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**Virtualization Technology delivers  
Virtually Infinite Possibilities for the  
On Demand World**

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Tight budgets, limited resources and short deadlines are a fact of life. That may be the reason why insightful IT analysts have recommended virtualization technology as an effective method to *improve utilization rates, increase server flexibility and reduce IT spending*. Simply put, virtualization technology is a way to pool IT resources while masking the physical attributes and boundaries of the resources from users of the resources, which can result in providing customers with the important advantages listed above. Although virtualization is not a new technology, it is receiving a lot of attention. Much of this renewed interest can be attributed to non-mainframe environments. Other platforms have recently realized the benefits of virtualization and are starting to develop and deploy forms of mainframe-inspired partitioning and virtualization to enhance their environments and remain competitive.

Renewed interest in virtualization is not limited to recent analyst recommendations and competitive developments. Many of our customers have identified simplifying and streamlining their core business processes and anticipating and forecasting changes in the marketplace in order to respond quickly to opportunities, competitor's moves or changing regulations as key business objectives. Virtualization technology, an integral component of the IBM mainframe strategy for over three decades, incorporates function that specifically addresses these challenges. Virtualization is being used by IT leaders in a variety of industries to address global economic challenges and move their businesses forward in the on demand world.

**Who benefits from virtualization technology today?**

To accommodate business transformation and compete with other financial institutions, America First Credit Union, developed a wide range of electronic services designed for anytime, anywhere member access via the Internet. By exploiting the virtualization technology of the IBM @server® zSeries® 800 (z800) and z/VM® software they were able to quickly provide their customers with competitive online services such as home banking and bill pay. America First

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**Highlights**

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***Pooling your resources can help provide you with the flexibility to better allocate them for use when and where needed.***

Credit Union implemented these new services to achieve increased productivity and accommodate new customer acquisition. The success of their online services led the credit union to continue to expand its online offerings and helped them respond to customer demands effectively without investing in new hardware. zSeries virtualization techniques allowed them to support multiple virtual test and production servers within the same physical environment enabling them to implement and test application changes without impacting their production environment. Another attribute of virtualization that appealed to the credit union was the flexibility to facilitate the dynamic reallocation of resources which can help them accommodate unpredictable fluctuations in workload. As a long time IBM customer, the credit union knew they could count on IBM mainframes to provide reliability and availability while offering the scalability necessary to meet their future demands.

The University of Florida, faced with the challenge of providing a secure environment to enable and encourage their researchers to share data, was able to harness the power of virtual servers combined with grid technology to deliver a winning solution. They found that the resilient, security-rich, high-performance computing resources delivered by virtualization and grid technologies helped them more fully utilize resources on demand, leading to improvements in productivity and advancing research on such widely disparate fields as transnational digital government, implantable intelligent devices and memory hierarchies.

ESAG (Energieversorgung Sachsen Ost AG) provides energy services to 450,000 customers in the Saxony region of Germany. They were concerned about the integrity, security and cost of their distributed SAP implementation. ESAG chose a Linux® on zSeries solution in order to reduce costs by consolidating SAP application and database servers. This solution, utilizing key elements of IBM's virtualization technology, helped them achieve improved control over performance of business-critical applications and enhance their disaster recovery capabilities.

***Reduce the time between inspiration and implementation by creating and deploying new server images rapidly, sometimes in minutes without planning, purchasing, installing and configuring new hardware and software.***

Swisscom IT, a major IT service provider, was interested in building a highly reliable and secure e-business foundation to help it achieve long-term business objectives and accommodate future growth. By deploying virtual Linux servers on a zSeries platform, they found that virtualization provided them with the flexibility they required to react to new business opportunities by going live with a new virtual server within hours instead of weeks.

**What is zSeries virtualization technology?**

zSeries multi-dimensional virtualization technology consists of both hardware and software that work together seamlessly as part of the zSeries architecture. zSeries hardware provides a robust and reliable foundation which supports a powerful and flexible software layer. The zSeries team considers virtualization during the design phase of the system resulting in technology that is inherent to the architecture. Our architectural strategy provides us the advantage of adding virtualization function to our products with an eye toward delivering efficiency and providing our client base with a superlative balance of flexibility and function for the overall solution. In this way, zSeries hardware and software collaborate to provide a wide range of virtualization function that sets zSeries servers apart from other platforms.

