

Cloud Workloads on the Mainframe

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Highlights

Far from being out of date, mainframes are used around the world to build robust, trusted clouds. Several recent IBM System z use cases are seeing striking results:

- ▶ An internal *business analytics* cloud service has enabled IBM to save more than \$20 million over five years.
- ▶ Innovative mainframe *production applications* in Italy and Hawaii have achieved wide acclaim.
- ▶ A large insurance company built a dedicated *development and test* cloud to rapidly provision new environments.
- ▶ A new, cloud-based *social collaboration* platform at IBM supports 50 million instant messages daily and has lowered the related costs by 75 percent.
- ▶ A large IT service provider in Africa and a state government in the United States are deploying *next-generation* mainframe clouds to deliver scalable, secure, and customizable services.

Benefits of a mainframe cloud

Increasingly, organizations are turning to cloud computing to improve their IT responsiveness and to reduce costs. And for enterprise workloads, which require highly reliable and secure platforms to meet demanding service levels, many companies are building their clouds using a mainframe.

A cloud built on a mainframe, such as IBM® zEnterprise® or others in the IBM System z® family, has several distinct advantages:

- ▶ **Performance:** System z mainframes build upon years of IBM leadership in virtualization and can host more virtual machines in a single footprint than any other platform. With its superior management services, a mainframe enables resources to be shared among workloads, achieving the highest possible utilization of the platform.¹ Further, because a mainframe has dedicated processors for I/O operations, workloads with high I/O demand, such as transaction processing, can run more efficiently. And resources can be dynamically scaled without affecting ongoing operations.
- ▶ **Reliability:** A System z mainframe is designed to operate with the highest levels of reliability and availability. Each component is built to be resilient with support for non-disruptive configuration changes and dynamic replacement capabilities. Many organizations using IBM mainframes report years going without any unplanned downtime.¹
- ▶ **Security:** The mainframe has garnered some of the highest marks for security in the industry. The latest IBM zEnterprise mainframe earned Evaluation Assurance Level (EAL) 5 certification for its logical partitions and EAL 4+ certification for its use of Linux. With its fine-grained, multi-layered security architecture, the zEnterprise platform excels in providing secure workload isolation, data protection and privacy, and offers extensive security and audit reporting to meet evolving industry standards and regulations.²
- ▶ **Cost savings:** As shown in Figure 1 on page 2, a mainframe-based cloud can cost less, overall, than a cloud built on other, competing platforms. A recent IBM study found that the three-year total cost of ownership (TCO) for a System z mainframe cloud can be 75 percent less than a third-party provider's public cloud and as much as 49 percent less than an x86-based private cloud. On the mainframe, a

¹ *Comparing Virtualization Alternatives - What's best for your business?* Solitaire Interglobal Report, 2012. (<http://public.dhe.ibm.com/common/ssi/ecm/en/zsl03192usen/ZSL03192USEN.PDF>)

² *Secure The Enterprise With Confidence Using A Mainframe Infrastructure*, Forrester Report, March 2013. (<http://public.dhe.ibm.com/common/ssi/ecm/en/zsl03233usen/ZSL03233USEN.PDF>)



variety of workloads can be consolidated and virtualized on a smaller footprint, which results in lower overall software costs when compared to other solutions. Further, with the System z smaller footprint, costs for labor, electricity, and floor space can be lower than with an x86-based private cloud.

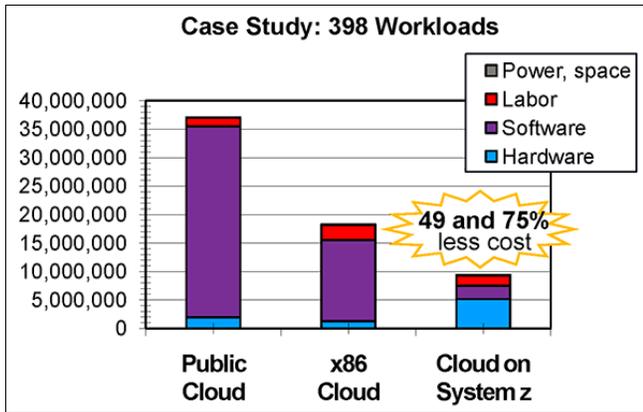


Figure 1 Comparative cost of a System z mainframe cloud³

Detailed use cases

The unique benefits of the mainframe allow businesses to deploy various enterprise workloads in a cloud without diminishing service levels or increasing risks in terms of security and reliability. Here we examine four specific cloud workloads, all built on System z platforms, that reveal the benefits of mainframe-based clouds.

