Achieve cloud without compromise

Build the cloud you want — with the privacy and protection you need

IBM

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Estimated 18-minute read

Introduction
Think differently about hybrid cloud

Cloud remains a primary business driver. Organizations are shifting workloads to a hybrid cloud architecture that blends on-premises infrastructure with private and public cloud models.

In this ongoing journey to cloud, security, cost and flexibility are top of mind. And with good reason. According to recent research from Ponemon, 59 percent of companies experienced a data breach caused by a third party.[1] While cloud offers clear agility benefits and enables data sharing across the enterprise, it can also expose data in the process, leading to risk. The market is also demanding new and better digital products and services, and your cloud model must help you meet this demand by driving to market faster. Cloud deployment and management costs can be a concern, particularly the costs of workload expansion as demand fluctuates and grows.

These converging needs require a new way of thinking about hybrid cloud. What your organization needs is cloud without compromise. That means cloud with data privacy and protection. Cloud with availability. Cloud with workload migration and predictable pricing. And also cloud with the openness and flexibility you've come to expect.

This approach requires a unique on-premises platform. But not all platforms are created equal.

Read on to see how IBM Z® helps you capture the opportunities of hybrid cloud.

Chapter 1
Build once, deploy anywhere

"Developers will be able to ramp up a new environment typically in less than an hour, then shut it down when they no longer need it, all without needing to wait in line for Z hardware resources."

Mika Lomu
Principal Solution Consultant, Tieto

Build and modernize to meet customer needs

Customer demand for new digital and AI services is driving a shift to cloud native experiences. Your organization is tasked with building and modernizing these services using an agile DevOps approach. This requires openness and structure.

Developers currently use many open-source tools including Kubernetes, Docker and Ansible, and more. These tools enable an application to be built once and deployed anywhere, accelerating your time to market.

Rapidly building and deploying open-source applications also requires an efficient approach with automation and scalability. Containerization helps speed time to market because it enables applications to be packaged together with their software dependencies. An enterprise-wide software build pipeline with continuous integration/continuous delivery (CI/CD) processes makes cloud native development more efficient. Consistent management and orchestration using automation creates efficiencies too.

How can you enable a streamlined cloud native approach while maintaining security, availability and resiliency?

Enable a cloud native experience with Red Hat OpenShift on IBM Z

IBM Z provides a cloud native ecosystem for access and use by administrators, developers and architects — without requiring IBM Z-specific programming skills. Now you can build, deploy, manage, orchestrate and automate through an integrated process on a system designed to be secure and resilient.

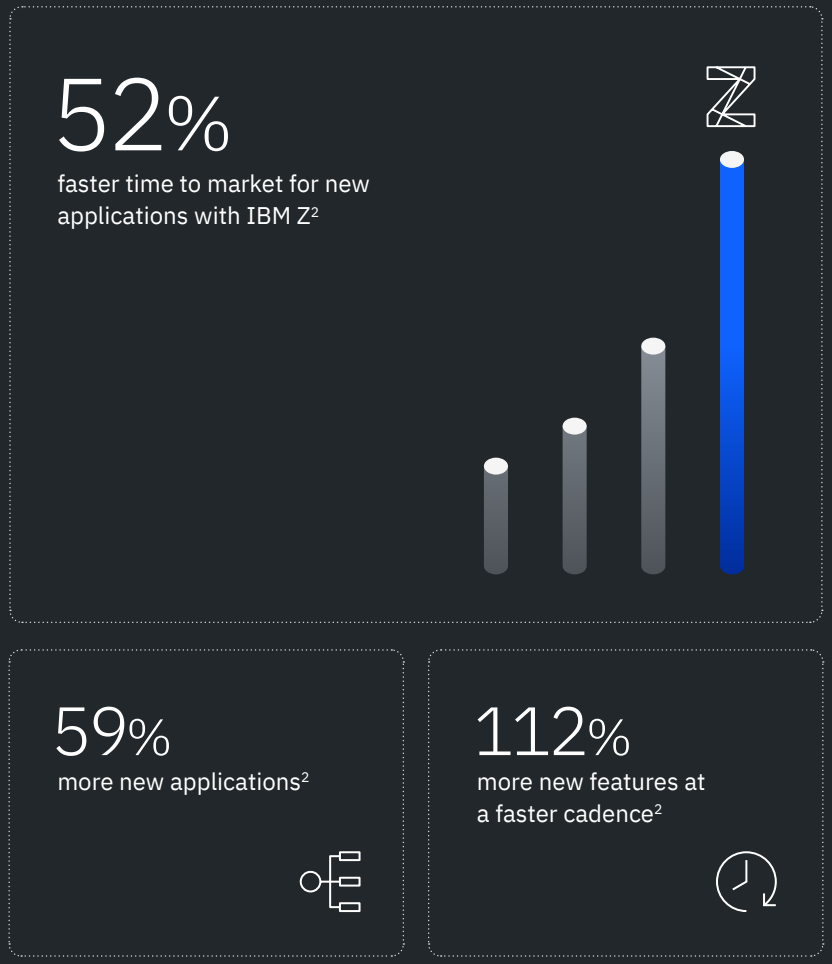
With IBM Z, you can deliver new applications and services with confidence by embracing open-source tools and containerization. Red Hat® OpenShift® is now available on IBM Z. OpenShift is a fully integrated open-source platform supporting application build through deployment. It combines the portability and agility of containers and Kubernetes with the security, scalability and reliability of IBM Z. The platform enables you to build applications once and deploy them anywhere.

