

- Guest LAN and VSWITCH exploitation of the Prefetch Data instruction to use cache prefetch capabilities to help performance of heavy guest-to-guest streaming workloads
- Enhanced scalability with z/VM using memory above 2 GB for an additional set of operations and support for up to 256 GB of real storage (memory) and more than 1 TB of total virtual memory in use by guests
- Exploitation of expanded DCSS space via the DCSS Block Device Driver, allowing up to 512 GB of data to be shared among Linux guests
- Support for Collaborative Memory Management Assist (CMMA) on System z by which z/VM and Linux guests exchange information to optimize their use and management of memory
- Up to 32 real processors in a single z/VM image
- Enhanced memory utilization using Virtual Machine Resource Manager (VMRM) between z/VM and Linux guests
- More extensive workloads and systems resource management features with VMRM including functions that may be called by client applications to allocate and manage resources for guests
- Enhanced I/O performance and operation of SCSI disks including support for N-Port Identifier virtualization on System z servers
- DVD installation to SCSI disks or 3390-format disks
- IPL of SCSI disks attached to FCP channels by z/VM for Linux and other guest operating systems
- Usability enhancements for the z/VM Virtual Switch (VSWITCH) and guest LAN environments
- Guest access to the system ASCII console to facilitate recovery of the guest during an emergency
- TCP/IP and guest LAN Support for HiperSockets using IPv6 protocol
- IBM System Storage™ SAN Volume Controller (SVC) Model 2145 support to access IBM disk subsystems
- Support for up to 262,668 cylinders for devices dedicated to a Linux guest with the PTF for APAR VM64709, planned to be available by year-end 2009 and double the number of cylinders, up to 65,520, available for CMS use with the PTF for APAR VM64711
- FICON Express8 for increased channel connectivity, increased data transfer rates, and enhanced performance
- Crypto Express2 and Crypto Express3 support including accelerating SSL transactions
- Enhanced guest performance assists for OSA-Express, FCP, and HiperSockets
- OSA-Express2 and OSA-Express3 support including TCP/IP stack enhancements to allow additional connections to virtual machines, particularly Linux images

- Recognition of all four ports on z10 OSA-Express3 Gigabit Ethernet (GbE) and 1000Base-T Ethernet features (including the OSA-Integrated Console Controller (OSA-ICC) in first quarter 2010) and two ports on the z10 BC OSA-Express3 GbE SX 2P and 1000BASE-T 2P features
- OSA-Express QDIO data connection isolation providing additional networking security with required minimum MCLs
- z/VM VSWITCH support for OSA-Express2 and OSA-Express3 for Layer 2 mode
- z/VM VSWITCH support for OSA-Express2 and OSA-Express3 link aggregation for increased throughput and provides more seamless nondisruptive failover in the event that an OSA port in the group becomes unavailable
- Coordinated near-continuous availability and disaster recovery for Linux guests with HyperSwap™ support and a Geographically Dispersed Parallel Sysplex™ GDPS® solution

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### *Access to a Linux Environment*

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IBM has established a Linux environment that delivers virtual Linux servers so developers can port, test and develop new software technologies for the System z platform. For registration procedures and terms of service for the Community Development System for Linux, go to:

**ibm.com/systems/z/os/linux/lcds/**

Additional opportunities for Independent Software Vendors (ISVs) to test drive the Linux experience are the Linux for System z Test Drive offerings. PartnerWorld® for Developer members who qualify for enterprise server benefits are eligible to participate in the Linux for System z Test Drive offerings. For more information, visit:

**ibm.com/servers/enable/site/testdrive/zseries**

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### *For more information:*

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- IBM System z:  
**ibm.com/systems/z**
- z/VM:  
**ibm.com/vm**
- Linux on System z:  
**ibm.com/systems/z/os/linux/**

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ZSF03131-USEN-03

# *Linux on IBM System z with z/VM V6*



October 2009

Linux on the IBM System z® platform can help in infrastructure simplification and legacy modernization. Running Linux as a guest of z/VM® is designed to provide the capability of running hundreds to thousands of Linux images while benefiting from the reliability, availability, scalability, security and serviceability characteristics of System z servers. At the same time, it allows you to exploit the exceptional capabilities of z/VM virtualization technology.

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### ***Helping control costs with virtualization and server consolidation***

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One IBM System z10™ server running z/VM Version 6 (z/VM V6) can do the job of many distributed servers scattered across the enterprise by hosting a variety of platforms such as Linux on System z, z/OS®, z/VM, z/VSE™, and z/TPF. With Linux on System z, the combination of the z/VM V6 hypervisor and an IBM System z10 server can address infrastructure simplification issues faced by many large enterprises while providing greater availability, scalability, virtualization, security, and reliability. System z environments with z/VM offer flexibility and management characteristics that can make it possible for you to satisfy the requirements of a dynamic infrastructure and deploying new Linux servers in minutes. The complexity of maintaining large numbers of distributed servers can be relieved with a single IBM mainframe, and can help to reduce costs by requiring less floor space. Simplification of the network by using HiperSockets™ may provide savings and reduce cabling, hubs, switches, and routers, as well as help to reduce maintenance effort. Using Linux on System z can enhance the value of your applications and data by allowing your Linux applications to communicate with other System z applications and access your critical data where it resides. This can help to improve responsiveness and reduce unnecessary duplication of data.

