Linux on IBM System z

An ideal platform for optimized workload deployment

Highlights

- Simplified IT infrastructure inside a single IBM System z server

- High flexibility and scalability, all system resources shared

- Optimized workload deployment—integrated and automated

- Fast speed of service delivery

- Unmatched qualities of service—rock-solid security and reliability

- Smarter computing at an attractive price

An efficient approach

Over the last twelve years Linux on IBM System z® has established itself as a proven platform for workload consolidation, workload re-deployment and new workload deployment.

The demands of the fast moving markets are stretching the limits of today's data centers. Add the management challenges data centers face as they invest in the next generation of their IT infrastructure and it is clear something new is needed. Smarter computing is IBM's answer and Linux on System z provides an excellent solution—especially with Linux on the new IBM zEnterprise® EC12 (zEC12).

Linux on System z can help you control costs for optimized workload deployment through its impressive scalability, availability, security and service management capabilities.

You can run application and data services, provision them very flexible and share the system resources at extreme levels of utilization. This infrastructure can run up to thousands of different workloads in parallel, providing load-balancing and efficient systems management that will help you achieve superior levels of service and improved operational efficiency.

Linux on System z can run all types of workloads, such as business intelligence with Cognos® and SPSS®, data warehousing and data serving with InfoSphere®, DB2® and Oracle Database, collaboration with the

Lotus® suite, Enterprise Content- and Asset- and Business Process Management applications, as well as vendor applications such as SAP, and Java and WebSphere®-based applications.

Around the globe, the way the world works today is transforming, and the required changes present tremendous challenges for IT organizations, especially with the proliferation of real and virtual servers on x86 or UNIX systems. These server platforms can make it difficult to fully utilize and effectively manage the IT assets.

Linux on System z is based on the common Linux kernel, has the same look and feel as Linux running on any other platform, but the unique combination of IBM System z server and z/VM® virtualization technologies, and Linux (with extensions to fully leverage the System z benefits) provide the uniquely powerful solution that combines the best.

Linux on System z can provide significant advantages for workload deployments over other Linux platforms, which can make a difference for your business. Optimize your IT to increase your efficiency.

Linux on zEnterprise

Clients of all industries around the world are benefited from Linux on IBM System z and their key decision criteria have been the outstanding workload deployment capabilities, the unsurpassed qualities of service, and the opportunities for cost savings.

The clients benefit from the values which have been improved with the new IBM zEnterprise EC12 (zEC12), or the IBM zEnterprise 114 (z114) or the IBM zEnterprise 196 (z196):

• The increase in processor performance improves the cost ratio when consolidating and deploying new and existing workloads.

• The improved total system capacity with the up to 101 user-configurable cores allows growing inside the existing physical server.
• The FLASH Express drives availability and performance for large amounts of temporary data.
• The increased capability of the internal network (HiperSockets™1) allows the fast communication between the many workloads on the same physical server.
• The processor chip, optimized to improve software performance e.g. for Java, DB2 and more.
• The improved qualities of service, e.g. the concurrent add/delete of I/O, the redundant array of independent memory (RAIM), the new multichip module design, the HiperSockets network traffic analyzer, and the Crypto Express4S cryptographic enhancements, helps to further improve the reliability of the business.
• The ability to run Linux workloads in an environment designed to run at sustained high processor utilization because of the designed offloading of network and disk I/O traffic through the server assist processors.
• The built in processor failover capabilities built into both memory and processor capabilities.

With the zEnterprise it is the possible to deploy an integrated hardware platform that brings System z and distributed technologies together in a hybrid approach. In that case, an IBM zEnterprise BladeCenter® Extension (zBX) is attached and works with the zEC12, z196 or z114 to support the multiplatform environment.

Consolidations, re-deployments and new workload deployments with Linux on System z can benefit from the hybrid approach of the zEnterprise:

- A complete solution suite can run on a single zEnterprise, running Linux workloads on zEC12, z196 or z114 servers in conjunction with a "companion" application on the zBX.
- A common management interface is provided by the IBM zEnterprise Unified Resource Manager to manage virtual servers running on z/VM and zBX.
- These benefits provide operational convenience when relocating applications from a zBX to Linux on System z as a result of application growth, closer consolidation requirements and/or a need for superior qualities of service.

System z servers, z/VM virtualization software and Linux will continue to deliver unique business value in the areas of virtualization, operational flexibility, scalability, workload management, efficiency, business continuance, reliability and security. These values will continue to exist on the System z hardware only. The capabilities of the zBX hardware will be native to the blades and the virtualization software.

The IBM zEnterprise System provides a smart design for enterprise computing that helps to optimize the IT infrastructure, by expanding the economy of workload consolidations, re-deployments and new workload deployments with Linux on System z

Single server simplicity

Linux running on a single System z server together with z/VM virtualization software can do the job of many distributed servers scattered across the enterprise. That means that the virtualization capabilities in a single 3.16 square meters System z footprint can help to support up to hundreds or thousands of virtual Linux servers, and you may be able to deploy new servers in minutes.

As well, IBM System z servers can run at utilization rates as high as 100 percent for extended periods of time.

Furthermore, a single IBM System z server doesn't require external networking to communicate between the virtual Linux servers. All of the Linux servers are in a single box, communicating via very fast internal I/O connections.

Even in a single footprint, the System z server 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.

A single zEC12 server can help to run the workload of even more physical servers, more network devices, more switches and more disk space with less energy and less floor space requirements; it is designed to deliver impressive simplicity. Linux running on a zEnterprise server allows you to "do more with less," and can help to realize savings in the area of software licensing in particular.

