Getting started with a cloud on System z can be quick, easy and effective

From simplified provisioning to complex challenges, a cloud-based mainframe can deliver significant value

Highlights

- Match mainframes to workloads to realize the promise of both the cloud and the system
- Achieve a resilient, secure, optimized cloud with an IBM® System z® or IBM zEnterprise® mainframe
- Optimize workloads and streamline processes with IBM solutions
- Benefit from 40 years of virtualization on System z

The computing world may be moving to the cloud, but in making that move, it's important to remember: Different parts of this world are best handled by different parts of the cloud. Consider your workloads. Database applications, transaction-processing systems, enterprise resource planning (ERP) solutions and more all run best on high-performance, high-availability, high-security systems. They run best on mainframes.

A cloud that deploys IBM System z or IBM zEnterprise mainframes together with its distributed systems can give you the control, reliability and quality of service you need for workloads that best serve your business. The open architecture of the IBM SmartCloud™ Foundation supports the cloud across multiple mainframe and distributed platforms.

Considering workloads with mainframes, in fact, can help you discover the best entry point for beginning or expanding your move to the cloud. Mainframes are well matched to your most challenging needs—such as stringent service level agreements, hard-to-meet recovery time objectives, business-critical security or payment card industry compliance. But they're also suited to simpler objectives—such as pooling resources to speed the frequent provisioning and deprovisioning development teams require.

Wherever you begin, employing a "fit-for-purpose" approach in which workloads reside on the system that best meets their needs ensures that your cloud can benefit from integrated capabilities for consolidation, management and performance. This approach can help you realize the cloud promise of reduced costs and increased agility together with the mainframe promise of rapid problem response and improved avoidance of downtime.

Mainframes play a valuable role in enabling cloud environments

Many organizations view the cloud as a way to improve services, simplify management and save money—and also as an excuse to move workloads off their mainframe. They may see the mainframe as older, inflexible technology with a limited number of administrators available to support it. They may see other technologies as less expensive, as well as more accessible, flexible and pervasive. But abandoning the mainframe is seldom the best course. The mainframe can be a significant tool for ensuring workload performance, security and quality of service.

Mainframe environments provide levels of availability and problem management that other platforms cannot equal. And in business environments where maintaining service level agreements is critical to customer satisfaction and the ability to control downtime can make or break the organization's profitability and reputation, a mainframe can support the viability and value of the cloud by keeping workloads running.

The consolidation provided by a mainframe can reduce both equipment acquisition and management costs compared to the expense of sprawling distributed environments. For a mainframe deployed in a cloud, rapid application and system deployment respond to dynamic environments faster than in traditional mainframe environments for the flexibility that rapidly changing businesses require. With IBM mainframe solutions, consistent operations with distributed platforms—from management interfaces to application development interfaces—help increase automation and break down silos of data, operations and management.

A System z or zEnterprise mainframe in a cloud environment is therefore:

