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Linux Platform Options – Selecting Linux on zSeries



Jim Elliott, Advocate,
Strategic Growth Businesses
IBM Canada Ltd.
ibm.com/vm/devpages/jelliott

Linux



Linux Platform Options – Selecting Linux on zSeries *Session 9202*

- **Datacenters planning to adopt Linux have a key architectural choice to make in designing large-scale implementations.**
- **Is the best approach to running Linux scale-out with rack-optimized servers, to scale-up with large SMP servers, or use virtualization facilities to run many images on a single server?**
- **In this session, Jim will examine the different options and their respective advantages and disadvantages and discuss some guidelines for making this critical choice based on workload and application requirements.**
- **For many users, Linux on zSeries may be the optimal choice.**
- **Jim will describe how Linux on zSeries, in combination with z/VM, will provide a robust Linux environment which integrates well with z/OS.**





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Scale-Up, Scale-Out, Virtualization



Linux



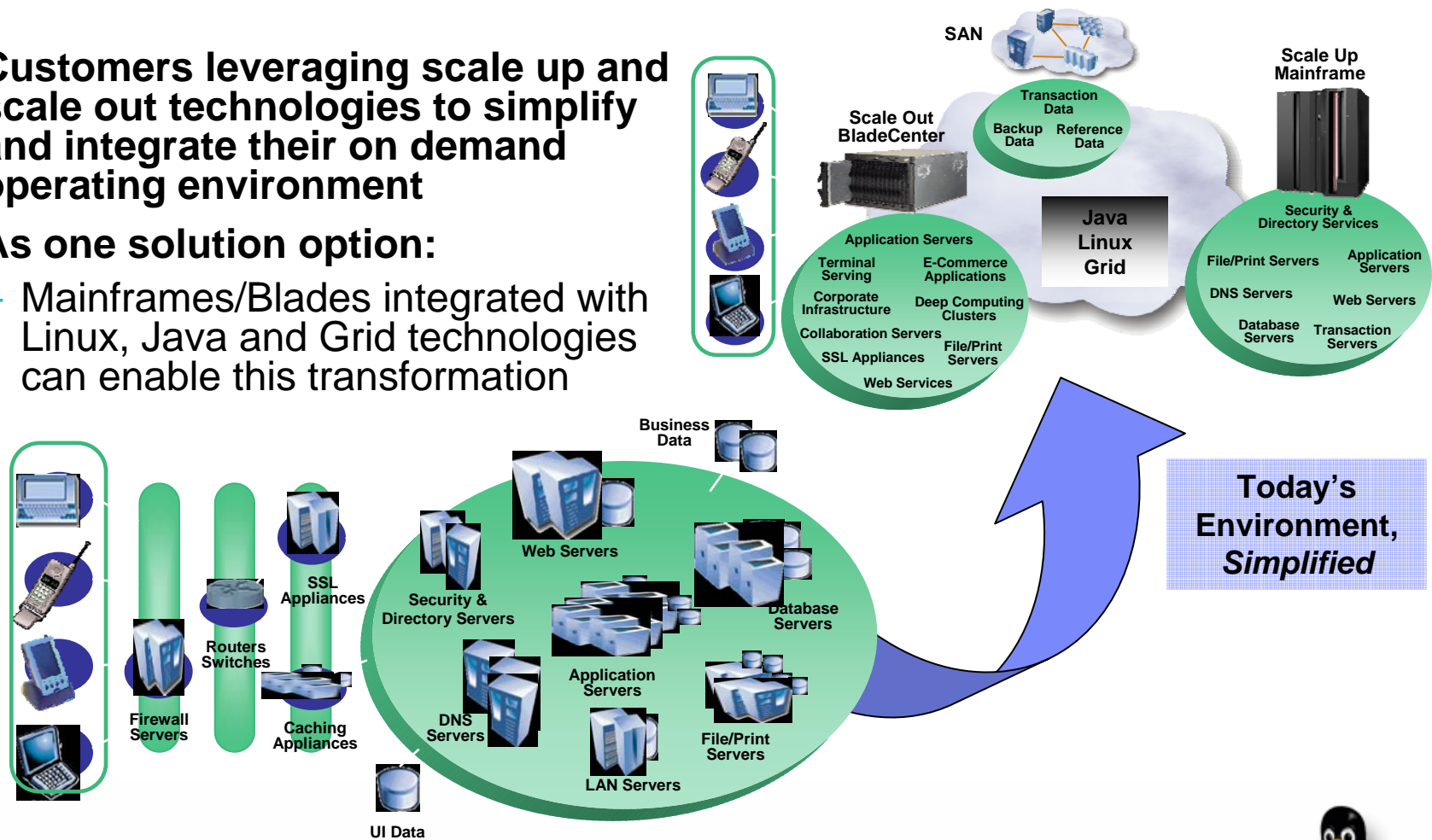
SHARE Session 9202

February 28, 2005

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Infrastructure Simplification

