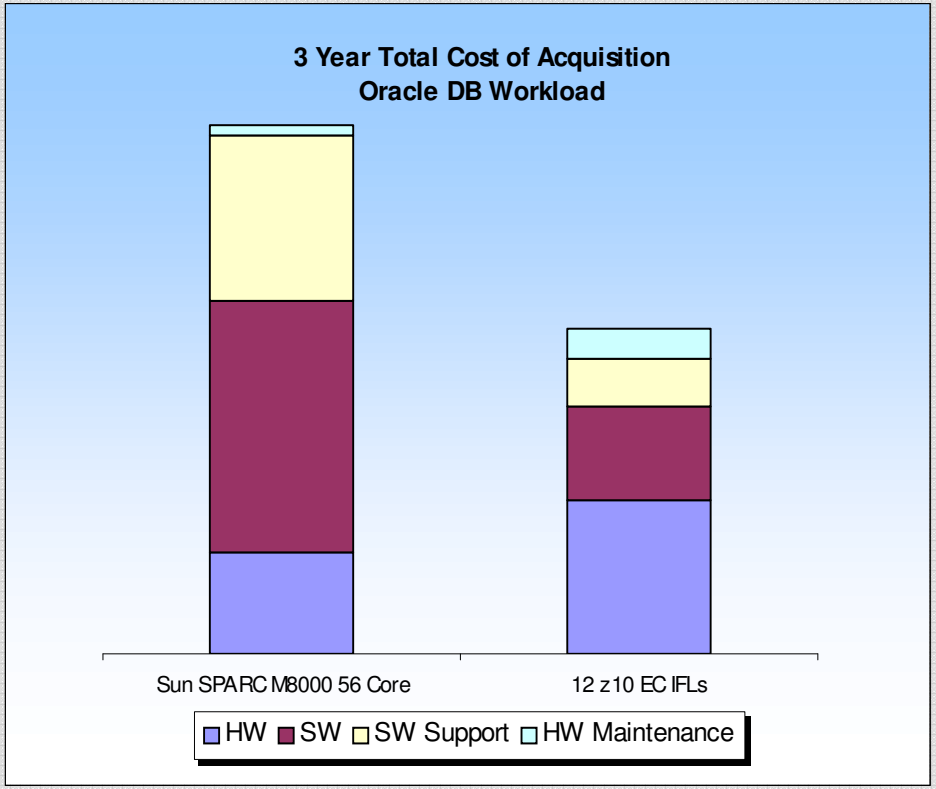
Unmatched Value, Competitively Priced

Now better Economics for Linux workloads:

New prices lower the cost of acquisition

- IFL prices for System z10 ECs reduced to $75k USD*.
- Reduced Memory prices extended to ALL new workload running on System z10 Servers - Now $2250 USD per GB**
- Lower costs of migration when combined with zRewards

Save up to 39% with System z before energy, admin, and floor space considerations



*Price are stated in US currency and may vary by country. This is for IFLs only, zIIPs and zAAP remain at $125k. Specialty engines do not include Internal Coupling Facilities (ICFs).

** New workloads defined consistent with zNALC terms and conditions and also include all Linux workloads. Prices will vary by country. Limited to 16GB per qualifying new processor.