Business analytics

Effective business analytics is a key differentiator because it helps companies make more informed decisions to drive better performance and improve their competitive advantage. Yet many organizations today implement analytics at the department level, which can be very costly. By moving to a centralized business analytics-as-a-service model in a mainframe cloud, companies can cut costs and reduce the duplicate effort that results when analytics are done department by department.

³ Server configurations are derived from IBM internal studies. Prices are in US dollars (\$) and vary by country. Public cloud numbers include the costs of hardware (instances, data I/O, storage, support, free tier or reserved tier discounts), software (middleware), and labor. System z mainframe and x86 examples include costs for hardware (system, virtualization, OS), software (cloud management, middleware), power, labor, and floor space. Note that power and floor space costs included in the System z and x86 examples are significant but small compared to the other costs listed, so they do not displayed in the bar chart.

In the past five years, business analytics has gained even more importance at IBM with the success of our internal analytics cloud, Blue Insight™. Blue Insight uses IBM Cognos® Business Intelligence on z/VM®, IBM SPSS® Predictive Analytics, and IBM DB2® Analytics Accelerator for z/OS® on a System z mainframe, combining the strengths of IBM industry-leading hardware and software to deliver business intelligence across the entire organization. The service has changed the way our business operates, providing high-volume, real-time analytics and automating thousands of critical business decisions worldwide.

Blue Insight grew out of the need for a better way to generate and deliver business intelligence (BI) data within IBM. The company was heavily invested in BI projects but the applications were being built separately and were independently managed by different business units, creating silos of information. This lack of a centralized, standardized BI service resulted in massive duplication of effort and costly maintenance and support. Blue Insight enabled IBM to centrally deliver valuable, actionable analytics across the enterprise, and to do it more quickly and cost-effectively, as Figure 2 shows.



Figure 2 Centralized business analytics-as-a-service

Today, Blue Insight supports more than 400,000 IBM employees worldwide and has achieved five-year TCO savings of more than \$20 million. The centralized BI service trimmed floor space needs by 74,000 sq. ft., used 30,000 fewer megawatt hours of electricity, and

cut per-user costs by 90 percent through standardized onboarding processes and automated provisioning of users. Further, reports that formerly took hours to run can now be completed in minutes. With System z as the focus for all analytics activities, business teams at IBM now have the insight they need to make informed decisions that are faster by orders of magnitude and directly impact key performance metrics.

Production applications

Cloud computing is not just for businesses. The technology has the potential to make production applications available as services to entire communities cost-effectively.

The University of Bari in Italy provides a great example of how private cloud services on System z can benefit smart communities. The university worked with IBM to deliver several community-focused applications to local businesses, including an auction service that local fishermen can access from their boats (see Figure 3). As fishermen pull in their catch, they can use the cloud-based solution to quickly determine demand in the various local fish markets. They can even use their mobile devices to enter the type and size of fish they caught and start a virtual auction among the wholesalers on the docks. If a deal is reached, the catch can be prepared for immediate pick up when they reach the dock, saving time and money and reducing waste. With the new, cloud-based auction service, the local fishermen have increased their addressable market by 700 percent, improved time-to-market by 70 percent, and seen their incomes jump by 25 percent.

The university has also made the cloud available to students so they can easily access virtual development environments for building services for the local community. With the System z cloud, teachers can update the development platform without changing the underlying infrastructure. And when the course ends, the environments are released to be reused by other students, helping to keep licensing costs to a minimum.