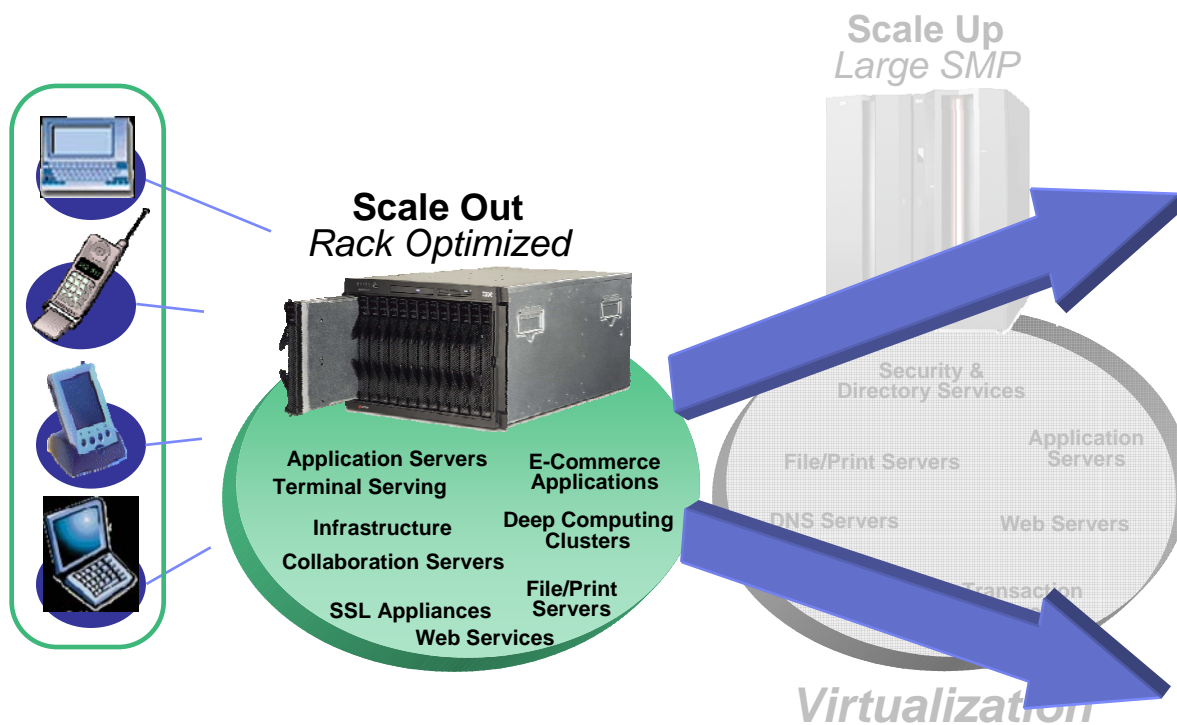
- Customers leveraging scale up and scale out technologies to simplify and integrate their on demand operating environment
- As one solution option:
 - Mainframes/Blades integrated with Linux, Java and Grid technologies can enable this transformation