System z Ecosystem

Dramatic growth responding to market demand

* >150 ISVs added to the System z portfolio in 2008

- > 500 new applications in 2H 2009

* >1,500 ISVs developing for our System z Ecosystem

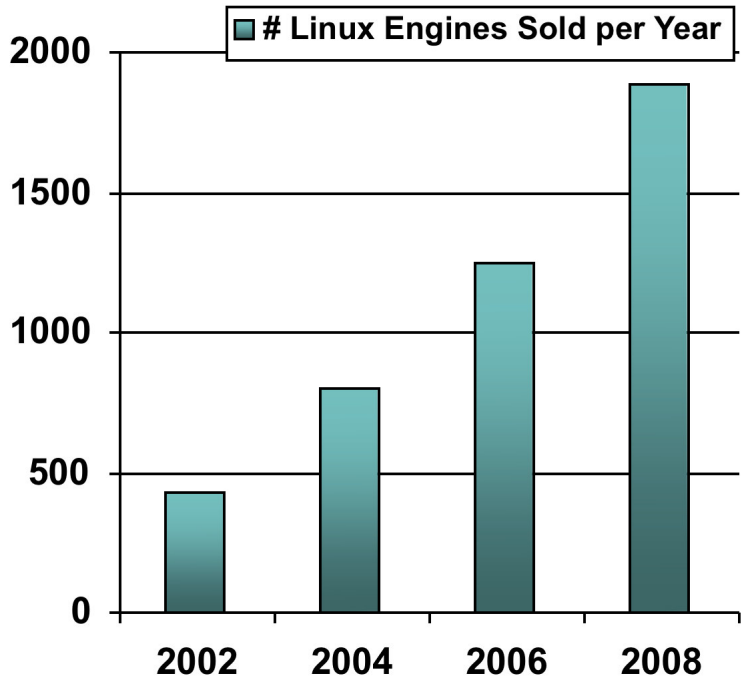
* >3800 applications available for z/OS

* >3000 applications available for Linux on System z

* >6,000 applications available for System z

System z Linux: The fastest growing server platform. 2008 new Linux capacity on z = ~ 40-60,000 x/86 cores

- 77% increase in System z Linux MIPS in 2008
  - +53% in Q1
- 22 of 54 new New System z Clients installed Linux in 2008
- Approximately 1,300 System z customers are now using Linux on z
- Linux is ~15% of the customer System z install base (MIPS)



Why are datacenters consolidating to System z ?

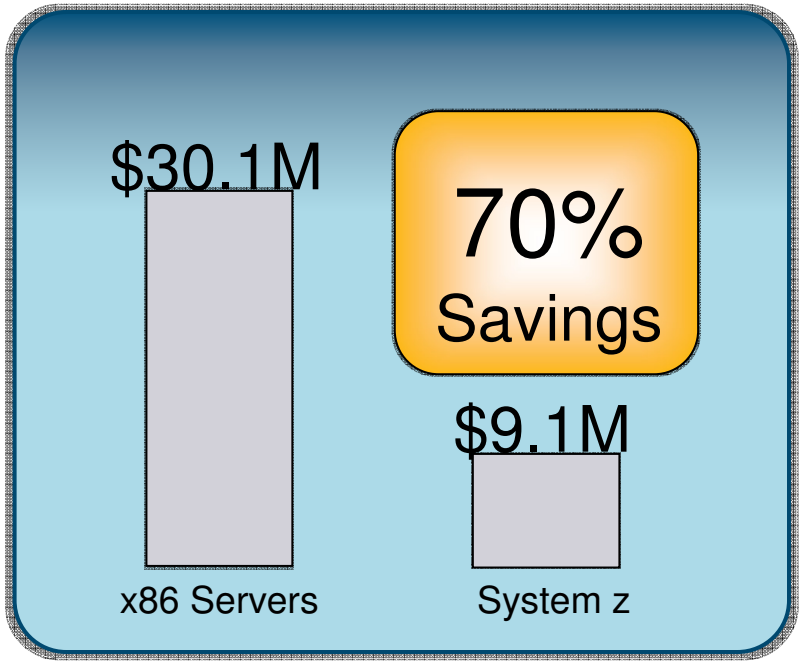
- **Extremely efficient virtualization lowers costs**
- **Superior availability and security reduces risks and improves service levels**

Customer	Distributed Cores	IBM System z10™ Cores	Ratio of distributed to z cores*
Nationwide	350	15	23 to 1
Government Agency	292	5	58 to 1
ABP	1324	36	36 to 1

* Client results will vary based on each specific customer environment including types of workloads, utilization levels, target consolidation hardware, and other implementation requirements.

Source: zCPO

A government organization consolidates applications and data to drive down costs of hardware, software and management by 70%!