Several options further enhance your ability to build and manage in the cloud with Red Hat OpenShift on IBM Z. IBM z/OS® Cloud Broker enables your OpenShift applications to easily interact with data and applications on IBM Z. With Linux® on Z you can easily run OpenShift in an on-prem private cloud environment. And Red Hat Ansible Automation Platform provides a playbook for automating processes on IBM Z, making it a valuable part of the Red Hat ecosystem.

With IBM Wazi for Red Hat®CodeReady Workspaces, your organization can simplify hybrid application development by leveraging your developers' preferred open-source tools, including Docker, Git and Jenkins. This integration enables straightforward, efficient development through an integrated enterprise CI/CD pipeline — supported by the security and scale of IBM Z. Kubernetes and containers give your developers the freedom to build and modernize services in the private cloud. And with IBM z/OS® Container Extensions you can seamlessly integrate solutions built on Linux and deployed on z/OS.

Also supporting your cloud native experience are IBM Cloud™ Paks for IBM Z. Modular and open-source-based yet designed to be secure, Cloud Paks help you quickly move core business applications from IBM Z to the cloud.

IBM Z supports the full cloud native experience to help you transform and quickly innovate. That's why organizations with IBM Z can cut time to market for new applications by up to 52 percent.[2]



Chapter 2
Encrypt data, wherever it goes

Keep data protected and private in a hybrid cloud world

Consumers have grown more concerned with the privacy of their data — as have regulators. In 2019, many fines were levied related to GDPR regulations. High-profile corporate data breaches and misuses have increased consumer scrutiny of how corporations use and share their data. These trends, along with new regulations such as the California Consumer Privacy Act and Thailand's Personal Data Protection Act, indicate that the pendulum is swinging toward more privacy and protection of personal data.

In addition to protection, your customers now expect privacy and control of their data. How can you deliver this?

Protect eligible data wherever it goes with IBM Z

IBM Data Privacy Passports on IBM z15™ is a consolidated data-centric audit and protection (DCAP) technology that has the capability to protect eligible data along its journey by setting appropriate data protection controls for your enterprise. It can help you reduce the risks associated with a security breach and can also help address compliance requirements.[3]

Protecting data within the enterprise is a challenge. Selective data encryption, the traditional method for protecting data, can be costly and resource-intensive. With pervasive encryption on IBM z15, you no longer need to choose which data to encrypt. You can run up to 19 billion fully encrypted transactions a day[4] with no impact to SLAs and no application changes. Encryption at the network level helps protect your data from potential attacks while in flight. Encryption at the dataset level is designed to ward off insider attacks that could compromise unencrypted data. And new IBM Fibre Channel Endpoint Security for IBM Z extends the value of pervasive encryption by protecting data flowing between Z platforms or through the Storage Area Network from the Z platform to your storage.