With the portability of Linux, applications may be moved quickly and easily to System z servers. The capacity of the System z platform makes it ideal to help simplify your operation and reduce your costs by consolidating to decrease the number of servers in your business. z/VM offers advanced technology to help achieve these results.

Multiple Linux systems on z10™ servers can be easily created and managed with z/VM. Linux server images can share physical resources as well as programs and data and internal high-speed communications. z/VM V6 supports Integrated Facility for Linux (IFL) processors, the attractively-priced hardware feature for Linux and OpenSolaris workloads available for System z. Linux on System z supports IBM z/Architecture® (64-bit) on System z platforms.

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### ***IBM mainframe servers***

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Business benefits from an infrastructure that provides optimal performance, real-time responsiveness, application flexibility, power, and virtualization, all with easy-to-use management. At the heart of this infrastructure is System z technology for the enterprise-class platform, optimized for integration and designed to handle the transactions and data of an on demand world.

IBM mainframes include the IBM System z10 Enterprise Class (z10 EC™) and IBM System z Business Class™ (z10 BC™) servers

The z10 EC server includes five models with up to 64 customer processor units (PUs) and up to 1.5 TB of memory. Each PU can be configured as a central processor (CP), IFL, Integrated Coupling Facility (ICF), System z Application Assist Processor (zAAP), System z10 Integrated Information Processor (zIIP), or additional System Assist Processor (SAP). In addition, four Logical Channel SubSystems (LCSSs) allow up to 256 I/O channels per LCSS, up to 1024 I/O channels total, and up to 60 logical partitions (LPARs) when properly configured.

The z10 BC server includes one model with ten customer-configurable PUs with 130 capacity indicators and up to 248 GB of memory. PUs can be configured for up to 5 CPs, 10 IFLs or 10 ICFs, and 2 SAPs. For every CP purchased, provided there are sufficient PUs available, a zIIP and/or zAAP can also be purchased. In addition, 2 LCSSs allow up to 256 I/O channels per LCSS, up to 480 I/O channels total, and up to 30 LPARs when properly configured.

System z10 servers can be configured in numerous ways to offer world-class flexibility to speed deployment of business solutions. System z servers are based on IBM z/Architecture, which supports a new standard of performance, capacity, and integration by expanding on the balanced system approach of the S/390® architecture.

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### ***Always on***

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System z technology delivers the high level of availability required in today's global-networked environment. Linux running in a System z environment can leverage this high level of availability for its workload. Even in a single footprint, the System z platform is designed to avoid or recover from failures to minimize business disruptions. High availability is realized through component reliability, redundancy, and design features that assist in providing fault avoidance and tolerance, as well as permitting concurrent maintenance and repair.

Another aspect of availability is nondisruptive growth, in most cases enabled by IBM Capacity Upgrade on Demand. System z servers have the capability to add server capacity and virtual servers nondisruptively and to install FICON®, ESCON®, and OSA-Express features without bringing the system down.

Some upgrades can be initiated by customers over the Internet on select servers.

Leveraging all these exceptional System z10 server capabilities with Linux on z/VM provides these attractive attributes to the Linux on System z environment.

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### ***z/VM exploits new technology***

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z/VM V6 is the result of over 40 years of innovation and refinement and can provide users with the ability to respond to rapidly changing market requirements more quickly and easily than with discrete single-operating-system servers. Unlike distributed hardware-based solutions, virtualization technology allows customers to virtualize processor, communications, memory, I/O, and networking resources to help reduce the need to duplicate hardware, programming and data resources.

Contrasted with a discrete server implementation, z/VM-based System z solutions are designed to provide significant savings, which may help lower your Total Cost of Ownership (TCO) for deploying new business and enterprise application workloads on a mainframe.

z/VM delivers support for hardware technologies such as FICON channels, high-speed communication adapters, advanced storage solutions, and the latest in cryptographic technologies. The z/VM V6 hypervisor provides capabilities with virtualization technology in support of Linux on System z and other guests by offering:

- Using the Hardware Management Console (HMC) to manage guests and to install Linux on System z as well as z/VM in a virtual machine from the HMC DVD drive without having to establish an external network connection. reducing complex configuration of the system
- Expanded guest support for specialty processors to allow all processor types (CPs, IFLs, zIIPs, zAAPs, and ICFs) on a System z10 server to be defined in the same z/VM LPAR for use by various guest operating systems.
- Redistribution of a CPU's share to z/VM virtual processors helps allow virtual machines to be managed more efficiently and Linux on System z provides new function that can automatically start and stop virtual processors based on virtual processor utilization and workload characteristics.
- Dumping Linux on System z guests to FCP-attached SCSI disks
- Support for Linux on System z guests using Dynamic Storage Reconfiguration (DSR)
- Support for the System z dynamic capabilities to help enable resources, such as dynamically adding processors, channels, OSA adapters, and memory to both the z/VM system itself and to individual guests