

IBM System z Technology Summit



Consolidation and virtualization update with
Linux and zVM on System z



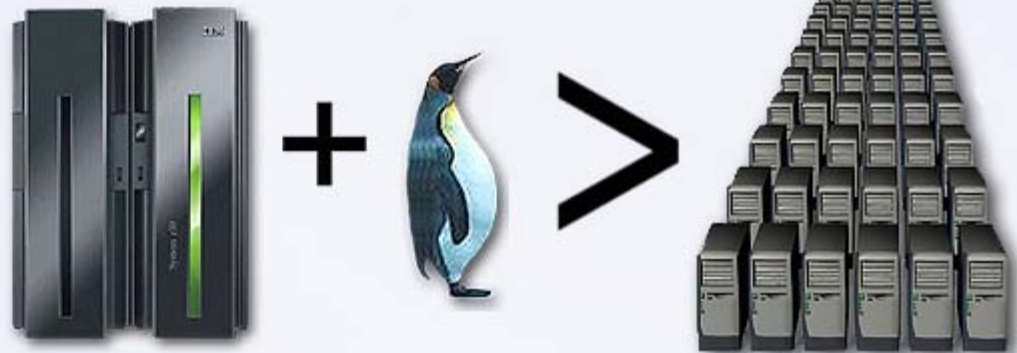
Linux on System z – take back control of your IT

A data center in a box – not a server farm

- **Potentially lower cost of operations**
 - Less servers
 - Fewer software licenses
 - Fewer resources to manage
 - Less energy, cooling and space
- **Central point of management**
- **Increased resource utilization**
- **Fewer intrusion points**
 - Tighter security
- **Fewer points of failure**
 - Greater availability

It's simple

System z® and Linux provide a better, faster solution to IT complexity



Linux on IBM System z

Linux + Virtualization + System z = SYNERGY

- **The legendary IBM mainframe – IBM System z**
 - Legendary dependability
 - Extremely security-rich, highly scalable
 - Designed for multiple diverse workloads executing concurrently
 - Proven high volume data acquisition and management
- **The IBM mainframe virtualization capabilities – z/VM**
 - Support for large real memory and 32 processors in a single partition
 - Enhanced security and LDAP server/client
 - Enhanced memory management for Linux guests
 - Enhanced management functions for Linux
- **Open standards operating system – Linux for System z**
 - Reliable, stable, security-rich
 - Available from multiple distributors
 - Plentiful availability of skills administrators and developers
 - Large selection of applications middleware and tooling from IBM, ISVs and Open Source

Why Linux on System z?

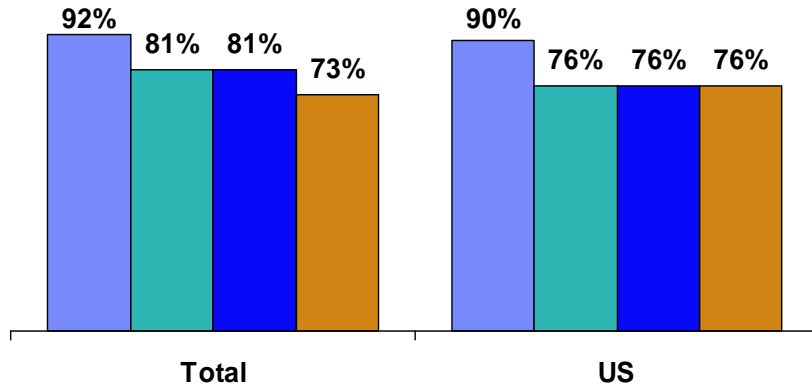
The reasons in 1999 are still valid today

- 1. Increased solutions through Linux application portfolio**
- 2. Large number of highly skilled programmers familiar with Linux**
- 3. Integrated business solutions**
 - Data richness from System z
 - Web capability of Linux applications
- 4. Industrial strength environment**
 - Flexibility and openness of Linux
 - Qualities of service of System z
- 5. Unique ability to easily consolidate a large number of servers**