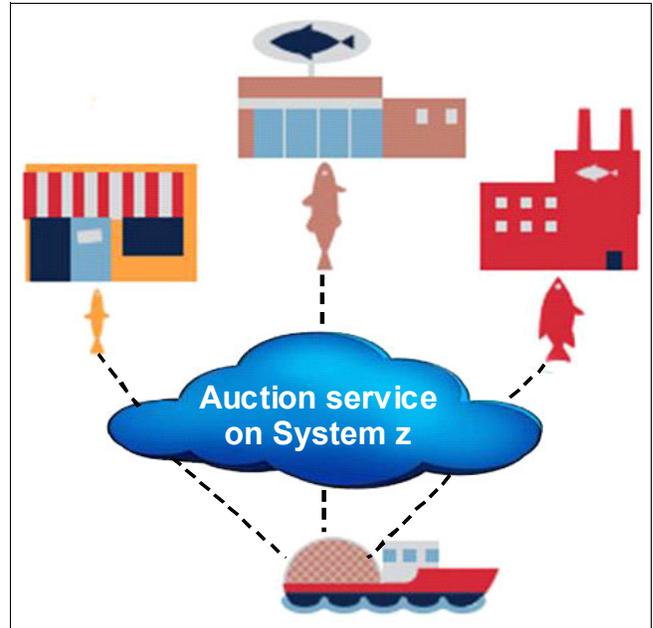


Figure 3 Centralized, cloud-based fish market-as-a-service

The City and County of Honolulu is another example of consolidating systems and creating a customized cloud on a mainframe. Officials there initiated a project to increase transparency and expand community access to government information. As part of the effort, they migrated applications and database instances from their existing servers to System z. The switch helped trim new application deployment time from a week to just a few hours, and reduced some database licensing costs by 68 percent when one of the city's application databases was moved to System z running Linux. And in the end, citizens gained real-time access to certain of the city's financial systems for the first time.

Honolulu also used System z to create a customized cloud environment that provides a scalable self-service platform through which city employees and the general public can create and deploy citizen-centric applications. Applications already available include CitySourced Honolulu 311, an innovative tool that enables citizens to photograph and pinpoint needed street repairs and report them to the city; DaBus, which provides real-time bus locations and wait-time estimates to bus riders; Festivals of Hawaii, which provides details about city festivals related to film, music, food, and wine, and Kokua, which supplies real-time traffic reports.

Development and test environments

A cloud can offer a better way for IT organizations to build and manage development and test environments for new applications. Developers can obtain resources on demand and then release the resources when they are not needed anymore, which can greatly improve productivity and speed up each new application's time-to-market.

Nationwide, the insurance and financial services company, has deployed a virtualized cloud environment on System z that gives its developers greater flexibility in allocating, or provisioning, computing capacity for new workloads. With the company's previous infrastructure, provisioning for a new project took days, weeks, or even months. The new virtualized cloud environment enables servers to be provisioned in just minutes. It also brings the added benefit of rapid scaling. This ability to flexibly add capacity whenever it is needed changes the mindset of developers and promotes "out-of-the-box" thinking, providing a strong foundation for innovation.

Nationwide's virtualized cloud on System z has replaced thousands of stand-alone distributed servers and has saved the company an estimated \$15 million over three years. The company also cut related power, cooling, and floor space requirements by 80 percent.

Collaboration and social networking

IBM employees have used desktop-based web conferencing applications for a long time. But a few years ago, the company moved this functionality to the cloud on System z, which has greatly simplified conferencing and includes social media and content management capabilities. The switch has also made collaboration among the company's global workforce more secure, regardless of the user's device or location.

Today, IBM Connections (see Figure 4), our cloud-based collaboration and social networking application, allows IBM employees to engage with colleagues, clients, and IBM Business Partners around the globe, sending and receiving more than 50 million instant messages per day. More than 600,000 users have created profiles on IBM Connections. They have posted thousands of blogs, shared over a million files, and created hundreds of communities and forums through which they can track the progress of shared projects and contribute with their own comments, links, and documents. With cloud-based IBM Connections on System z, IBM has not only lowered associated costs

by 75 percent but has dramatically increased collaboration and productivity among employees.

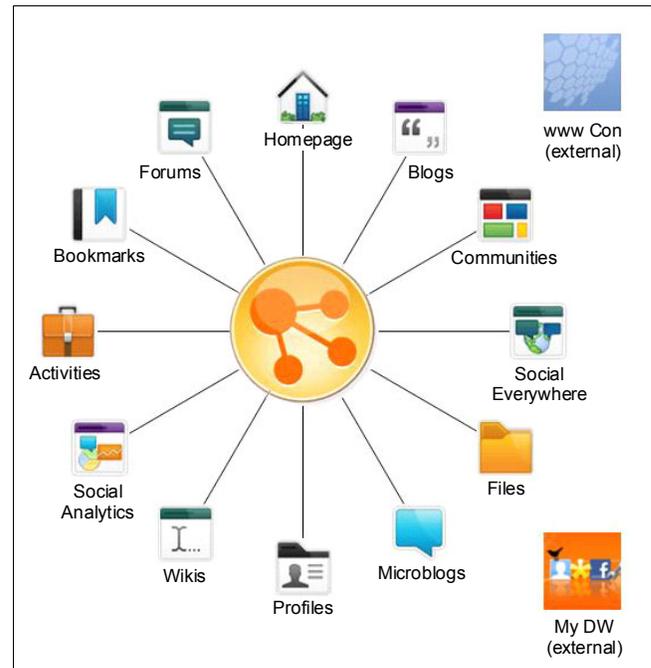


Figure 4 Centralized social collaboration-as-a-service

Next-generation trusted clouds

Thanks to the efficiency and scalability of the mainframe, managed service providers (MSPs) and cloud service providers (CSPs) can deliver affordable, secure clouds with mainframe-level qualities of service. This makes the mainframe the perfect technology to support the next-generation of trusted clouds. In fact, in 2013, the number of MSPs running clouds on System z jumped 42 percent from the previous year.⁴

Business Connexion, one of the largest IT service providers in Africa, is using System z mainframes to lead the next wave of cloud services there.