As encryption is adopted more widely, organizations must manage a growing set of encryption keys to help them maintain the availability and security of the encrypted information. IBM Enterprise Key Management Foundation (EKMF) Web Edition is designed to efficiently and securely manage keys for IBM z/OS data set encryption on IBM Z. Your organization must also manage complexities related to complying with new regulations. Workload isolation helps clients address compliance complexity they may responsible for by keeping the integrity of applications and their data separate from one another.

With IBM z15 you can use IBM Secure Execution for Linux to provide scalable isolation for individual workloads to protect from attacks such as malicious administrative access. Deploy secured and isolated services within a single IBM Z server, without needing to run on physically separated logical partitions (LPARs).[5] IBM z15 also allows you to secure more data with cryptographic algorithm enhancements and additional virtual hardware security model scalability.

By protecting your data regardless of data source at rest and in flight, you can build trust with customers and partners in the evolving cloud landscape.

"With IBM Z handling all the encryption, I can rest assured that all of our customer data is safe, without the need for any developer input on the application layer — which makes my life a lot easier."

Johan Bosch
Executive Director, Emid →

Chapter 3
Remain always available for your customers

Be available and resilient to meet “always-on” demands

Customers expect your services to be always on and accessible — 24 hours a day, 7 days a week, 365 days a year. That means your IT systems must be always on. This requires the highest levels of systems availability, uptime and resiliency.

Even the most reliable systems require planned downtime for routine maintenance and security patching. Having a resilient system means you can get back up and running and recover quickly from planned maintenance and disruptions.

Stay resilient with IBM Z

IBM Z is designed to keep your systems available and resilient. The platform helps you meet client needs by delivering up to 99.99999% availability.[6]

IBM Z Instant Recovery keeps your systems resilient by reducing the impact of planned and unplanned downtime. With this capability, you unlock additional system performance, capacity, and “dark cores” in your IBM Z to accelerate shutdown and startup activities following downtime. After IBM Z starts up, you can quickly catch up on workloads — without increasing IBM software costs. The result? IBM z15 gets back up and running to normal levels in half the time as compared to IBM z14™.[7] In addition, newly introduced recovery process boosts are started and ended automatically by the operating system to speed up recovery from IBM Parallel Sysplex- and IBM HyperSwap-related events.

With superior availability for everyday operations and resiliency for when downtime is required, IBM Z is the “always on” platform for the digital era.

> “Given our global operations, we need our systems to be available round-the-clock, so reliability is a priority for us. With IBM Z, we’ve never experienced any performance or reliability problems to shake our trust in the technology.”
>
> **Ian Wilson**
> Managing Director, Fort Vale

> “The reliability of IBM Z is outstanding — in the 20 years I’ve worked with the IBM Z platform, we’ve never experienced an hour of unplanned downtime.”
>
> **Mike Riggs**
> Director of Judicial Information Technology,
> Office of the Executive Secretary, Supreme Court of Virginia

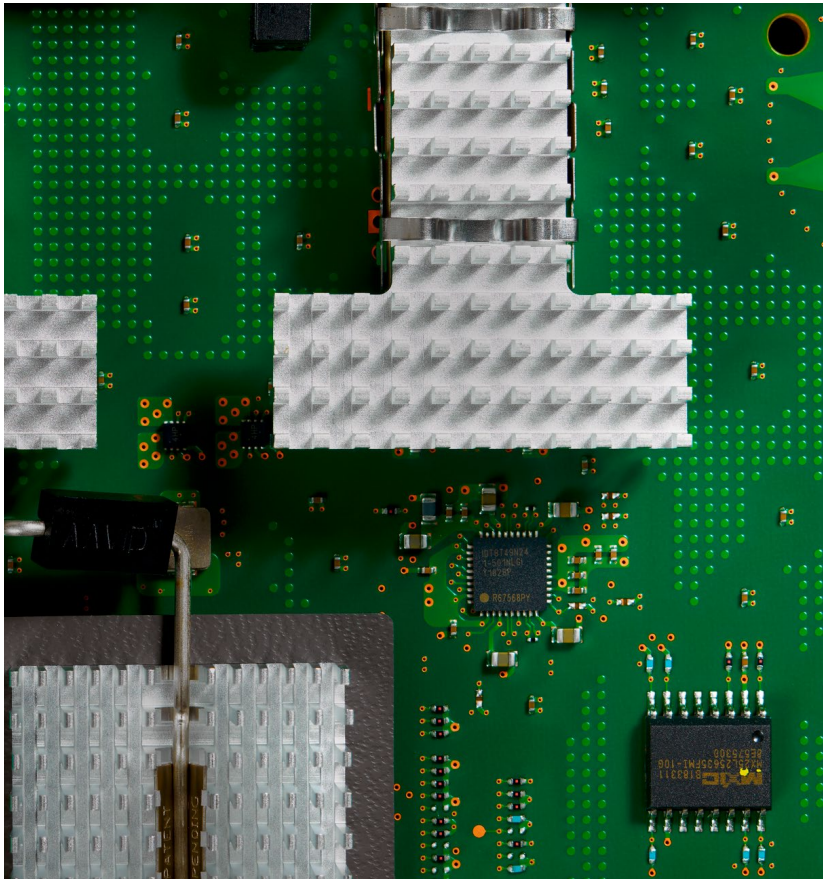
Chapter 4
Get the platform purpose-built for cloud