Today's Environment, Simplified



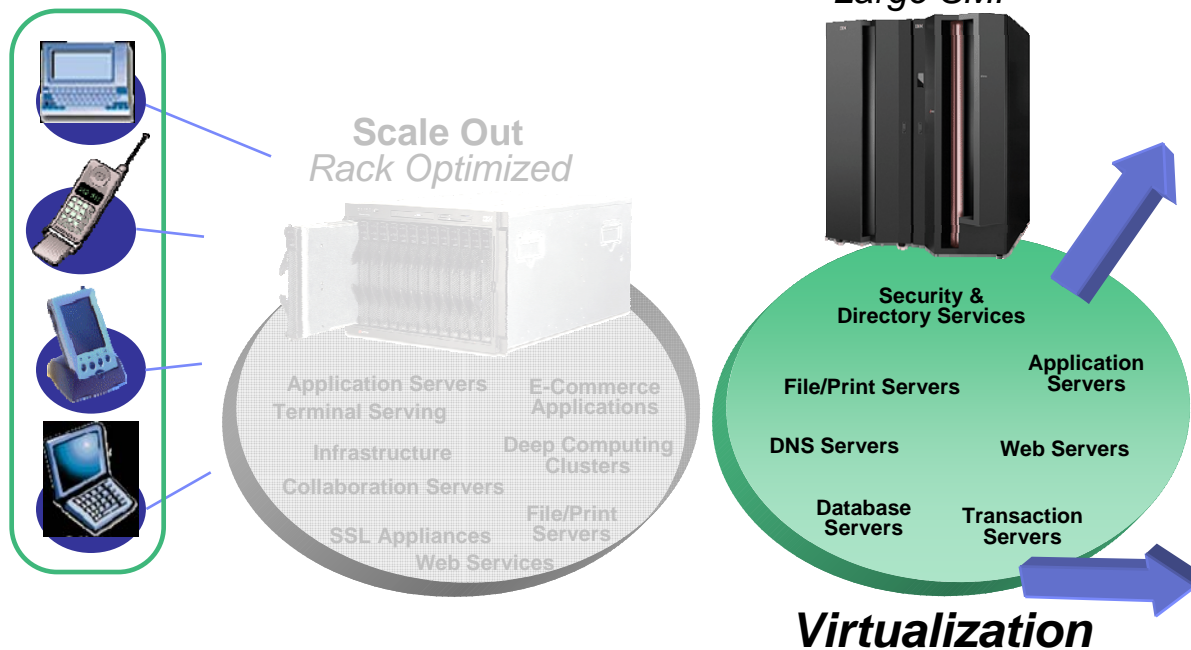
Ideal rack optimized implementations



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



Ideal large SMP implementations

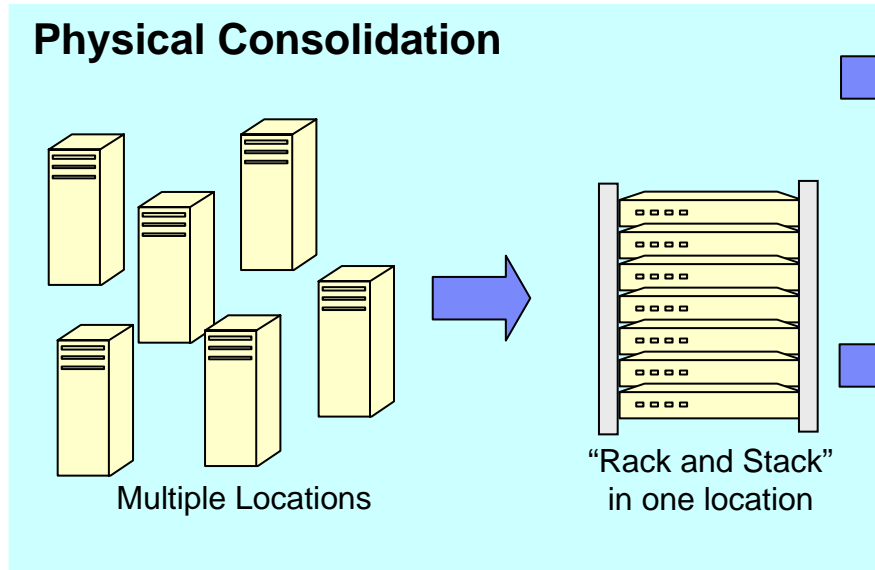


- High performance transaction processing
- I/O Intensive workloads
- Large database serving
- High resiliency and security
- Unpredictable and highly variable workload spikes
- Low utilization infrastructure applications
- Rapid provisioning and re-provisioning