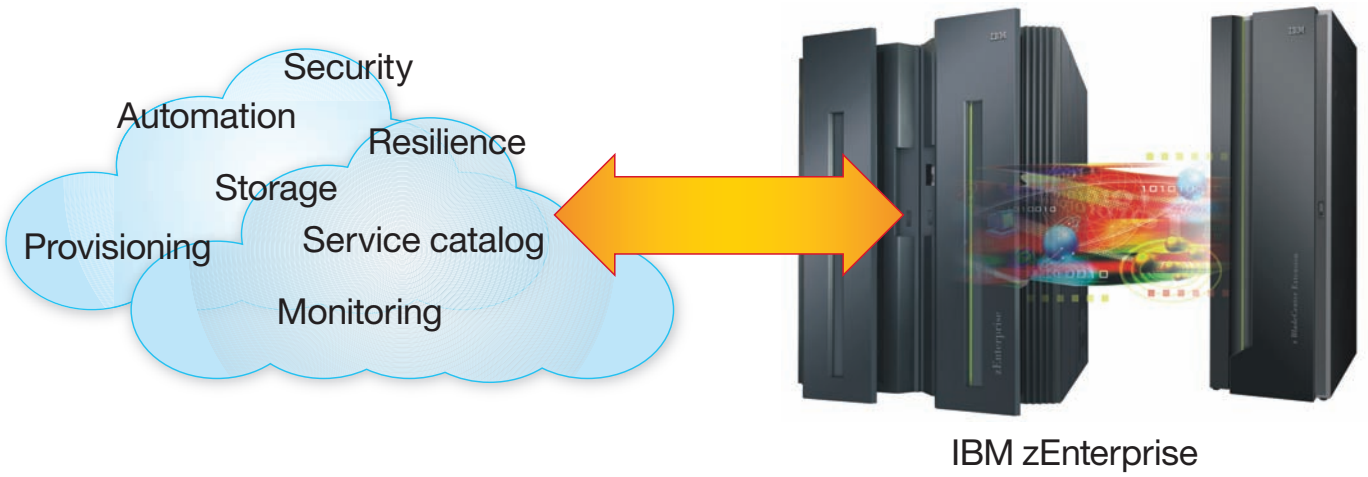
- **Resilient and secure:** Able to consistently deliver higher workload availability, with high security levels and reduced vulnerabilities based on IBM design, testing and manufacturing and backed by system warranty, maintenance and service
- **Optimized:** Achieving an average of more than 80 percent sustained utilization, with a complete IBM system stack optimized across hardware, firmware, hypervisor, operating system, middleware and applications to deliver maximum efficiency
- **Scalable:** With the ability to scale up and within—as well as scale out—for near linear performance scalability; capacity upgrade on demand; dynamic workload resource balancing; flexibility to meet peak workload requirements; and high virtual machine density to reduce the number of systems required

With these capabilities, System z or zEnterprise mainframes provide superior solutions for manageability amid scalability, infrastructure monitoring in complex and heterogeneous environments, agility based on infrastructure integrations, rapid deployment, reduced time to cloud value, and increased resource capacity.

For demanding workloads, mainframes deliver performance

System z and zEnterprise mainframes provide a secure, available, high-performance environment for executing cloud workloads. One way to get started is to begin with application development on a cloud-based mainframe, streamlining development operations but also taking advantage of a quick and easy cloud entry point that can provide a rapid return on the mainframe investment.

Optimizing the cloud with IBM zEnterprise



By adding to the foundation created for development, however, and moving up to more challenging workloads such as high availability or security, the organization can achieve still greater value. Now it is possible not only to leverage the strengths of the mainframe itself but also to utilize data and applications—such as IBM DB2® database software, IBM Customer Information Control System (CICS®) transaction management software and SAP enterprise application software—that reside on the mainframe platform.

But which workloads are best suited to a cloud-based mainframe? Here are the core options:

- **Database applications:** With their high demands for availability as well as backup and recovery, database applications can remain more secure and more stable in a mainframe environment than in a distributed environment. The data that runs the business can run better on a high performance System z or zEnterprise mainframe.
- **Transaction-processing systems:** Organizations with a core business based on transaction processing have core requirements for high performance. Mainframes provide the consistent, reliable performance they can depend on.
- **ERP workloads:** Relying on databases and requiring high performance for information management and flow, ERP solutions benefit from the ability of a mainframe to integrate capabilities and span functions across very large environments.

Mainframes are also well-suited for a number of use cases that can be handled in the cloud. These include:

- **Highly regulated services:** When government mandates or industry standards require strict security and adherence to processes and policies, a System z or zEnterprise mainframe provides centralized control, built-in security protocols and solutions such as IBM Resource Access Control Facility (RACF®) that are designed to protect critical data and provide an extensive audit trail for compliance reporting.