> "With Tailored Fit Pricing, we don't have to worry about predicting demand any more. Instead, we can leave on capacity — and pay only for what we use."
>
> **Terry Glover**
> Director of Infrastructure, Dillard's

Find a platform that fits your capacity needs

The demands of cloud require a flexible compute approach to your IT infrastructure. Your organization must have access to computing resources on demand. You need flexible consumption models to account for fluctuating demand and scaling workloads. And you need the ability to deploy your workloads on whichever cloud model you choose — public, private, hybrid, or a combination of these.

In addition, you require IT infrastructure fitted to your capacity needs. This is true whether you are a Fortune 500 company, a startup, or anywhere in between. You need the capacity to handle your most challenging workloads and remain always on for your clients. Yet you don't want to pay for more than you truly need.



Meet your unique capacity and workload needs with IBM Z

The new IBM z15 is designed for the modern cloud data center. Meet growing or unique workload needs by unlocking additional capacity through new on-chip and sort acceleration. This capability makes available additional computing resources within IBM Z for defined workloads such as cryptography, compression and sorting.. Fit IBM Z right into your cloud data center with flexible packaging built for cloud.

Get predictability in your workload pricing model, even as workloads fluctuate and scale. IBM Z Tailored Fit Pricing is a flexible software pricing model that dramatically simplifies the existing pricing landscape through deployment options tailored to your IBM Z environment. Two pricing alternatives to the traditional rolling-four-hour-average model provide pricing stability optimally geared to the demands of the digital era.

IBM Z is designed for organizations of all sizes, industries and capacity needs. The IBM z15 family scales dramatically in capacity by a multiple of over 1,800, from the entry-level T02 single-frame model to the fully equipped T01 multiframe.[8] This makes Z ideal for meeting business demands of all levels and for scaling as your business does. The entry-level models offer significant power-consumption-cost and floor-space savings over x86 architectures.

“Flexible compute” means resources, consumption and pricing models, and an infrastructure footprint geared to your needs. And IBM Z provides this.

A single-frame z15 can save on average **59% per year**

in power consumption costs versus compared x86 workloads running the same throughput.[9]

Chapter 5
Integrate storage into your hybrid cloud

Cloud native storage for all your workloads

To get the most out of your hybrid cloud, you need cloud native storage that's designed for your hybrid cloud environments and the critical workloads you deploy in them. Obviously you want that storage to be fast, reliable and secure. But you'll also need seamless cloud integration. Years of research and collaboration between IBM Storage and IBM Z teams deliver this business value.

The newest generation of IBM DS8900F and IBM TS7770 families, designed to match the mission-critical capabilities of IBM Z and LinuxONE servers, provides a transparent connection to hybrid cloud environments, bringing massive capacity, data protection and disaster recovery capabilities through the cloud.