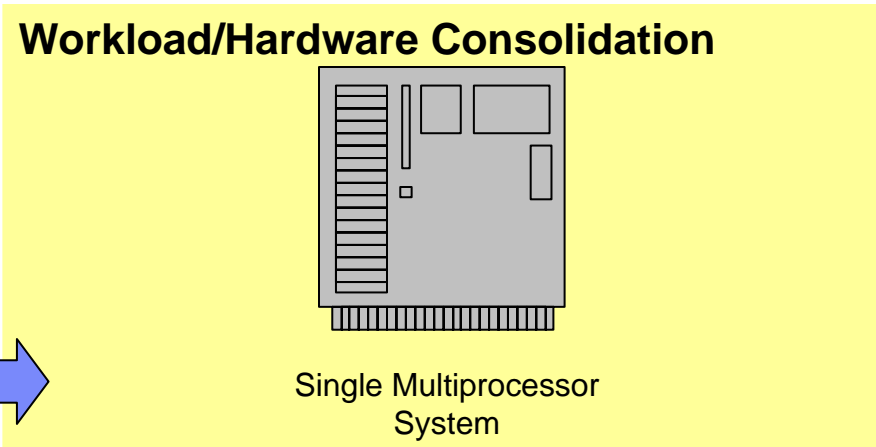


Server Consolidation: Cost Savings and Operational Efficiency

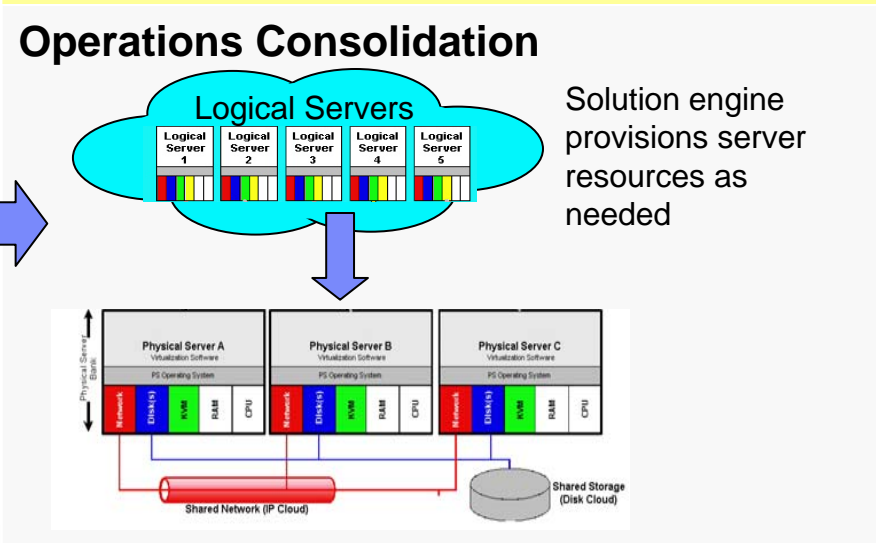
Physical Consolidation



Workload/Hardware Consolidation



Operations Consolidation



Workload vs. Operations Consolidation

■ Workload consolidation

- Focus on hardware cost savings
- Operating system-level approach
- Needs single operating system
- No application changes
- Simpler, potentially more robust
- Shorter timescales

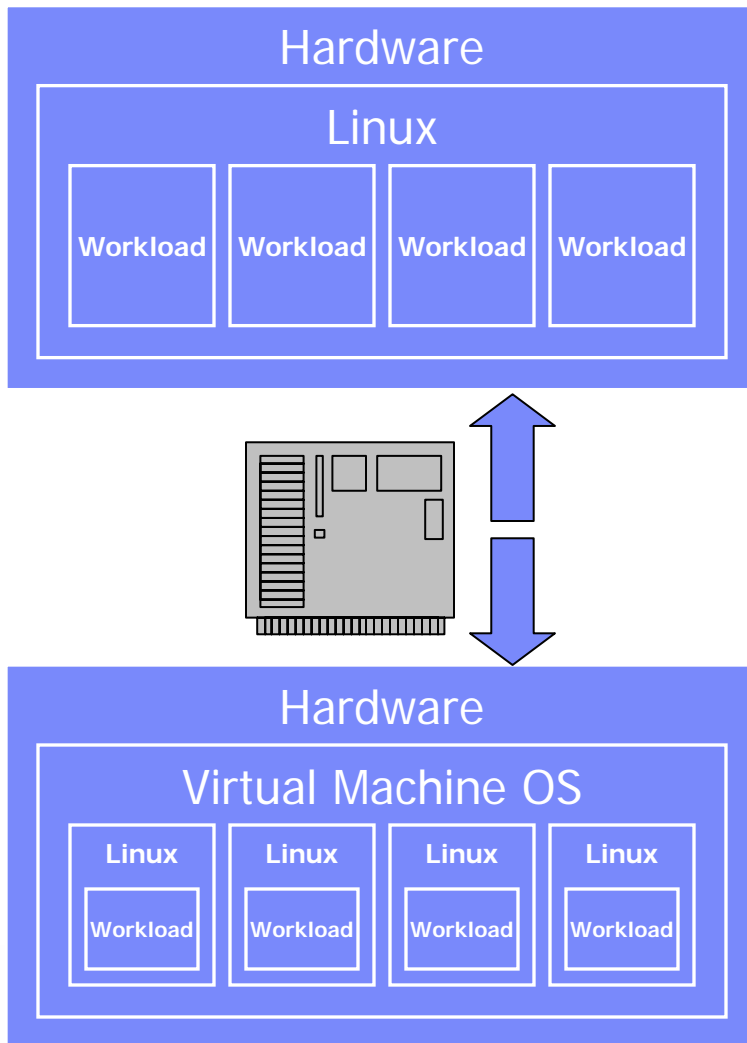
■ Operations consolidation

- Focus on operational effectiveness
- Application-level approach
- Can support multiple operating systems
- May need application (server) changes
- Potentially more functional
- Longer timescales

Bottom line: Both are valid approaches with overlapping but distinct benefits.



Workload Consolidation vs. Workload Scalability



■ Issues

- Which is best? Native Linux or VM?
- If native Linux, will it scale?
- If native Linux, will it handle multiple workloads?
- If VM, who does what?

■ Rule of Thumb

- If you have one very large workload, use Linux natively
- Sweet spot for VM is server consolidation



Consolidation Factors

- **Hardware costs**
 - CPU, storage, network (cables, routers, etc.), maintenance support
- **Software costs**
 - Product, service and support
- **System occupancy costs**
 - Space, power, special environment requirements
- **People, services, etc.**
 - FTEs, financing, etc.
- **Hidden factors**
 - RAS
 - Vendor choice
 - Time to market, new business opportunities



Design / Architect Continuum – A General “ROT”

- **x86**
 - Few servers
 - Moderate to high average CPU % busy
 - Low I/O requirements
- **OpenPower, pSeries, iSeries**
 - CPU intensive
 - Large memory
 - LPAR benefits
 - Moderate I/O
- **zSeries**
 - Many servers
 - Low to moderate average CPU % busy
 - Virtual servers on demand
 - High I/O requirements