Top three reasons for savings

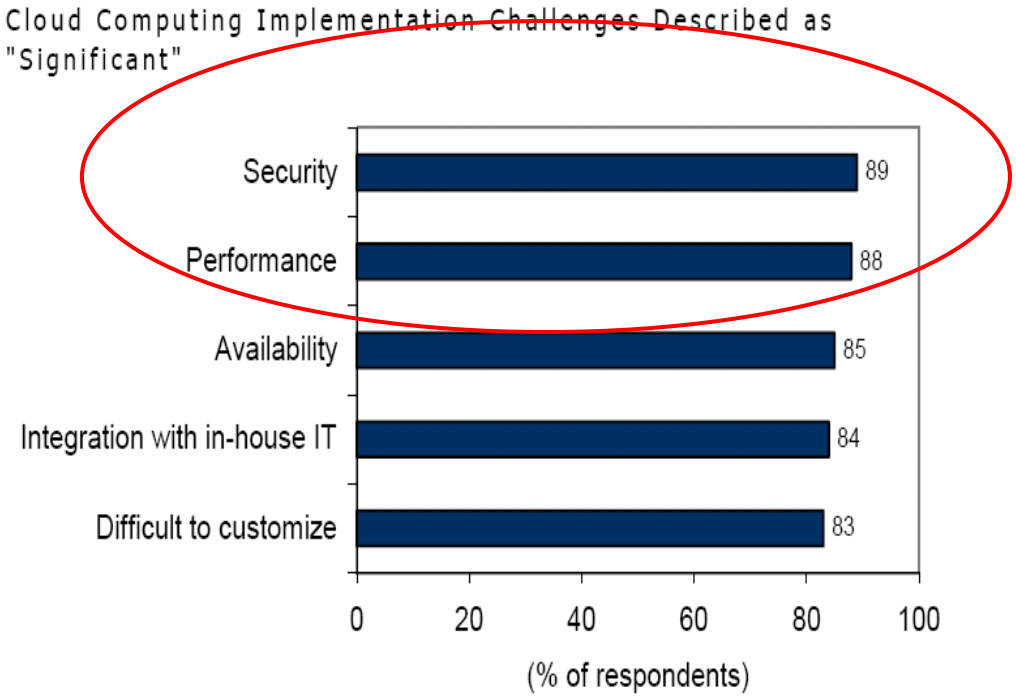
- Consolidated 292 Oracle servers to one System z
- System administration costs reduced 90%
- Subscription and support licenses reduced over 95%

A regional North American government organization

Other benefits:
Superior Resiliency & Security
Single administrator productivity
Infrastructure simplification
Lower Energy Costs

System z is the natural platform for shared service clouds

IBM is helping customers overcome the challenges posed by cloud computing



Note: Multiple responses were allowed.

Source: IDC's Enterprise Panel, 2008

…and System z can help.

Virtual – a "share all" approach to system resources for efficiency

Secure - a multi-tenant design point with EAL 5 certification

Available - 24x7x365 operations with zero data loss recovery

Efficient - consuming 80% less energy than distributed solutions

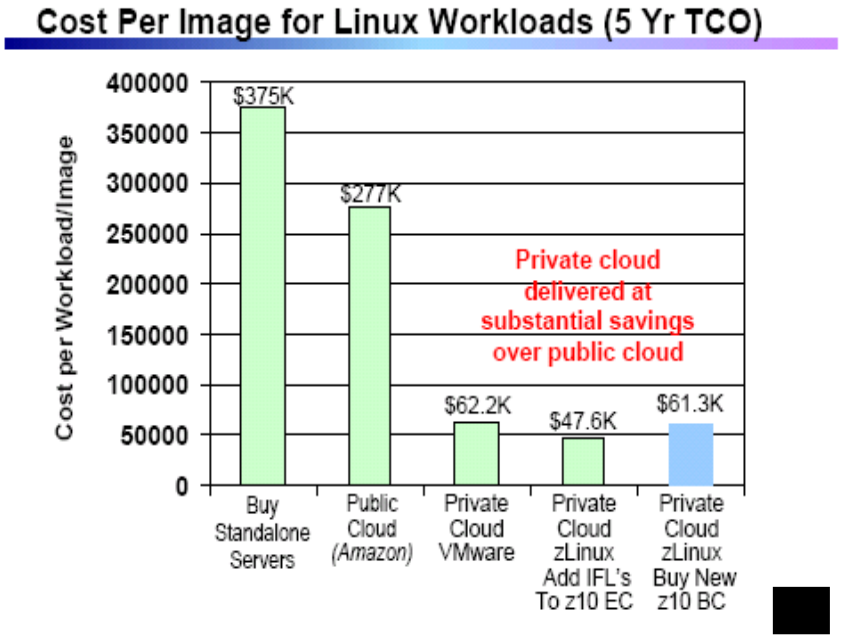
Scale - ability to meet massive demands from users and data