IBM DS8900F and TS7770 virtual tape solution allows you to transfer IBM Z data directly and more efficiently to any cloud. You'll also save up to 50% on your IBM Z CPU utilization when you migrate large data sets, so you can focus on applications like cognitive computing, business intelligence and real-time analytics.[10]

And of course, container support is a must. IBM DS8900F provides persistent storage for mission-critical containers with support for Container Storage Interface (CSI). IBM DS8900F also supports IBM Cloud® Pak™ solutions to enhance and extend the functionality and capabilities of Red Hat OpenShift. These solutions are designed to give you an open, faster, and more secure way to deploy and maintain cloud-native applications.[11]

Along with bringing all the benefits of Z and the cloud to your critical workloads, these solutions can also be customized with smaller footprint, lower entry cost options and a flexible variety of racked and rack-mounted configurations, so you get the same enterprise capabilities regardless of your business size. In addition, the IBM DS8910F Storage System can now be integrated into IBM z15 model T02 to enable a powerful end-to-end solution delivered in a single 19-inch industry standard rack.

Protect 100 percent of data

Extending the security and protection capabilities of IBM Z, IBM Storage helps you protect 100 percent of your data across your hybrid cloud. Reduce and eliminate insider threats of unauthorized access to the Storage Area Network by ensuring that data is accessed only by authorized server and storage devices. IBM Fibre Channel Endpoint Security is an end-to-end solution that ensures all data flowing on FICON and Fibre Channel Protocol (FCP) links from IBM Z to IBM DS8900F systems is encrypted. This solution provides in-flight protection for all data, independent of the operating system or access method in use. With IBM DS8900F as your primary storage for production data, and IBM TS7770 as a secondary storage for backup and data protection, your data is 100% encrypted and only accessible by authorized devices, wherever it resides across the hybrid cloud.

For example, you can use IBM Z host systems to securely access data across an entire grid of linked T7770 systems, even if they are not in the same physical location. Data transfer capabilities that provide 100% encryption of all grid data will help your organization keep pace with regulations and compliance requirements.

Cyber resilient storage

Every business needs measures in place to protect data from being altered, corrupted or deleted in the case of an outage or attack. Your storage needs to have high availability and disaster recovery capabilities to help you recover access to data in seconds and uphold service-level agreements without interruption. And you may need an additional layer of “air gap” protection to keep a copy of some of your data offsite on tape systems.

IBM Z cyber-resilient storage is critical for your hybrid cloud. IBM DS8900F offers the powerful data security functionality of IBM Safeguarded Copy. This technology provides immutable points of data recovery that are hidden and protected from being modified or deleted. These immutable copies are a trusted and secure source of data that can be used for forensic analyses or surgical or catastrophic recoveries. Extending cyber resilience even further, IBM DS8900F can back up IBM Z data to the cloud that can later be used to repair or recover production environments.

IBM TS7770 enables cloud-based disaster recovery to ensure your critical data is available where and when it is needed, while building up your grid. This new cloud restore capability is supported across a range of environment and other cloud storage environments.[12]

With nearly zero seconds failover across a linked “grid” of up to eight systems, IBM TS7770 virtual tape solution is designed to provide high availability and disaster recovery, and it integrates with physical tape systems to create true air gap protection.[13]

Conclusion

Get the cloud you want with the data privacy and security you need

To capitalize on opportunities in the cloud landscape, your organization must have superior IT infrastructure. It must be secure yet open, resilient and available yet flexible, and aligned to your current needs yet able to scale as they change. Get cloud without compromise — with IBM Z.

Explore the new IBM z15 →

For more information, contact your business partner.

References

1 59 percent of companies said they have experienced a data breach caused by one of their vendors or third parties. In the U.S., that percentage is even higher at 61 percent — up 5 percent over last year's study and a 12 percent increase since 2016.

Source: Data Risk in the Third-Party Ecosystem: Third Annual Study Ponemon Institute © Research Report Sponsored by Opus; Nov. 2018 (secured approval to quote).

2 Companies using the transformative mainframe developed 2X the number of new features in approximately half the time.

Companies saw benefits relate to delivering more functionality to the business — 59% more new applications, 112% new features at a faster cadence (27% faster development lifecycle for new apps and 52% faster for new features). IDC Business Value White Paper, co-sponsored by IBM and Broadcom, The Business Value of the Transformative Mainframe, August 2019.