Software for Linux on various platforms

- **Most Open Source server software will run on any architecture**
- **Intel x86**
 - Largest volume of commercial software
- **Intel Itanium**
 - Limited commercial software – primarily databases, compute intensive, and ERP
- **AMD 64, Intel EM64T**
 - Tolerates x86 software, limited exploitation
- **IBM POWER – OpenPower, iSeries, pSeries, BladeCenter JS20**
 - 1000+ commercial applications available
- **IBM zSeries**
 - 900+ commercial applications available



Linux Under VM for Workload Consolidation

- **Primary advantage:**
“walls” are flexible

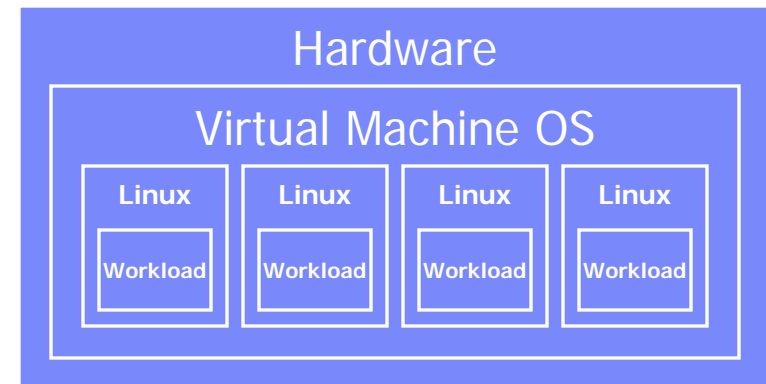
- Pay for what you use at guest level
- Add or remove capacity at will

- **But it’s not magic!**

- Physical limits are still there
- There is overhead and, therefore, you can overload
- The highly CPU-intensive may work better in native operating system

- **Golden rule**

- Don’t assume – test





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Linux on zSeries



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Servers > Mainframe servers >

IBM eServer®

Linux on zSeries

An ideal foundation for on demand operating environments

What do you get when you combine the scalability and reliability of IBM mainframe servers with the flexibility and open standards of Linux? Measurable business value.

→ [Get started with Linux on zSeries](#)

Featured topics

→ [IBM Communication Controller for Linux on zSeries enables NCP for operation in the Linux environment](#)

Communication Controller for Linux on zSeries can provide an alternative platform for running the Network Control Program (NCP) software product, in place of many configurations where customers currently use a 37xx hardware environment. You now have the advantage of the Communication Controller running in the Linux on zSeries environment.

↳ [First National Bank of Omaha will switch from Sun servers and EMC storage to IBM systems running Linux](#)

Search390.com

First National Bank of Omaha is planning to migrate its WebSphere applications from Sun Solaris to virtual Linux servers on one IBM eServer zSeries 990, which will run the z/VM operating system, and is moving to IBM's TotalStorage SAN Volume Controller virtualization software for its storage device management needs.

Request a quote

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Effective infrastructure simplification

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See who's on



IBM z/VM Web Site

ibm.com/vm

The screenshot shows the IBM z/VM web site interface. At the top, there is a navigation bar with the IBM logo, a search box, and links for "Country/region [select]" and "Terms of use". Below this is a secondary navigation bar with links for "Home", "Products", "Services & solutions", "Support & downloads", and "My account". The main content area features a breadcrumb trail: "Servers > Mainframe servers > z/VM >". The "z/VM" section is highlighted in the left sidebar. The main content area displays the "z/VM" logo and the text "the newest VM operating system based on 64-bit z/Architecture." Below this, there is a section titled "Currently marketed releases of z/VM" which includes a key icon and text stating "Now available: z/VM V5.1" and "Also available: z/VM V4.4". To the right, there is a "Mainframe history" section with a timeline showing "1964" and "2004", and the text "40 years and counting". Below this is a section titled "Is your VM current?" with the text "Thinking about migration?". At the bottom right, there is a "Mark Your Calendar!" section for the "April 11-15, 2005 Innsbruck, Austria zSeries Tech Conference".

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Servers > Mainframe servers > z/VM >

IBM @server®

z/VM®
the newest VM operating system based on 64-bit z/Architecture.

Currently marketed releases of z/VM

 Now available: **z/VM V5.1**
Also available: **z/VM V4.4**
z/VM provides a highly flexible test and production environment for enterprises deploying on demand business solutions. Built upon the solid VM/ESA base, z/VM exploits the z/Architecture and helps enterprises meet their growing demands for multi-user server solutions with a broad range of support for operating system environments such as z/OS, OS/390, TPF, VSE/ESA, CMS, or Linux on zSeries. Read [more](#) about z/VM.

Summary of News and Updates

View 22 Feb. 2005 updates.
Read the z/VM and VM Site News and Changes for a summary of VM-related news, announcements, pointers, new classes, and places to hear about z/VM virtualization technology.