Reasons for running Linux on the mainframe

Key Factors in Running Linux on Mainframe

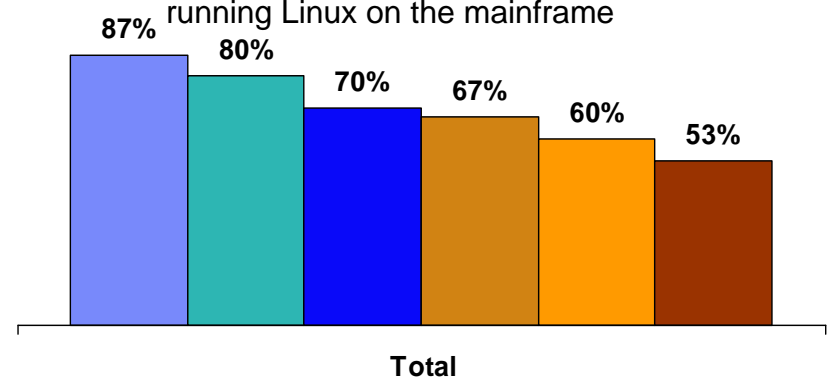
Base: Running Linux on the mainframe



- Mainframe reliability
- Cost savings
- z/VM virtualization capabilities
- Application availability

z/VM Capabilities Valuable for Running Linux on Mainframe

Base: Those who consider z/VM capabilities a key factor in running Linux on the mainframe



- Rapid deployment of Linux virtual machines
- High server consolidation ratio
- Virtual networking
- Staff productivity
- Data sharing
- System management features and functions

- **Mainframe reliability is the top driver for running Linux on System z, followed by cost savings, z/VM[®] virtualization capabilities and application availability**
- **The most important z/VM capabilities are rapid deployment of Linux virtual machines and high server consolidation ratio**

Source: 2009 IBM Market Intelligence

What System z brings to Linux

- **The most reliable hardware platform available**
- **Centralized Linux systems can be easier to manage**
- **Designed to support mixed work loads**
 - Allows consolidation while maintaining one server per application
 - Complete work load isolation
 - High speed inter-server connectivity
- **Scalability**
 - zEnterprise 196 scales to 80 configurable processors
 - System z10 EC scales to 64 configurable processors
 - System z10 BC scales to 10 configurable processors
 - Dedicated I/O processors
 - Up to 14 (z196), up to 11 (z10 EC), or 2 (z10 BC)
 - Hundreds to thousands of Linux virtual servers

What is different about Linux on System z?

▪ Access to System z specific hardware

- Crypto support – CPACF, CryptoExpress3
- Traditional mainframe and Open I/O subsystems
 - IBM DS8000 Enterprise Storage Systems
 - IBM XIV Storage System and Storwize V7000
 - SAN Volume Controller for other storage
- OSA-Express3 for very high speed communication between systems
- HiperSockets for ultra-high speed communication between Linux images on the same machine

▪ z/VM aware

- Enhanced performance
- System management tools



Value of Linux on System z

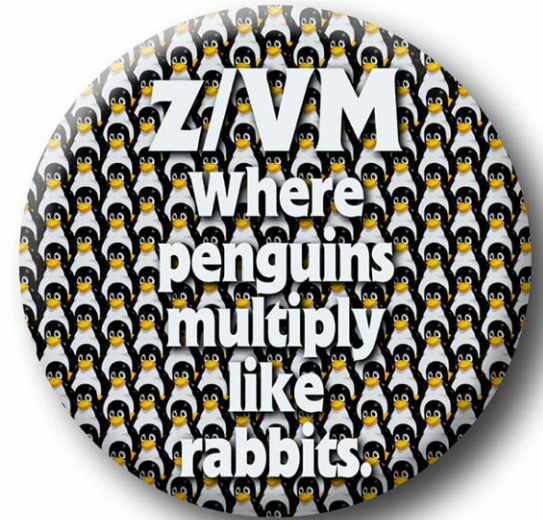
- **Reduced Total Cost of Ownership (TCO)**
 - Environmental savings – single footprint vs. hundreds of servers
 - Consolidation savings – less storage, less servers, less software licenses, less server management/support
- **Improved service level**
 - Systems management (single point of control)
 - Reliability, availability, security of System z
- **Speed to market**
 - Capacity-on-demand capability on System z
 - Dynamic allocation of on-line users, less than 10 seconds to add a new Linux server image using z/VM and IBM DS8000