3 Data Privacy Passports supports data sources that can be accessed through a JDBC connection. May vary based on data types, database schema and data use, and SQL queries.

4 Disclaimer :This transaction rate is based on internal measurements of a z15 configuration consisting of 2 8-way LPARs and a 4-way ICF running with dataset encryption and CF encryption enabled. Using these results, full size z15 transaction rates were projected using standard LSPR MIPS. The performance that any user will experience may vary.

5 Cryptographic isoluation uses special encryption keys in the hardware. IBM Secure Execution is supported on the latest z15 and LinuxONE III generation machines (including T02 and LT2).

6 IBM z15 solutions are designed to deliver 99.99999% availability.

Disclaimer: Internal data based on measurements & projections was used in calculating the expected value. The z15 servers must be configured in a parallel sysplex using z/OS 2.3 or above; GDPS management of data and middleware recovery across Metro distance systems and storage, including GDPS Metro Multi-site Workload and GDPS Continuous Availability; and DS888X with IBM HyperSwap. Necessary resiliency technology must be enabled, such as System Managed CF Structure Duplexing, Sysplex failure mgt and Capacity Provisioning Mgr. Other configurations may provide different availability characteristics.

7 IBM System Recovery Boost (Instant recovery) on z15, enables a z/OS partition to return to your pre-shutdown SLAs in up to 50% less time than on z14.

Disclaimer: z15 z/OS partitions benefit from IBM System Recovery Boost for one boost period of 30 minutes during shutdown and 60 minutes during restart. Measurements were collected in a controlled environment running an IBM developed workload under z/OS 2.4, comprised of online transactions accessing WAS, CICS, MQ, IMS and Db2. Comparisons were made between z15 with IBM System Recovery Boost and z14. Individual client results may vary.

8 The range of MIPS on z15 T02 is 98 to 183,267 MIPS for the largest z15 T01 model, representing a ratio of 1870.

9 A single-frame z15 saves up to 40% per year on power consumption cost when consolidating workloads from compared x86 model systems.

Compared z15 model consists of 3 CPC drawers containing 108 IFLs, & one I/O drawer to support both network and external storage. Power consumption of z15 is estimated using z15 Preliminary Power Estimator spreadsheet tool, assuming maxi CPU utilization. x86 systems ran at various CPU utilizations according to 15 customer surveys, representing Development, Test, Quality Assurance, and Production levels of CPU utilization and throughput. Three workloads were tested, consisting of a mix of leading databases and application servers. Each consolidated workload ran at the same throughput and SLA response time on Z and x86. Power consumption on x86 was measured while each system was under load. z15 performance data and number of IFLs was projected from actual z14 performance data including a performance improvement of 10% on z15. Compared x86 models are all 2-socket systems containing a mix of the following x86 processor models: 8-core Xeon E5-2667 v4, 12-core Xeon E7-8857 v2, 12-core Xeon E5-2680 v3, 8-core Xeon E5-4650, 8-core Xeon E5-2650, and 14-core Xeon E5-2690 v4. External storage is common to both platforms and not included in power consumption. Assumes IBM Z and x86 are running 24/7/365.Assume US average commercial power rate of $0.10 per KWh. Assume Power Usage Effectiveness ratio of 1.67 (67% additional power is required for cooling the data center).

10 Results are based on internal IBM data measurements on an EC12 (8 CPs, 32GB Main Memory) when migrating data sets exceeding 6000 3390 tracks in size. Results will vary by customer based on particular workloads, configurations, software levels and the quantity and size of data sets being migrated.

11 Performance metrics based on internal IBM tests using zHyperLink technology (4K read) in a controlled environment.

12 Data sets can now be restored to any empty TS7770 system outside TS7700 grids using Cloud Connect technology. As volumes are created in a grid, TS7700 Cloud Connect copies them to the assigned cloud pools, where they can be managed by the Data Facility Storage Management Subsystem (DFSMS). Version retention is enabled within each cloud pool, allowing previous versions to be retained long enough to meet any requirement.

13 High availability and disaster recovery with nearly zero seconds failover across up to 8 redundant TS7770 systems. A DS8800 replicates simultaneously up to 2 TS7770s, resulting in absolute Zero Recovery Point Objective.