Worldwide announcement letters(US letters below)

Mainframe history

1964 | 2004

40 years and counting
Explore IBM mainframe innovation →

Is your VM current ?

VM/ESA
z/VM
Thinking about migration?

Mark Your Calendar!
April 11-15, 2005
Innsbruck, Austria
zSeries Tech Conference



List Server Discussions

■ VMESA-L discusses z/VM

- To subscribe, send a note to listserv@listserv.uark.edu. In the body of the note, write only the following line:
 - `SUBSCRIBE VMESA-L firstname lastname`
- View and search the current list and archives:
 - <http://listserv.uark.edu/archives/vmesa-l.html>

■ LINUX-390 discusses Linux on zSeries

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 - `SUBSCRIBE LINUX-390 firstname lastname`
- View and search the current list and archives:
 - <http://www.marist.edu/htbin/wlvindex?linux-390>



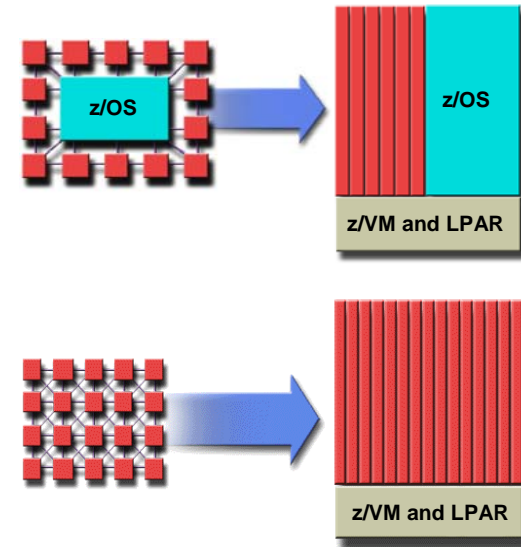
What is Linux on zSeries?

- **A native zSeries operating environment**

- Exploits IBM zSeries hardware
- Not a unique version of Linux

- **zSeries application sourcing strategy**

- The IBM commitment to z/OS, z/VSE, and z/TPF is not affected by this Linux strategy
- zSeries customers are offered additional opportunities to leverage their investments through Linux
- New doors are opening for zSeries customers to bring Linux-centric workloads to the platform



Why Linux on zSeries?

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



What zSeries brings to Linux

- **The most reliable hardware platform available**
 - Redundant processors and memory
 - Error detection and correction
 - Remote Support Facility (RSF)
- **Centralized Linux systems are easier to manage**
- **Scale to 32 application processors and up to 8 dedicated I/O processors**
- **Hundreds of Linux virtual servers**
- **Designed to support mixed work loads**
 - Allows consolidation while maintaining one server per application
 - Complete work load isolation
 - High speed inter-server connectivity



What is different about Linux on zSeries?

- **Access to zSeries specific hardware**
 - Crypto support – PCICA, CPA, PCIXCC, Crypto2
 - Traditional and Open I/O subsystems
 - Disk (ECKD or SCSI) and tape
 - OSA-Express and OSA-Express2 for very high speed communication between z/OS, z/VSE, z/TPF and Linux
 - HiperSockets for ultra-high speed communication between z/OS, z/VSE and Linux
- **z/VM aware**
 - Enhanced performance
 - System management tools



Value of Linux on zSeries

- **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 zSeries hardware and z/VM software
 - High performance integration with z/OS
- **Speed to market**
 - Capacity-on-demand capability on zSeries
 - Dynamic allocation of on-line users, less than 10 seconds to add a new Linux server image using z/VM and ESS



Roadblocks to Linux Adoption on zSeries

- **Wide acceptance of Linux as an enterprise-class environment, but still skepticism outside Intel platform and certain applications**
- **Be prepared to answer some tough questions:**
 - *“Why should we use Linux in the first place?”*
 - *“Why should I run a ‘free’ operating system on such an expensive platform?”*
 - *“What if we don’t know anything about VM? Or Linux?”*
 - *“What if our end users don’t like it?”*
 - *“Nobody else is doing it, right?”*
- **Be willing to accept your own answers; sometimes a different approach may be better**



How Expensive is zSeries?

- IFL processor costs – how does this compare to 20, 50 or 100 x86 or Power systems?
- If you can't utilize >50 percent of an IFL, think hard
- If current server utilization is >50 percent, think very hard
- Much more than CPUs – with z/VM, we can share memory, disk, I/O, network resources
- Virtualization has its (physical) limits – z/VM can't get 200 percent out of a processor, but it can help you get close to 100
- For critical workloads, overcommitting resources will typically degrade more gracefully in z/VM
- Think in terms of workload and reliability, not just processor capacity
- Plan, test, benchmark



When Do You Need More than “Good Enough”?