System z clouds achieve operational efficiency through economies of scale

Clouds built on mainframes can deliver economies of scale by using less resources while delivering more workload capability

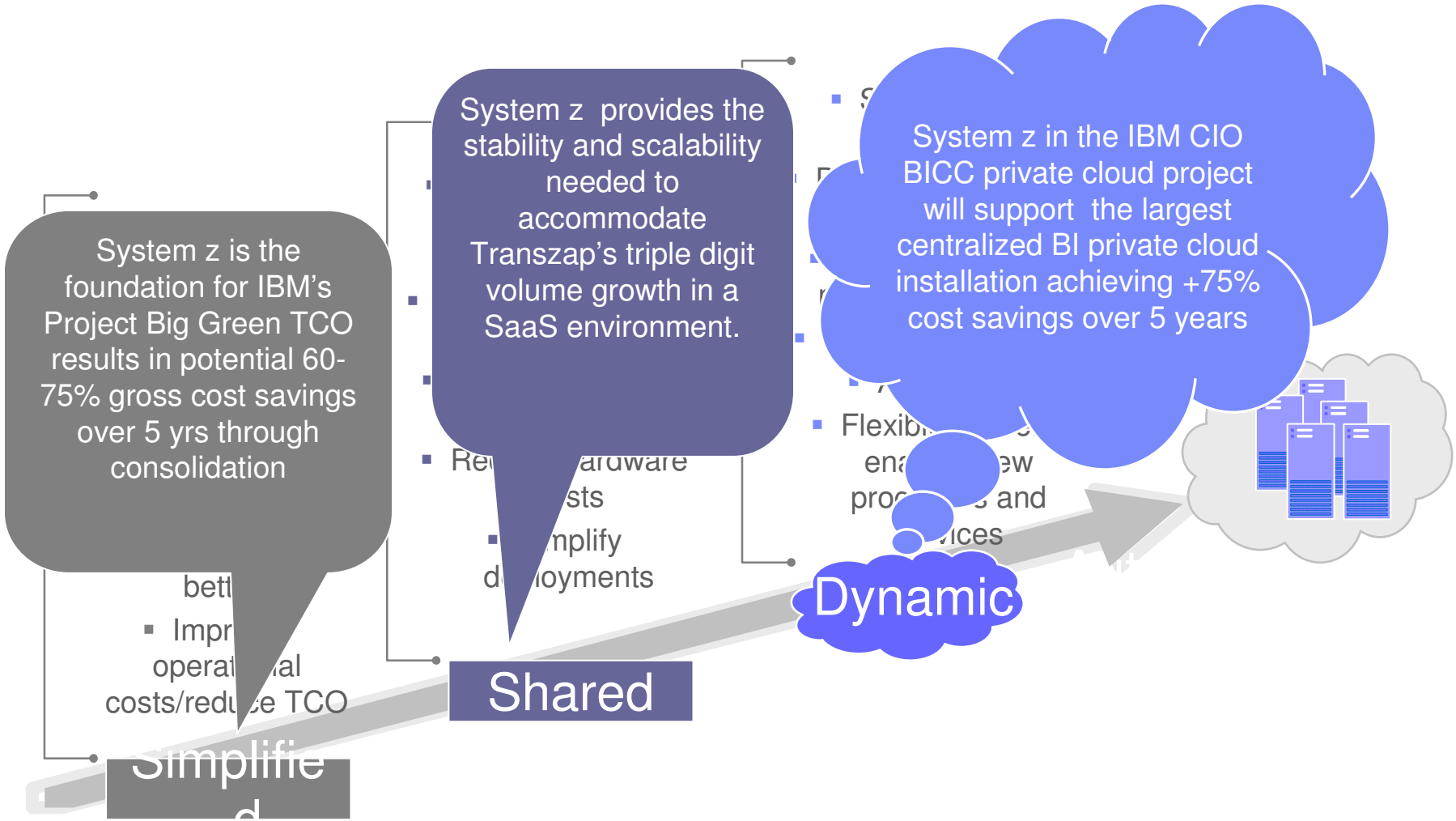
Dramatic Simplification through Virtualization