System z – The ultimate virtualization resource

- **Utilization often (usually?) exceeds 90%**
 - Handles peak workload utilization of 100% without service level degradation
- **Massive consolidation platform**
 - Up to 60 logical partitions, 100s to 1000s of virtual servers under z/VM
 - Virtualization is built-in, not added-on
 - HiperSockets for memory-speed communication
 - Most sophisticated and complete hypervisor function available
- **Intelligent and autonomic management of diverse workloads and system resources based on business policies and workload performance objectives**

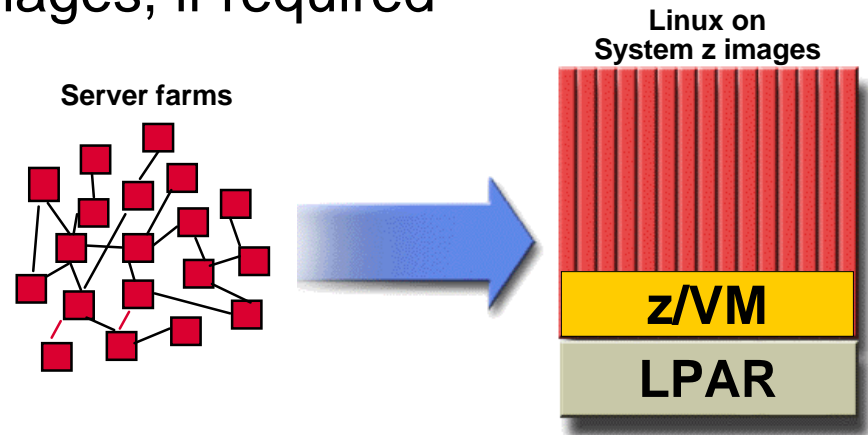
z/VM – Extreme virtualization

- **z/VM helps enterprises meet their growing demands for multi-system server solutions with a broad range of support for operating system environments**
- **Mature technology – VM/370 introduced in 1972**
- **Software Hypervisor integrated in hardware**
 - Sharing of CPU, memory and I/O resources
 - Virtual network – virtual switches/routers
 - Virtual I/O (mini-disks, virtual cache, ...)
- **Easy management**
 - Self-optimizing workload management
 - Deploy virtual servers in seconds
 - Highly granular resource sharing (<1%)
 - Add physical resources without taking system down, scale out to 1000s of virtual servers
 - Do more with less: More virtual servers per core, Share more physical resources across servers
 - Extensive virtual server life-cycle management



The value of z/VM for Linux

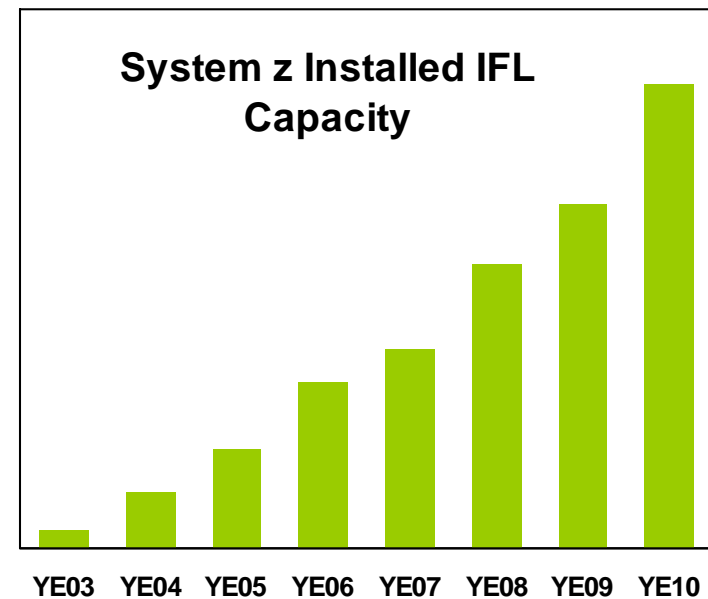
- **Enhanced performance, growth and scalability**
 - Server consolidation enables horizontal growth
 - N-tier architecture on two tiers of hardware
 - Extensive support for sharing resources
 - Virtual networking
 - Effective isolation of Linux images, if required
- **Increased productivity**
 - Development and testing
 - Production support
- **Improved operations**
 - Backup and recovery
 - Command and control