Making the Case for zSeries Virtualization

- **When workload growth and decline is difficult to predict (be it production, development, or test/assurance systems)**
- **When customer demand does not match your IT resources and business results suffer**
- **When your IT staff wants to optimize their productivity for deploying and managing virtual servers**
- **When innovation is stifled because your staff cannot experiment or develop new solutions using existing resources**
- **When speed to market affects your business results**
- **When your server applications need fast and flexible access to z/OS data and applications**
- **When business resiliency is a high priority**
- **When you want more control over your environmental expenses (e.g. floor space, cooling)**



zSeries LPAR and z/VM: World-class Server Virtualization

■ Logical Partitions (LPAR)

- zSeries Logical Partitioning (LPAR), introduced in 1988, has provided years of business-critical, high-performance server partitioning for the world's largest corporations
- Hardware partitioning enabling up to 30 “logical partitions” each of which runs a separate operating system – traditional operating systems and Linux

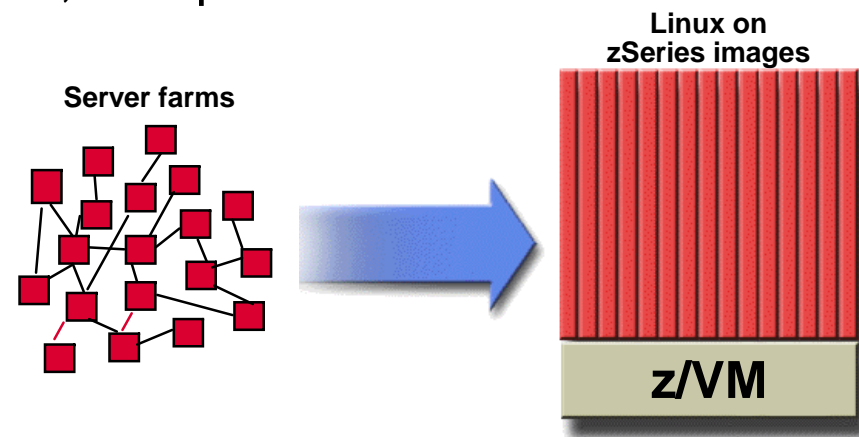
■ Virtual Partitions (z/VM)

- z/VM, commercially available since 1972, has supported mixed workloads that require minimal hypervisor overhead, massive scalability, and exceptional levels of availability
- Support for large numbers of Linux images with rich system management capabilities

■ Both LPAR and z/VM employ hardware and firmware innovations developed over the years that make virtualization part of the basic fabric of the zSeries platform