- **Agile operations:** The ability to bring virtualized systems online quickly, move workloads between them easily and deprovision them to make resources available for other workloads is central to creating agile and responsive clouds. With multiple applications and virtual machines deployed on a single hardware system, a mainframe provides the multi-architecture manageability and utilization rates not possible with other technologies.
- **Test and development:** In a cloud that includes mainframes, there's no need for dedicated systems for temporary use such as test and development. Virtual machines on dedicated, distributed systems—where servers often run at low capacity—don't free up much capacity when they are deprovisioned. But with mainframes typically running at close to 100 percent capacity, creating—and later deprovisioning—virtual machines can provide real capacity savings and efficiencies.
- **Cross-architecture solutions:** Increasingly important functions such as business intelligence and analytics, which draw on information residing on a range of platforms, can take full advantage of the cross-architecture and central management capabilities of System z and zEnterprise mainframes.

From creation to termination, cloud deployment follows defined steps

Cloud computing gives organizations a way to extend IT capabilities—such as backup and recovery or the management of service level agreements—so they are more effective. System z and zEnterprise mainframes give clouds a platform that is not only secure and high performing with capabilities for better managing and accommodating workloads, but that is also cost effective when compared to an equivalent capacity of distributed systems.

Honolulu improves citizen involvement with a System z-based cloud

The City and County of Honolulu needed to increase government transparency by providing useful, timely data to its citizens. The goal was to improve citizen involvement, service to citizens and the efficiency of operations.

Deploying a custom cloud based on a System z mainframe, Honolulu was able to provide previously closed information to its citizens in real time—for greater transparency that helped to improve citizen participation in government. The cloud environment provided a scalable self-service platform that city employees could use to develop open-source applications, and which empowered the public to create citizen-centric applications with access to years' worth of city data.

The mainframe-based cloud also helped the city achieve real business results—reducing the typical application deployment from a week to only hours, lowering licensing costs for one database by 68 percent, and enabling the creation of a new property tax appraisal system that helped increase tax revenue by USD1.4 million in just three months.

Now, how do you get there? How do you make the benefits of a mainframe in the cloud a reality?

Building on virtualized and consolidated resources, the path to creating a cloud and managing cloud services is an interactive process that addresses workloads, the infrastructure environment and end user needs.

Whether the immediate need is for a cloud to simplify and streamline specific uses such as application development or for leveraging a mainframe's core advantages to handle difficult challenges such as compliance or security, creating a cloud follows defined steps:

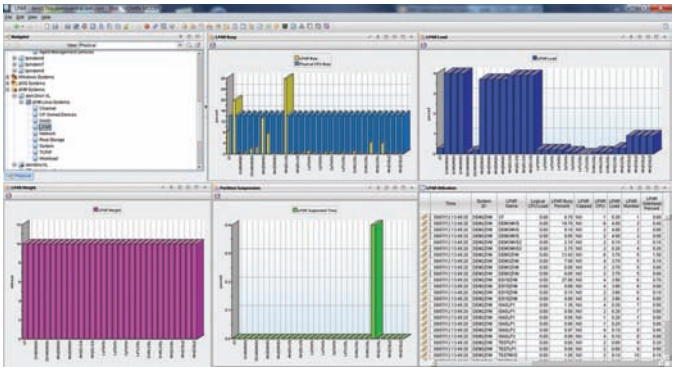
1. **Create services:** The organization defines the scope of cloud services—including which workloads will be operated and managed on which servers or mainframes—identifies necessary service level agreements, and designs topologies and best practice management templates.
2. **Offer services:** IT publishes the services to a service catalog and offers them to users for selection.
3. **Subscribe to services:** Business and technical users select the services they need, combining related services as needed to create a workload—for example, three services related to product sales—that can accomplish a specific task.
4. **Deploy the service:** At this point, IT decides whether it should provision the service to a mainframe or distributed system, depending on the specified workload and requirements or policies such as operating system and applications, limits on response time, or backup needs. Management agents and best practices are defined, also according to workload requirements and policies. Automation simplifies and speeds the entire deployment process.
5. **Manage service operation:** As the service is running, IT gains visibility into services, controls operations and changes, handles events, and automates activities to execute changes.
6. **Terminate service:** When the service is no longer needed, IT conducts a controlled cleanup that deprovisions resources, returning them to the cloud's virtual resources pool for use by another service.