Unit	Distributed	System z Linux	% Reduction
Software Licenses	**26,700**	**1,800**	**93%**
Ports	**31,300**	**960**	**97%**
Cables	**19,500**	**700**	**96%**
Physical Network Connections	**15,700**	**7,000**	**55%**



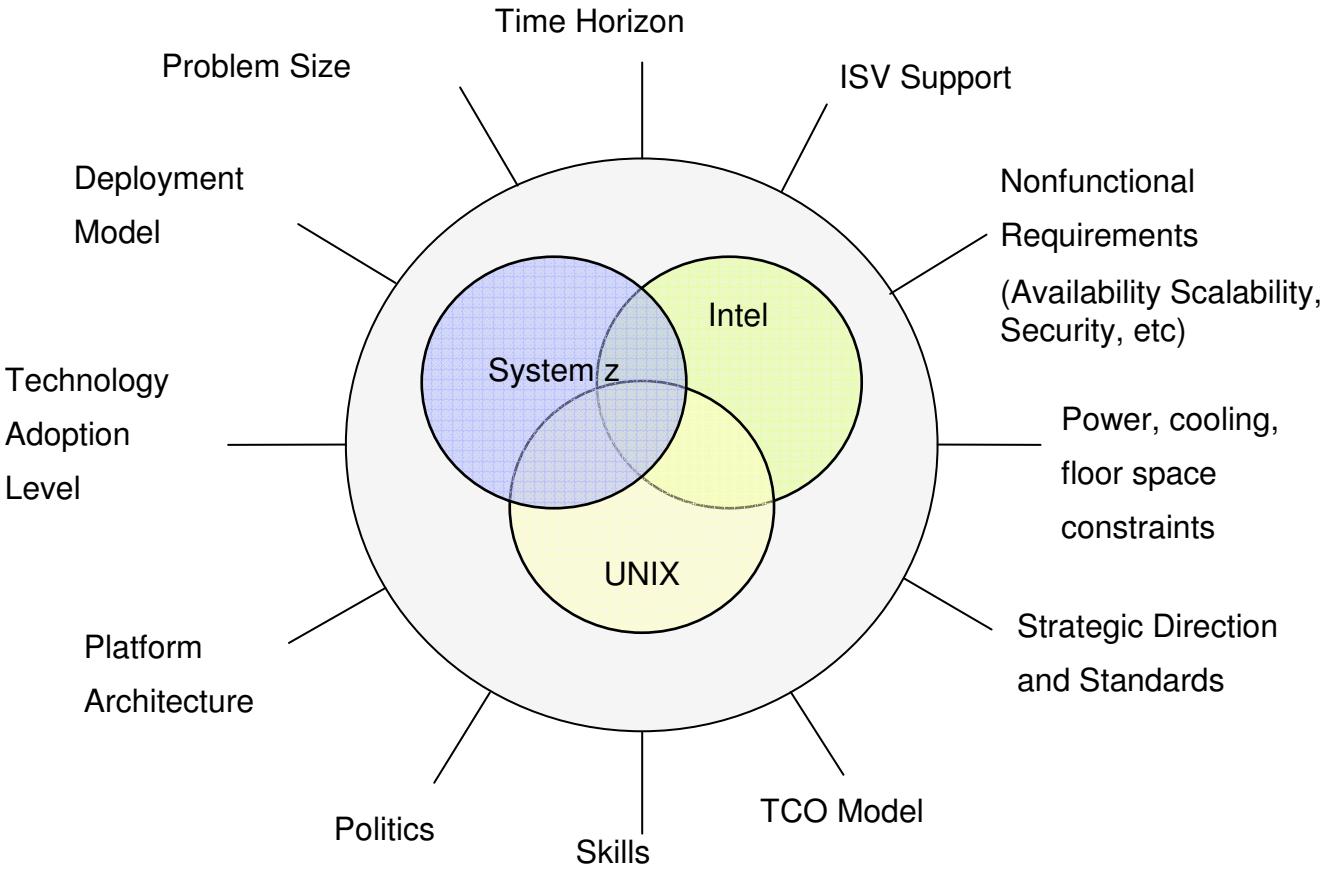
Project Big Green view of TCO results in potential 60-75% gross cost savings over 5 yrs