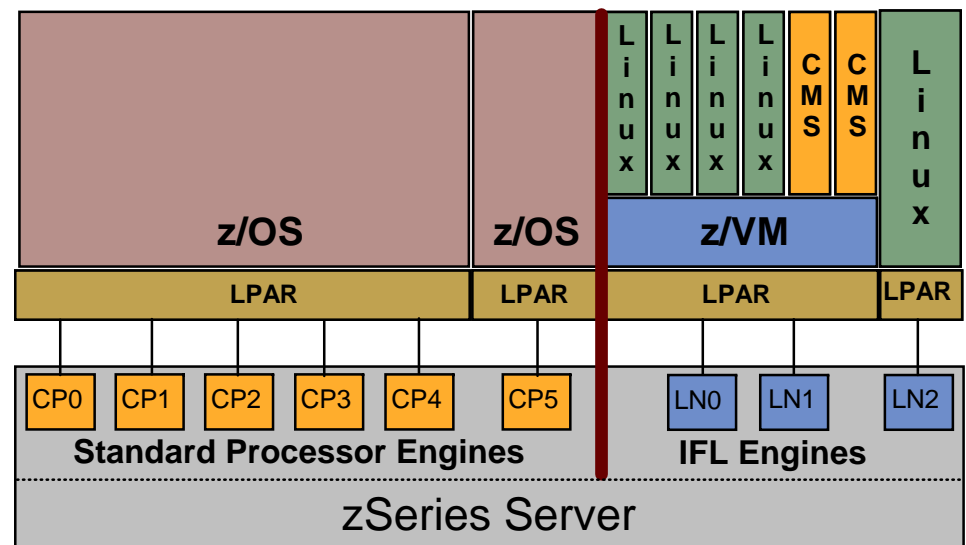
The value of z/VM for Linux

- **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

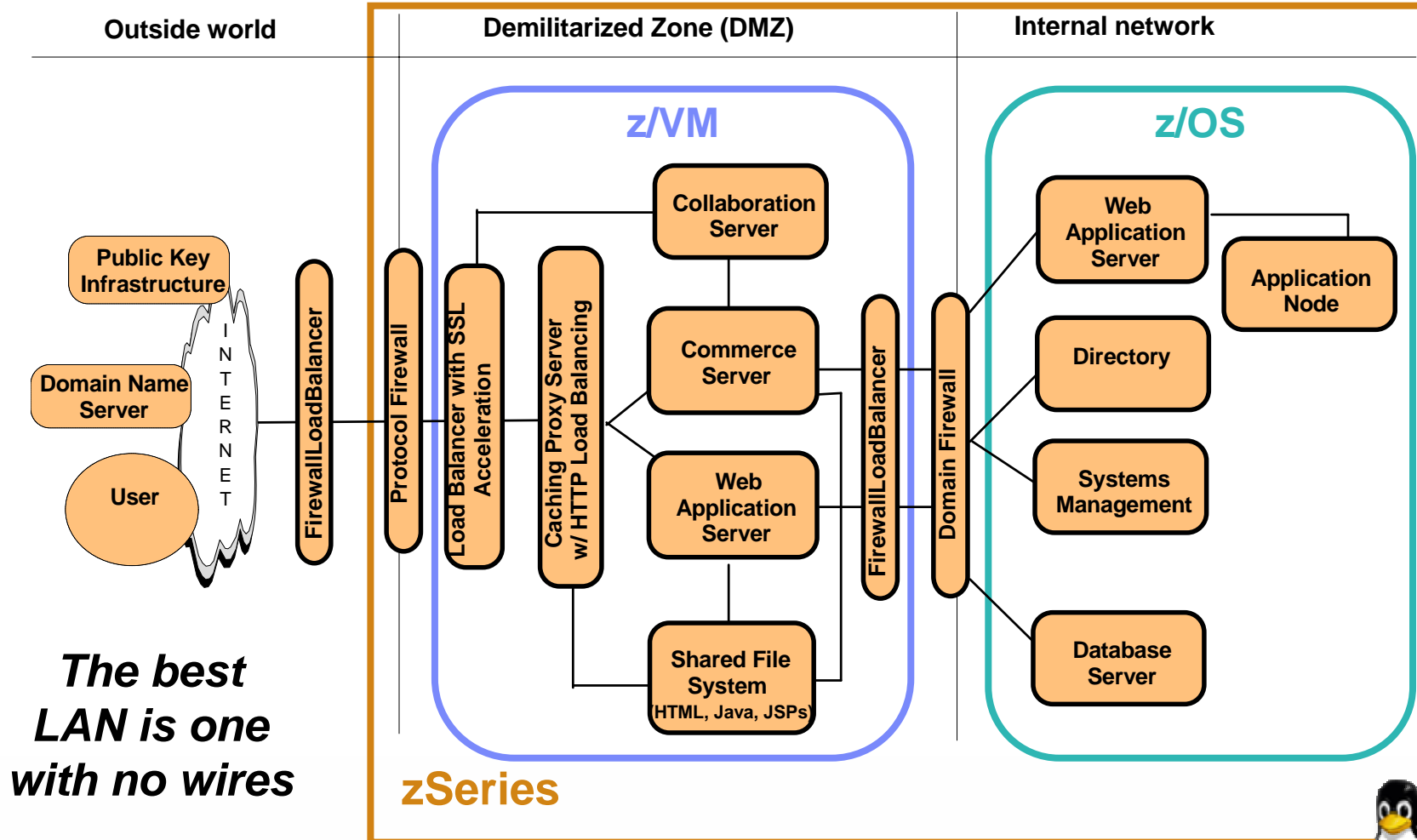


zSeries Integrated Facility for Linux

- **Additional engines dedicated to Linux workloads**
 - Supports z/VM and Linux on zSeries
- **Traditional zSeries software charges unaffected**
 - IBM zSeries software
 - Independent Software Vendor products
- **Linux and z/VM charged only against the IFLs**



Application serving with Linux on zSeries



The best LAN is one with no wires



IBM Software for Linux on zSeries

ibm.com/linux/matrix

IBM @server® zSeries

DB2	Version -	Hardware	Kernel/Distribution	Sources	
Data Ma	IBM @server® zSeries				
DB2 Adm	IBM @server® zSeries				
Tivoli	IBM @server® zSeries				
IBM Tivoli Manager e-busine	WebSphere software	Version - Release	Hardware	Kernel/Distribution	Sources
	WebSphere Application Server	6.0	zSeries	Red Hat Enterprise Linux 3 Update 2, Update 3 SUSE Linux Enterprise Server 8 SP3 SUSE Linux Enterprise Server 9	Available December 10, 2004 Software Announcement 204-289 November 30, 2004 Supported Platforms
	WebSphere Application Server	5.1.1	zSeries	Red Hat Enterprise Linux 3 Update 1 SUSE Linux Enterprise Server 8 SUSE Linux Enterprise Server 8 SP3 SUSE Linux Enterprise Server 9	Supported Platforms



Next Steps

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- Familiarize yourself with Linux and zSeries
- View Linux as a valid alternative for IT systems
- Incorporate open source software development into IT strategies
- Look at Linux on zSeries to see how it can:
 - Lower costs
 - Increase reliability and security
 - Improve service

**Jim Elliott, Advocate
Strategic Growth Businesses
IBM Canada Ltd.
jim_elliott@ca.ibm.com
ibm.com/vm/devpages/jelliott**



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