**Virtualization technology benefits**

The challenge of providing support for the mission-critical products and services while developing revolutionary new products and services designed to compete in the world of on demand business can be daunting. Many IT leaders find they are living with fixed budgets based on last years expenses that were, at best, adequate to support last years mission-critical applications. In order to remain competitive they must find a way to continue to support their mission-critical workload while developing and delivering new products and services. As if this weren't a big enough challenge, they must find a way to accomplish this without additional funding. In many instances, we believe that virtualization technology can help to provide a solution for this dilemma.

***zSeries incorporates the qualities of service that provide an exemplary environment for Linux applications.***

Virtualization technology has a number of unique capabilities designed to help your business improve resource utilization and support new workloads without additional hardware investments. With virtualization, your *resources can be pooled so that they can be better allocated for use when and where needed*. This capability can provide you with the flexibility to direct existing resources, which may be underutilized or performing lower priority tasks, to handle unpredictable spikes in mission-critical workload or allocate resources in support of new workloads designed to expand your company's competitive reach. In order to meet the constantly changing requirements of an on demand enterprise, z/VM, the zSeries operating system embodying over 35 years of IBM's virtualization experience, provides the Virtual Machine Resource Manager (VMRM). VMRM cannot only automate the reallocation of resources but also gives you the power to limit the amount of resource allocated to a particular server, prioritize certain workloads over others to help you meet service goals, or simply address the most important tasks on a higher priority basis.

z/VM supports multiple virtual servers on a single hardware platform which can help you respond quickly to new opportunities and fluctuating market needs. *You can reduce the time between inspiration and implementation by creating and deploying new server images rapidly, sometimes in just minutes*. This powerful capability can ideally enable you to launch new products and services without planning, purchasing, installing and configuring new hardware and software. Development groups who need test environments built and rebuilt rapidly in order to efficiently handle change management can also benefit from this unique advantage. By providing support for Linux, z/OS®, z/OS.e, VSE/ESA™, and TPF, z/VM gives you the option to develop and deploy new products and services in a variety of environments. A single zSeries server can support a large number of virtual servers. For instance, in a test environment a consultant was reported to have successfully created over 41,000 virtual images on a single IBM mainframe server. Although this scenario is not realistic for production environments, it is indicative of the unique flexibility that virtualization can provide.

### **HiperSockets — a zSeries advantage**

A zSeries feature called HiperSockets™ introduced the ability for virtual servers to communicate at near memory speed. This zSeries feature offers several advantages. From the hardware side you can benefit from efficiency by eliminating much of the latency often associated with external physical networks. Implementing HiperSockets can also result in cost savings by reducing the amount of hardware (cabling, routers, switches and hubs) that would otherwise be required if physical servers, rather than virtual ones, were connected together via an external network. Reducing the amount of physical components is one of the first steps towards infrastructure simplification which can translate to reductions in maintenance effort and staffing required for systems operation. HiperSockets can also provide a security advantage since inter-server communication is contained within the zSeries server and therefore eliminates exposures which may arise when separate physical servers communicate with each other.

Regardless of the industry that your business competes in, security and privacy are most likely among your top business priorities. Because of threat of security attacks and the resulting high risks, thoughtful organizations are giving a lot of attention and spending a considerable amount of money on securing their IT environments. For decades, IBM customers in all industry sectors – not to mention IBM itself – have employed zSeries virtualization technology as a trusted, reliable, security-rich, and robust platform for multi-user computing and for hosting multiple virtual servers. zSeries virtualization technology is designed to help maintain the integrity of the virtual machine environment while providing a hosting platform that addresses identity, access, threat, privacy and audit management. Available features of this security solution include firewalls, virus protection, intrusion detection, authentication and encryption to help protect your most valuable assets from malicious attacks. zSeries hardware partitioning was the first product of its kind to be awarded EAL5 (Evaluation Assurance Level) international common criteria security certification. z/VM is currently in evaluation for security certification by AtSec Inc. These certifications, based on a universal set of criteria, can help give you additional confidence in the security of z/VM and zSeries servers.