The IT transformation roadmap for the enterprise to get to cloud computing is paved for System z



Platform choice – Fit for purpose, workload and situation

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

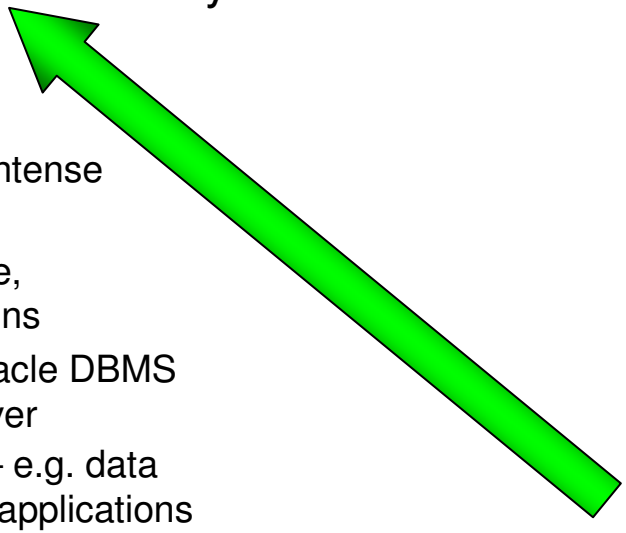


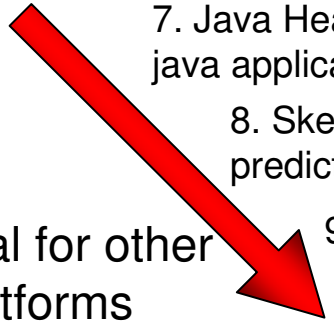
Some factors are specific to each business, others are common to all and can be generalized

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.

1. Data Intensive – large working set and/or high I/O content applications
2. I/O Bound – e.g. high I/O content applications
3. Mixed Low – e.g. multiple, data-intense applications or skewed OLTP, MQ
4. Mixed High – e.g. multiple, cpu-intense simple applications
5. Database – e.g. Oracle DBMS or dynamic HTTP server
6. Java Light – e.g. data intensive java applications
7. Java Heavy – e.g. cpu intensive java applications
8. Skewless OTLP – e.g. simple and predictable transaction processing
9. Protocol Serving – e.g. static HTTP, firewall, etc.
10. CPU Intensive – e.g. numerically intensive, etc.





“Optimization Conundrum”

- All server platforms claim they are “the best” and have the benchmarks to prove it.
- In reality, each has a different “sweet spot” workload for which they were designed to excell
- But diversity breeds complexity, increasing management costs and risk.
  - Is the lowest-common-denominator really the best you can do?
  - What if you could optimize for each workload, and avoid the downsides of heterogeneous complexity?