The virtualization capabilities available with System z can help to lower the overall acquisition costs by up to 60 percent,[2] reduce energy costs by up to 80 percent,[2] and can help to reduce software costs by up to 90 percent[2,3] compared to x86 alternatives.

What an idea, Linux on a single zEnterprise server with the size of a refrigerator versus a full room of distributed servers.

High scalability and flexibility
The outstanding and improved System z server capabilities enable the enormous vertical scalability and the z/VM and System z virtualization technologies enable the impressive horizontal scalability of the Linux on System z environment.

z/VM offers the highest levels of resource sharing—including the over-commitment capabilities for processors and memory, cooperative memory management, I/O bandwidth, and system availability, resulting in nearly 100 percent utilization of the system resources nearly 100 percent of the time.

z/VM offers several data-in-memory techniques that further enhance the scalability and performance of memory-intensive workloads. For example, users can store Linux program executables in a single z/VM memory location and share the executables with any or all of the hosted Linux systems, or in-memory emulated storage, called virtual disks, allows Linux systems to achieve memory-speed data transfers for read and write I/O operations.

z/VM support for the dynamic reconfiguration features of the System z servers allows the non-disruptive dynamic and flexible configuration of processors, channels, network adapters and memory to individual Linux servers, helping to increase availability.

The security certification of z/VM allows you to run production servers side by side on the same server as test and development servers. This can help to improve resource utilization and offer significant operational efficiency as well.

Linux and the outstanding z/VM capabilities on System z are working hand in hand, resulting in leadership virtualization that allows optimized workload deployment.

Impressive workload management
Linux running on System z can help manage a high number of servers with a small number of IT professionals.

Designed to integrate, the Linux on System z environment can run multiple and mixed workloads concurrently. This is supported by unmatched resource sharing of the System z servers, which can direct resources quickly and efficiently between applications, virtually and dynamically, whenever and wherever they are needed. This resource management is done according to user-defined and business-oriented policies.

The impressive capabilities to automate service management consists of many functions and products, such as the z/VM Single System Image feature allows to cluster z/VM images, or the z/VM Virtual Machine Resource Manager, which are working together to provide the tools for systems administrators to help keep the Linux-based services running at the most optimal level and utilizing resources efficiently. In addition, IBM Systems Director and IBM zEnterprise Unified Resource Manager are supporting the configuration, monitoring and government of workloads that are deployed across zEnterprise assets.

IBM Tivoli® completes the comprehensive automation and service management portfolio for the Linux on System z environment, helping to drive greater IT efficiencies and quality.

These leading capabilities allow for a substantial workload optimization without adding costs associated with new server footprints.

Optimized workload management, integrated and automated, provides fast service delivery

Unmatched qualities of service

The IBM System z is a highly reliable and available server. All of the server elements have always had an internal redundancy, and all of these redundant elements can be switched automatically in the event of a failure. As a result of this redundancy, it is possible to make fixes or changes to any element that is down without stopping the machine from working and interrupting access by the customers.

The IBM System z environment has highly integrated security features. Its capability to run multiple Linux systems concurrently on the same server requires the ability to isolate and protect each Linux environment. IBM System z servers are the world's only servers with the highest level of hardware security certification, Common Criteria Evaluation Assurance Level 5 (EAL5).

z/VM virtualization software provides high security levels as well. z/VM provides Live Guest Relocation that helps to non-disruptively move system resources when performing z/VM or hardware maintenance. z/VM can virtualize System z cryptographic devices so they can be shared by many Linux systems. z/VM can balance the workload across multiple cryptographic devices, and should one device fail or be brought offline, z/VM can transparently shift Linux systems using that device to use an alternate cryptographic device without user intervention.

Linux running on a zEnterprise server benefits from the extended qualities of service, build-in the System z servers and z/VM software.

Linux workloads on System z are evolving to a higher level of quality.

Cost-attractive IT optimization solution model

Linux on System z provides enormous opportunities for cost saving, which result from its outstanding capabilities for workload deployment and IT infrastructure simplification.

The key areas of potential cost savings are:

• Software licenses and support costs
• A single System z processor can run a mass of Linux applications, and Linux software is usually priced on a per-processor basis. Running software on fewer processors can result in fewer licenses and support costs.
• Operational and maintenance efforts
• The centralized management and autonomic computing capabilities of the Linux on System z environment can help reduce the errors and minimize workload-balancing tasks that otherwise can consume IT staff hours.
• Floor space and energy consumption
• Fewer servers and networks can require less floor space and can mean savings in acquisition costs, heating, air conditioning and electricity costs.
• Business continuity costs
• The suite of the System z built-in features can rapidly respond to, or even anticipate, threats to system health, helping to prevent costly system downtime. As well, multiple disaster recovery solutions are available, such as copying volumes or mirroring disk volumes within one site or between two sites.

Linux running on zEnterprise is expected to provide great cost savings, operational simplification, security and reliability. Linux on System z provides a uniquely powerful infrastructure that helps you achieve a quick return on investment without sacrificing enterprise-class qualities of service.

Linux on System z is focusing on

- Simplicity,
- Scalability and flexibility,
- Integration and automation,
- Security and reliability for workload optimization.

Optimized workload deployment for a smarter computing.

For more information

To learn more about Linux on IBM System z, please contact your IBM representative or IBM Business Partner, or visit:
ibm.com/systems/z/linux

[1] The HiperSockets function is an integrated function of the System z servers that provides users with attachments to virtual Local Area Networks with minimal system and network overhead. HiperSockets does not use an external network.

[2] Distributed server comparison is based on IBM cost modeling of Linux on zEnterprise vs. alternative distributed servers. Given there are multiple factors in this analysis such as utilization rates, application type, local pricing, etc., savings may vary by user.

[3] When using z/VM virtualization to consolidate and manage Oracle software.

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