Linux on System z

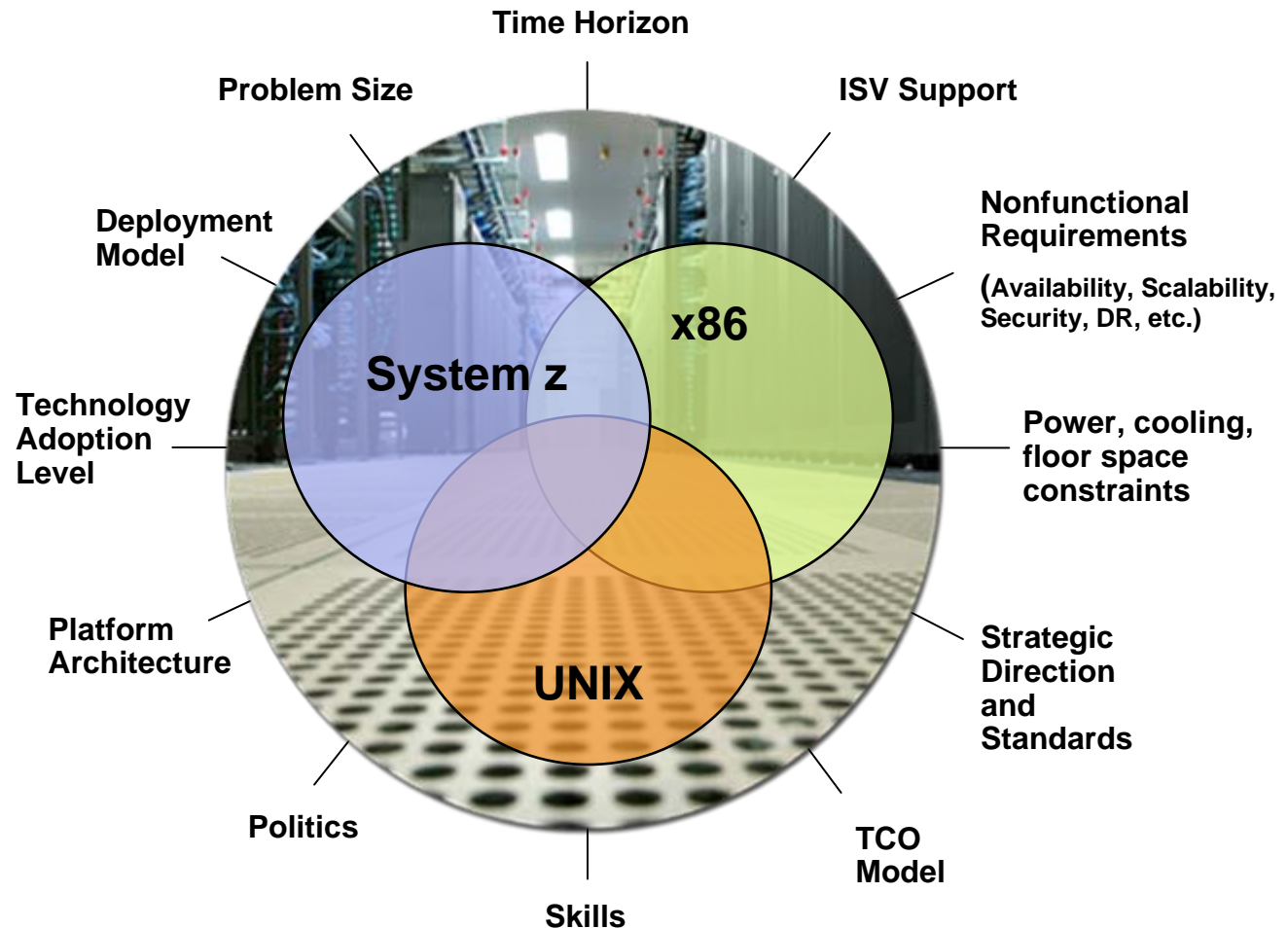
Client adoption continues to drive success