Golden Rule: An optimized dynamic infrastructure is heterogeneous

- **Optimized infrastructures**
  - **best "fit for purpose" technologies across the application tiers**
  - **Appropriate cost and service levels**
  - **Highly Virtualized to reduce management cost and risk**
- **Cloud computing is a delivery model for a Dynamic Infrastructure**

- **System z is an intersection point of:**
  - **Workload Optimized System Stacks**
  - **Cloud services**
  - **Capabilities for a dynamic infrastructure**
  - **Heterogeneous platform virtualization to minimize the complexity of heterogeneous workload-optimized stacks (future)**

System z delivers the benefits of workload optimized systems while eliminating the risks, costs, and complexity typically associated with heterogeneous multi-tier environments.

System z enables a ***Workload-Optimized World***

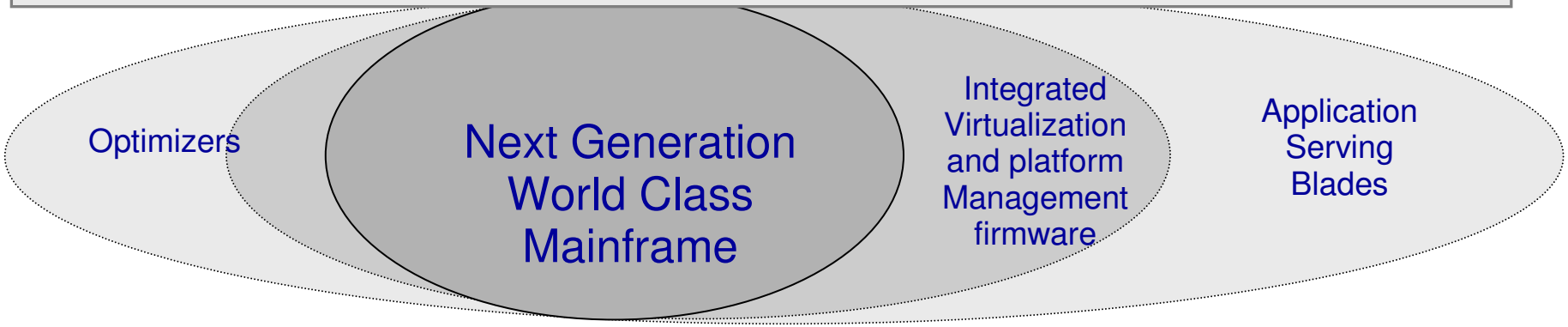
Breakthrough the limitations of conventional computing models System z, the world's premier workload-optimized platform for enterprise applications.

Our Vision:

Deliver the best of all worlds, Mainframe, UNIX, x86 and single function processors, integrated in a single system for ultimate flexibility and simplicity to optimize service, risk and cost across multiple heterogeneous workloads

The Optimized platform for multi-tier enterprise applications and data

ZFUTURE delivers the benefits of workload optimized systems while eliminating the risks, costs, and complexity typically associated with heterogeneous multi-tier environments.



- for computing intensive workloads
- Accelerate System z workloads at a lower cost per transaction
- Improve application response time
- Transparent to Applications

- Next Generation Mainframe processor
- Massive I/O throughput
- Extreme scale
- Industry Leading QOS
- Extreme consolidation of virtual images (40:1)
- Highest Utilization
- Investment Protection for upgrades

- Integrate, monitor, and manage multi-OS resources as a single, logical virtualized system
- Consolidate multi-tier application policies to a single management interface
- Extends Mainframe Qualities of Service to all assets in a mission critical multi-tier application
- Delivered as integrated platform firmware

- For multi-tier applications
- Logical device integration between System z resources with IBM Power and x86 servers
- Virtualization delivered as integrated platform firmware

Introducing the

IBM Smart Analytics Optimizer

System z

Data warehouse

For an integrated business intelligence solution,

The future is now!

IBM Smart Analytics Optimizer

Unlocking unprecedented value from enterprise data

Customers Need:	The IBM Smart Analytics Optimizer Helps:
Fast and predictable query response times on unpredictable workloads	*Fast and predictable query response times on unpredictable workloads*
Simplified deployment	*Fast integration for immediate impact, and simplified hardware management*
Improved security, reliability, availability of business analytics	Extend the qualities of service of System z, To ensure the security of business data, With enhanced delivery of analytics

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 & related administration*

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

A Bright Future with 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