

**Erratum**

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## IBM System z Virtualization Genetics

**Over 40 years of continuous innovation in virtualization**

- Refined to support modern business requirements
- Exploit hardware technology for economical growth
- LPAR, Integrated Facility for Linux, HiperSockets
- System z Application Assist Processors
- System z Information Integration Processors


*Business Value: Scalability, Reliability, Robustness, Flexibility, ...*

Year	System Model	Key Virtualization Features
1960s	CP-67	S/360
1972	VM/370	S/370, Diagnose Hypervisor Interface, Conversational Monitor System (CMS), Inter-User Communication Vehicle (IUCV)
1980	4381 VM/SP	SMP, Program Event Recording (PER), Open Systems Adapter (OSA), Network Switching
1981	303x VM/SP	Control Program Hypervisor, Translation Look-Aside Buffer (TLB), REXX Interpreter, Large SMP, Dynamic Virtual Machine Timeout
1981	308x VM/HPO	64 MB Real, Discontiguous Saved Segments, Named Saved Systems, I/O Priority Queuing
1988	3090 VM/XA	31-Bit, Absolute   Relative SHARE, SIE on SIE, Automated Shutdown
1988	9x21 VM/XA	31-Bit, Accounting Facility, Minidisk Cache, HiperSockets
1988	9672 VM/ESA	ESA, Instruction TRACE, Start Interpretive Execution (SIE), Host Page-Management Assist
1995	zSeries VM/ESA	Virtual Switch, Guest LANs, Set Observer, Virtual Machine Resource Manager
2007...	System z9 z/VM V5	64-Bit, Virtual Disks in Storage, Performance Toolkit, CMS Pipelines, QDIO Enhanced Buffer State Mgmt
2007...	System z10	Virtual Machine Resource Manager, QDIO Enhanced Buffer State Mgmt, I/O Priority Queuing

IBM System z – a comprehensive and sophisticated suite of virtualization function

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## Dynamic virtual processor management

- **Allows z/VM guests to expand or contract the number of virtual processors it uses without affecting the overall CPU capacity it is allowed to consume**
  - Guests can dynamically optimize their multiprogramming capacity based on workload demand
  - Starting and stopping virtual CPUs does not affect the total amount of CPU capacity the guest is authorized to use
  - Linux CPU hotplug (cpuplugd) daemon starts and stops virtual CPUs based on Linux Load Average value.
    - The cpuplugd daemon is available with SLES10 SP2 and IBM is working with it Linux distributor partners to provide this function in other Linux on System z distributions.
- **Helps enhance the overall efficiency of a Linux-on-z/VM environment**

CPU 0 SHARE=25	CPU 1 SHARE=25	CPU 2 SHARE=25	CPU 3 SHARE=25	Reduced Need for Multiprogramming	CPU 0 SHARE=50	CPU 1 SHARE=50	CPU 2 Stopped	CPU 3 Stopped
Guest SHARE = 100					Stop 2 CPUs	Guest SHARE = 100		
CPU 0 SHARE=50	CPU 1 SHARE=50	CPU 2 Stopped	CPU 3 Stopped	Increased Need for Multiprogramming	CPU 0 SHARE=25	CPU 1 SHARE=25	CPU 2 SHARE=25	CPU 3 SHARE=25
Guest SHARE = 100					Start 2 CPUs	Guest SHARE = 100		

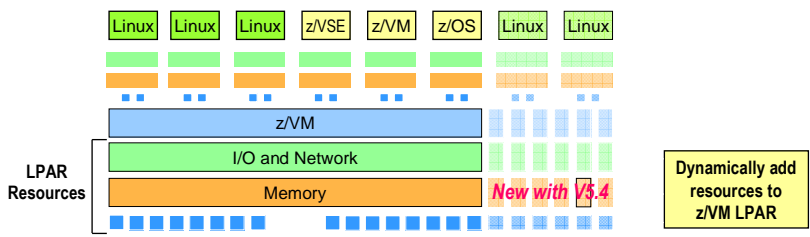
Note: Overall CPU capacity for a guest system can be dynamically adjusted using the SHARE setting


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z/VM: The Very Basics


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## Dynamic memory upgrade

- z/VM V5.4 exploits dynamic memory reconfiguration
- Users can nondisruptively add memory to a z/VM LPAR
  - Additional memory can come from: a) unused available memory, b) concurrent memory upgrade, or c) an LPAR that can release memory
  - Systems can now be configured to reduce the need to re-IPL z/VM
  - Memory *cannot* be nondisruptively removed from a z/VM LPAR
- z/VM virtualizes this hardware support for *guest machines*
  - Currently, only z/OS and z/VM support this capability in a virtual machine environment





**Smart economics:** Nondisruptively scale your z/VM environment by adding hardware assets that can be shared with every virtual server

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