- **The momentum continues:**
 - Shipped IFL engine volumes increased 34% from YTD 4Q09 to YTD 4Q10
 - Installed IFL MIPS increased 6% from 3Q10 to 4Q10
 - Installed IFL MIPS increased 35% from 4Q09 to 4Q10
- **32% of System z customers have IFLs installed**
- **Linux represents 19% of the System z install base capacity (MIPS)**
- **64 of the top 100 System z clients are running Linux on the mainframe**
- **> 3,000 applications are available for Linux on System z**



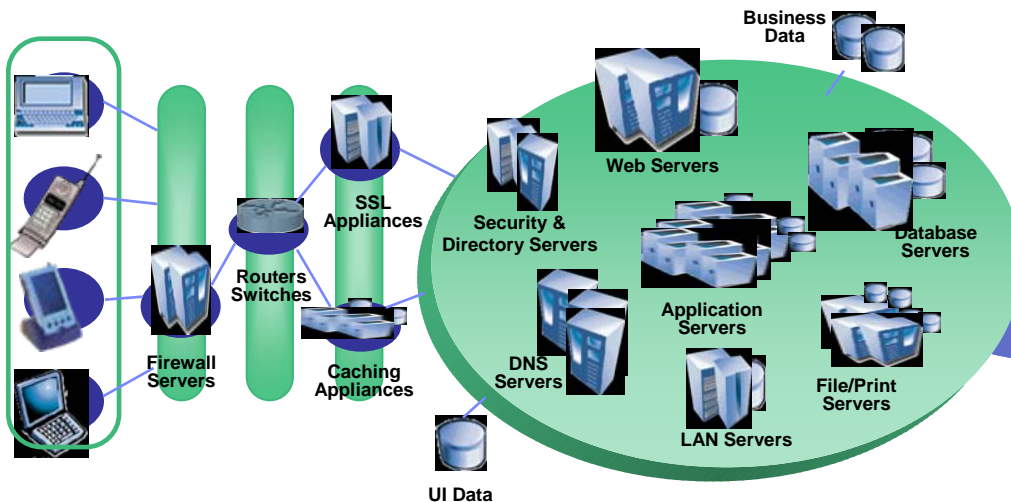
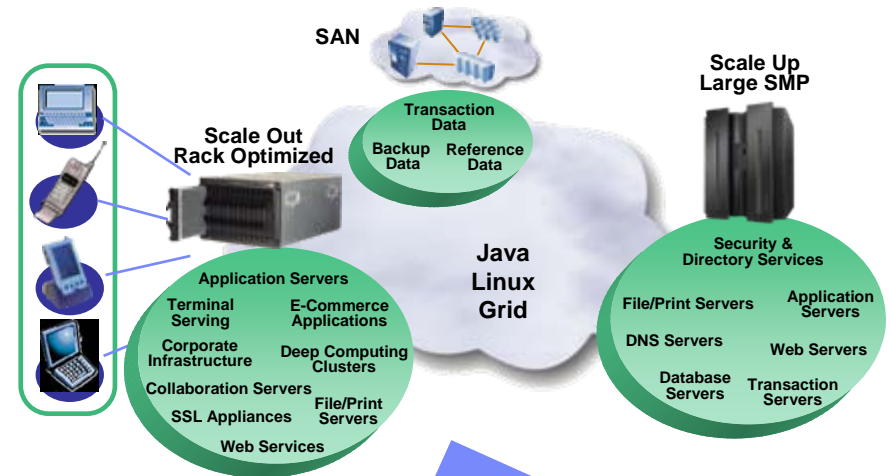
Platform choice – Fit for purpose, workload and situation