Across these steps, the efficiency of the System z and zEnterprise platform can simplify deployment of thousands of virtual machines, support service level agreements by matching requirements of workloads to capabilities of the platform, ensure tamper-proof security with built-in encryption and data protection—and more.

IBM offerings make it easy to get started with an enterprise cloud

IBM streamlines and strengthens these processes with the IBM SmartCloud Foundation, which provides Infrastructure as a Service (IaaS) and Platform as a Service (Paas) on System z. IBM SmartCloud Foundation both integrates with the distributed cloud environment and supports workloads requiring System z-level management.

And to take advantage of the fact that cloud workloads run more cost effectively, reliably and securely on the Linux on System z operating system than on any other platform, IBM and IBM Business Partner StreamFoundry offer Cloud Ready for Linux on System z.



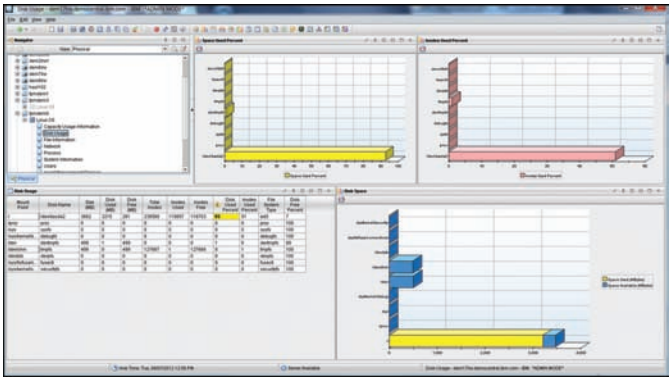
Tivoli OMEGAMON XE for z/VM and Linux LPAR: This high level system view shows total usage across the entire zEnterprise deployment to allow for tracking information, including cloud-based information, for workload optimization.

Designed for out-of-the-box cloud enablement, this image-based deployment and management solution also provides a springboard for simplified entry into mainframe platforms. It leverages multiple products for automation that can reduce administration and capital costs, remove inefficiencies due to image sprawl, and avoid server and workload underutilization. These capabilities are made possible by industry-leading IBM solutions including:

- **IBM Tivoli® Provisioning Manager:** Automates server provisioning and software deployments to create thousands of virtual machines simultaneously
- **IBM Tivoli Monitoring:** Provides a common, flexible and easy-to-use browser interface to facilitate system monitoring of cloud applications and resources
- **IBM SmartCloud Control Desk:** Provides a service catalog to make services visible to users and administrators for deployment
- **IBM Tivoli Storage Manager:** Helps simplify the protection and management of rapidly growing data volumes with visibility from a single point of control
- **IBM Tivoli System Automation for Multiplatforms:** Supports high availability with policy-based automation to reduce service disruptions

Cloud Ready for Linux on System z delivers cloud service management capabilities for the deployment of standardized, virtualized and mixed infrastructure environments that exploit System z availability, security and reliability. Process automation speeds the delivery of business services as it improves the use of mainframe assets for high performance and reliable backup and recovery.

The ease-of-deployment capabilities of Cloud Ready for Linux on System z make it an ideal solution for the two key entry points to gaining the benefits of a private cloud—establishing a cloud on System z for use in internal operations such as development, and incorporating System z into the organization-wide cloud to serve the full set of internal and external users.



IBM Tivoli OMEGAMON® for z/VM® and Linux: This lower level cloud-user view shows detailed resource usage for the Linux ITM agent for a specific cloud virtual machine for a single user.