The company aims to help the developing economies in Nigeria, Kenya, Tanzania, Mozambique, Angola, and Namibia extend their enterprise capabilities through the use of mainframe-based clouds. It has partnered with telecommunications companies to use their existing local footprints to resell its enterprise cloud services, opening the door to new customers while giving small and medium enterprises in those regions new access to trusted clouds. Further, its mainframe-based infrastructure will enable Business Connexion to deploy enterprise-level *cloud-in-a-box* solutions that are

⁴ Partnership with MSPs Allows More Companies to be on the Platform Than Ever Before, IBM Systems Magazine, May 2014

secure and scalable and are built on smaller data centers that are so efficient they are said to draw as little energy as a clothes dryer.

The mainframe is also being used to build a next-generation trusted cloud by the State of New York.

The government there wants to reduce its IT budget by removing inefficiencies in its IT infrastructure and applications. Currently, some 1600 municipalities in the state run separate applications on redundant infrastructures that do not share data. Working closely with IBM, the State of New York is developing the NY Municipal Shared Services Cloud. This mainframe-based services cloud (see Figure 5) will offer a wide range of integrated and secure IT services to all levels of government. Further, with a shared, mainframe-based cloud environment, state government departments will have a long-sought, uniform view of their information. Some municipalities in New York State spend \$8 million or more annually on IT infrastructure and services, and based on early estimates, the new, shared cloud model could eliminate 25 percent of that expense.



Figure 5 Centralized municipal shared services

What's next: How IBM can help

IBM offers an integrated family of cloud technologies for quickly building public, private, and hybrid clouds.

One of the latest System z mainframe offerings is IBM Enterprise Cloud System, a *cloud-in-a-box* featuring a converged, pre-integrated stack of IBM zEnterprise hardware, IBM storage, and IBM virtualization and cloud software. With Enterprise Cloud System, much of the integration and setup is done at the factory, so organizations can build an OpenStack based cloud on Linux on System z in just a few days. Learn more here:

<http://www-03.ibm.com/systems/z/solutions/cloud/system.html>

Among the other IBM cloud-related offerings are these:

- ▶ IBM Cloud Management Suite for System z: Enables companies to provide dynamic provisioning for business-critical workloads using IBM SmartCloud® Orchestrator, with added IBM OMEGAMON® performance monitoring capabilities and IBM Tivoli® Storage Manager data back-up. Learn more at these websites:

<http://www-03.ibm.com/software/products/en/cloud-management-suite-for-system-z>

<http://www-03.ibm.com/software/products/en/tivoliomegaxonzvmandlinu>

- ▶ IBM z/VM: Offers industry-leading and proven virtualization technology with impressive horizontal and vertical scalability, rapid server provisioning, and workload isolation. Learn more here:

<http://www.vm.ibm.com/>

- ▶ IBM Wave for z/VM: Manage virtual machines with drag-and-drop simplicity. Learn more here:

<http://www-03.ibm.com/systems/z/solutions/cloud/wave/>

For more information about these cloud offerings, contact your IBM representatives.

Resources for more information

For additional information about System z and the use cases highlighted here, see the following resources:

- ▶ IBM zEnterprise cloud solutions
<http://www-03.ibm.com/systems/z/solutions/cloud/>
- ▶ IBM Blue Insight
<http://public.dhe.ibm.com/common/ssi/ecm/en/zsc03198usen/ZSC03198USEN.PDF>
- ▶ University of Bari
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- ▶ City and County of Honolulu
<http://public.dhe.ibm.com/common/ssi/ecm/en/zsc03142usen/ZSC03142USEN.PDF>
- ▶ Nationwide
<http://www-03.ibm.com/software/businesscasestudies/crdb/undefined/corp?docid=STRD-8YSM3M>
- ▶ IBM Connections
<http://public.dhe.ibm.com/common/ssi/ecm/en/zsc03174usen/ZSC03174USEN.PDF>
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