- Many factors influence 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



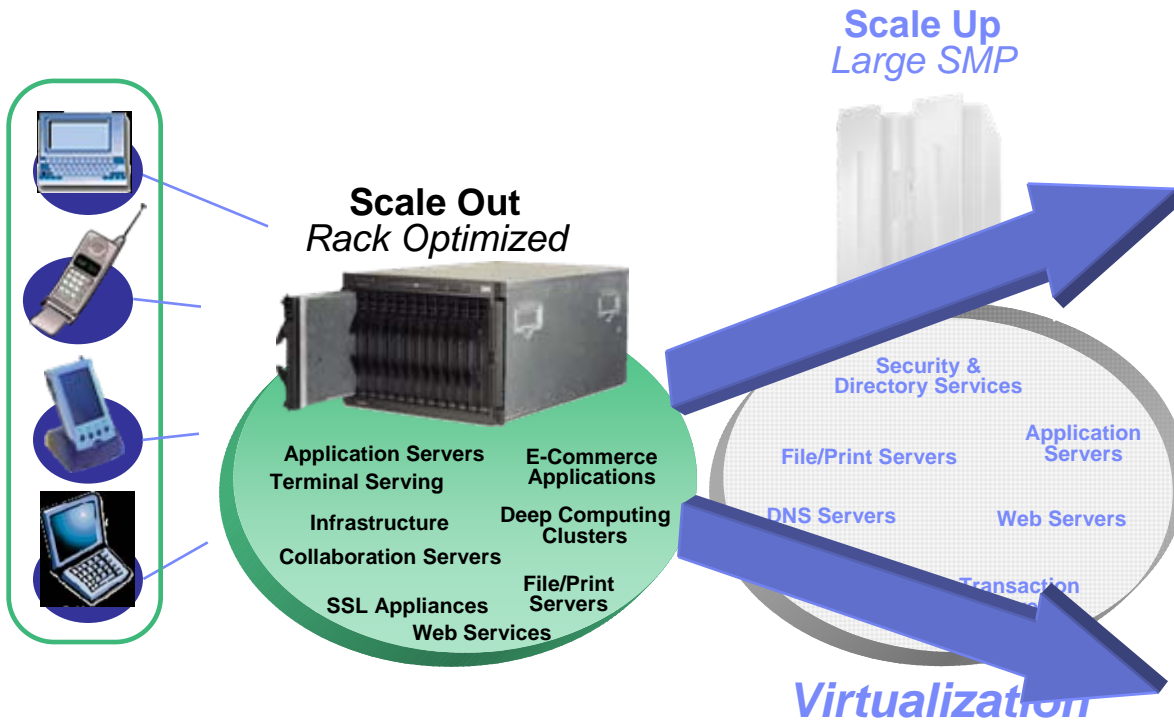
Infrastructure simplification and platform choice

- Customers leveraging scale up and scale out technologies to simplify and integrate their on demand operating environment
- As one solution option:
 - Large SMP and Rack Optimized servers integrated with Linux, Java and Grid technologies can enable this transformation