### Capacity on Demand

Increasing processor capacity is quick and efficient with zSeries. Scalability can be achieved on properly configured zSeries servers through a customer initiated procedure with very little effort. To support customer growth the latest version of z/VM allows you to scale up by providing support for up to 24 real processor engines in a single virtual image. When you need to scale out you can create new server images and add up to 64 virtual processor engines in a single guest configuration. To address short-term additional capacity requirements try our On/Off Capacity on Demand feature (On/Off CoD) available on select zSeries servers. On/Off CoD can help your business cope with both predictable and unpredictable surges in transaction volume with the aid of temporary increases in processor-based capacity. On/Off CoD provides the flexibility to activate or deactivate such capacity efficiently. This temporary capacity gives you the flexibility to address seasonal or period-end fluctuations in activity. It can even enable you to deploy pilot applications without investing in new hardware.

Today many IT departments operate on a “charge back” basis. Billing the Line of Business (LOB) for the IT services and support they require. Advanced accounting capabilities are yet another example of how virtualization can directly benefit your business. In a dedicated, single use server environment, a charge back scenario might consist of acquiring and deploying – hardware, software, networking, utilities and staff specifically for the support of one LOBs workload. These charges might be based on 24 hours of operation, seven days a week, even if the servers in question were only active a small percentage of the time (not an uncommon scenario for distributed servers). z/VM provides the capability to track resource consumption for each virtual server. With this advanced tracking capability, processor, I/O, memory and network usage can be tracked on an individual server basis. Using these data points, your business can determine appropriate charges for IT services based upon the actual resource consumed. Advanced tracking can provide you with the confidence that you have the available resource to host additional workload. Once again, z/VM can help you to efficiently share resources and improve utilization.

### **Linux can lower costs and simplify your environment**

On demand business requires a streamlined infrastructure. Linux on zSeries is all about removing complexity from your IT infrastructure. Over the past few years IBM has invested heavily in enhancements to z/VM to provide a robust platform to support Linux and new workloads on zSeries. *zSeries has unprecedented qualities of service that provide an exemplary environment for Linux applications.* The Integrated Facility for Linux (IFL) engine, unique to the zSeries platform, is designed to provide processing capacity, exclusively for Linux workloads. By deploying Linux on zSeries on an IFL engine rather than on a general purpose processor, you can save on IBM software charges because IBM does not include the capacity of the IFL engine when computing the MSUs of the server supporting the IFL engine. Consolidation of Linux virtual images on zSeries servers can help your business reduce server sprawl and potentially lower software licensing fees.

### **Efficiencies of Consolidation**

Unfortunately, demands for increased service and responsiveness, decreasing budgets, and the need to maximize the use of physical assets with limited skills are becoming common realities of IT management today. Another way that z/VM can help you cope with these pressures is by permitting the efficient sharing of highly available server resource among many diverse applications. By sharing, a higher degree of utilization can be achieved than would be possible on a dedicated lightly loaded server. Sharing also has the potential to help reduce the need for additional server and storage hardware, software licensing, floor space, and utilities. All of these factors can improve your total cost of operation and increase return on your investment.

Our success stories include businesses, representing a variety of industries that have implemented virtualization to support server consolidation. Consolidating large numbers of distributed servers onto one larger server can help to reduce complexity and lower costs. Server consolidation can also help you increase resource utilization and ease systems management. The infrastructure can be

simplified by reducing the tangle of connections often associated with tying distributed servers to network and storage devices. When a single mainframe is used to consolidate the workload of numerous distributed servers, consolidation can offer benefits by lowering floor space requirements and utility bills. Server consolidation can also represent savings in staffing as it may be more efficient to operate and maintain a single mainframe versus many distributed servers. Pooling and dynamic allocation of resources is just one way that virtualization can help to improve utilization.

**How can virtualization technology help your business?**

z/VM is a flexible solution with the tools and technology to help save your business time and money by helping drive efficient system utilization and provide you with the advantages of the latest technological advances. With 35+ years of innovation in both zSeries hardware and software, zSeries continues to lead the way with advanced virtualization designed to deliver the tools and technologies needed to help your business become a true on demand business today.

You could use it to respond to new or critical customer requirements rapidly, sometimes within minutes, creating products and services that your competition has yet to contemplate. It may provide you with the ability to surpass your customers and suppliers response time expectations helping you meet your service level agreements. It could even put a smile on your boss' face when he/she finds out that you successfully deployed new workloads while meeting current workload challenges and that you accomplished it without requesting additional funding.

However you choose to look at the benefits that virtualization can provide, when combined with zSeries hardware it translates into legendary reliability, availability, serviceability, security and scalability. Qualities of service you have come to depend on.





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