From technology to business, IBM delivers cloud benefits

Establishing a cloud environment with Cloud Ready for Linux on System z and the framework of the IBM SmartCloud Foundation enables organizations to better manage the provisioning of workloads, control image sprawl and deploy applications in their virtual and cloud environments—all with reduced management complexity. With provisioning capabilities included in this solution, you can optimize efficiency, accuracy and service delivery with automated provisioning activities such as discovery and tracking of resources; adherence to policies and preferred configurations; automatic configuration of software to Microsoft Windows servers and clients, as well as Linux and UNIX servers; and change management for resources, including maintaining configurations as the infrastructure evolves and grows.

Marist College uses a cloud to expand its academic reach

For Marist College in New York, the collaboration enabled by cloud computing based on a System z mainframe has helped unite disciplines, students, faculty and campuses throughout the world by connecting them with a shared environment. It enables an online space where students and researchers can share and develop ideas, adding depth to the educational process.

The academic cloud expands access to the learning applications and library databases that students and faculty need. For example, schools worldwide now can access the Marist cloud, request user IDs and provide online lab exercises for students. Or, a researcher can request a cluster of machines to support a computationally intensive research project.

Using the same infrastructure, a professor can select machines running all of the software needed for a class. Once the project is finished, the resources can be disassembled and returned to the general pool to be reallocated for the next requester. Automated systems allow the college to meet fluctuating demands, maximize utilization of systems and software licenses, and reduce energy costs, while providing resource availability 24x7 from classrooms, dorms or homes.

Cloud Ready for Linux on System z and SmartCloud Foundation are designed to quickly and easily deliver the value of System z and zEnterprise mainframes, with provisioning-related benefits such as:

- Automated hypervisor setup and preconfigured networks on zEnterprise that use 88 percent less labor than manual setup
- Automated provisioning using Tivoli Service Automation Manager running on System z that is 89 percent faster than manual provisioning
- Integration and elastic scaling achieved by dynamically adjustable capacity at sustained performance
- Automation that pools standardized virtualized building blocks and provides plug-and-play capacity across hardware generations
- Service management that integrates virtualization management with IT service delivery and automates lifecycle management for cloud services

IBM solutions provide mainframe- and cloud technology-related benefits such as:

- Increased productivity with advanced workload management that provisions resources on the fly
- Higher resource utilization with up to 80 to 100 percent utilization of the CPU and a “shared everything” architecture
- Increased data center efficiency with less floor space required and up to 80 percent less energy used than with distributed servers
- Greater reliability and availability with built-in hardware redundancy

IBM solutions provide business benefits that include:

- The ability to quickly and easily get started with a cloud by utilizing IBM SmartCloud Provisioning and using System z or zEnterprise as the basis for a cloud
- The ability to quickly and easily incorporate System z or zEnterprise into the corporate cloud open stack while supporting workload quality of service
- Ongoing enhancements to IBM mainframes that are designed to support new cloud-based workloads

Why IBM?

IBM has provided virtualization on System z for 40 years—so moving to a cloud environment on the system is a logical extension of virtualization's value. A significant strength of IBM in cloud environments is choice and the ability to deliver clouds on a full range of technologies. IBM designs solutions based on client needs and IBM expertise to ensure that the right hardware, software and global reach are available to help clients fully leverage the benefits of the cloud.

System z has the capability to allow for the fast growth in cloud workloads and to support their easy management. The highly scalable, cost effective, secure and reliable System z platform is undergoing constant updates to support cloud workloads, either standalone or as part of large corporate clouds.

For more information

To learn more about IBM System z used in a cloud-computing environment, please contact your IBM representative or IBM Business Partner, or visit: **ibm.com**/systems/z/solutions/cloud/

Additionally, IBM Global Financing can help you acquire the software capabilities that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize a financing solution to suit your business and development goals, enable effective cash management, and improve your total cost of ownership. Fund your critical IT investment and propel your business forward with IBM Global Financing. For more information, visit: **ibm.com**/financing

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