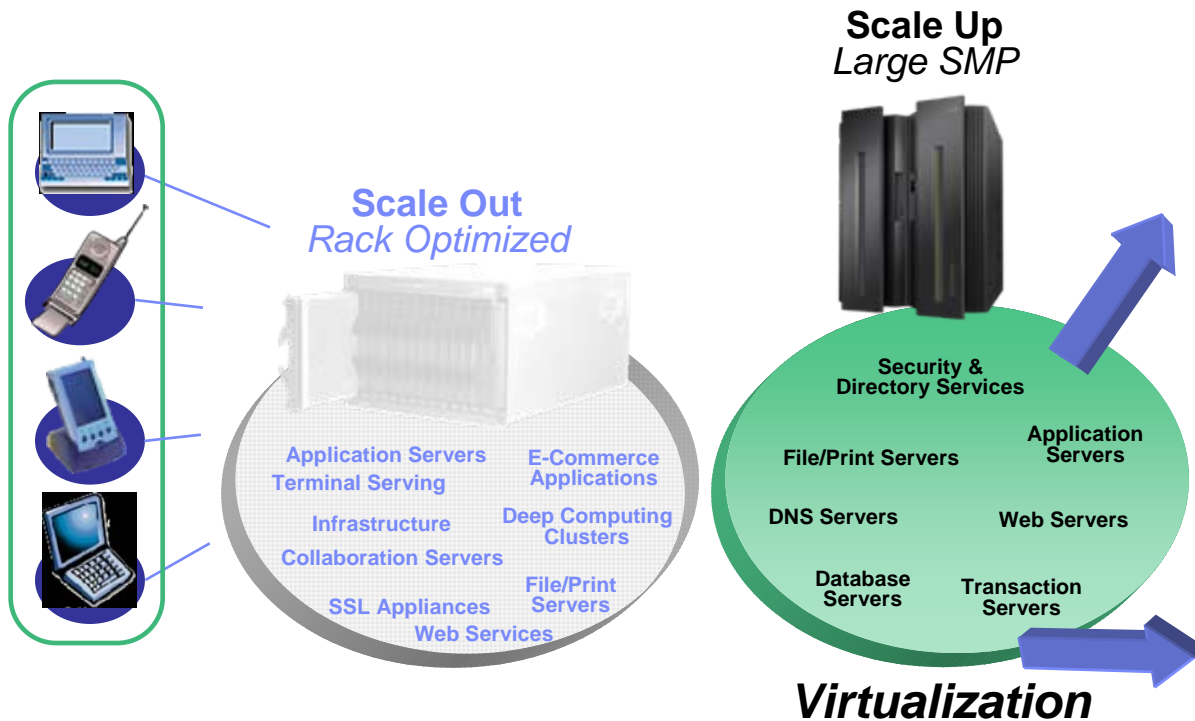
Today's Environment, Simplified

Ideal scale-out implementations



- **Clustered workloads**
- **Distributed computing applications**
- **Infrastructure applications**
- **Small database**
- **Processor and memory intensive workloads**

Ideal scale-up implementations



- High performance transaction processing
- I/O intensive workloads
- Large database serving
- High resiliency and security
- Unpredictable and highly variable workload spikes
- Low utilization infrastructure applications
- Rapid provisioning and re-provisioning

Selecting an application

- **Performance on System z CPUs is comparable to CPUs on other platforms of similar speed**
 - CPU speed is not the entire story – it's in the architecture!
 - Architecture designed for multiple or consolidated workloads
 - System z has definite advantage with applications that have mixed CPU and I/O
- **System z and z/VM provide excellent virtualization capabilities**
 - Look for applications that are on lower utilized servers
 - Development and Test are good choices to start
- **Good planning is essential**
- **IBM can:**
 - Perform sizing estimates
 - Assist with planning and initial installation needs

Linux distributors

- **Novell SUSE Linux Enterprise**
 - <http://novell.com/mainframe/>
 - <http://novell.com/linux/mainframe/>

The Novell logo consists of the word "Novell" in a bold, red, sans-serif font, followed by a registered trademark symbol (®).

- **Red Hat Enterprise Linux**
 - <http://redhat.com/rhel/server/mainframe/>



Thanks!

J. L. (Jim) Elliott

*Consulting Sales Specialist – System z
zChampion & Linux Champion
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