



IBM Z Strategy and Future Outlook

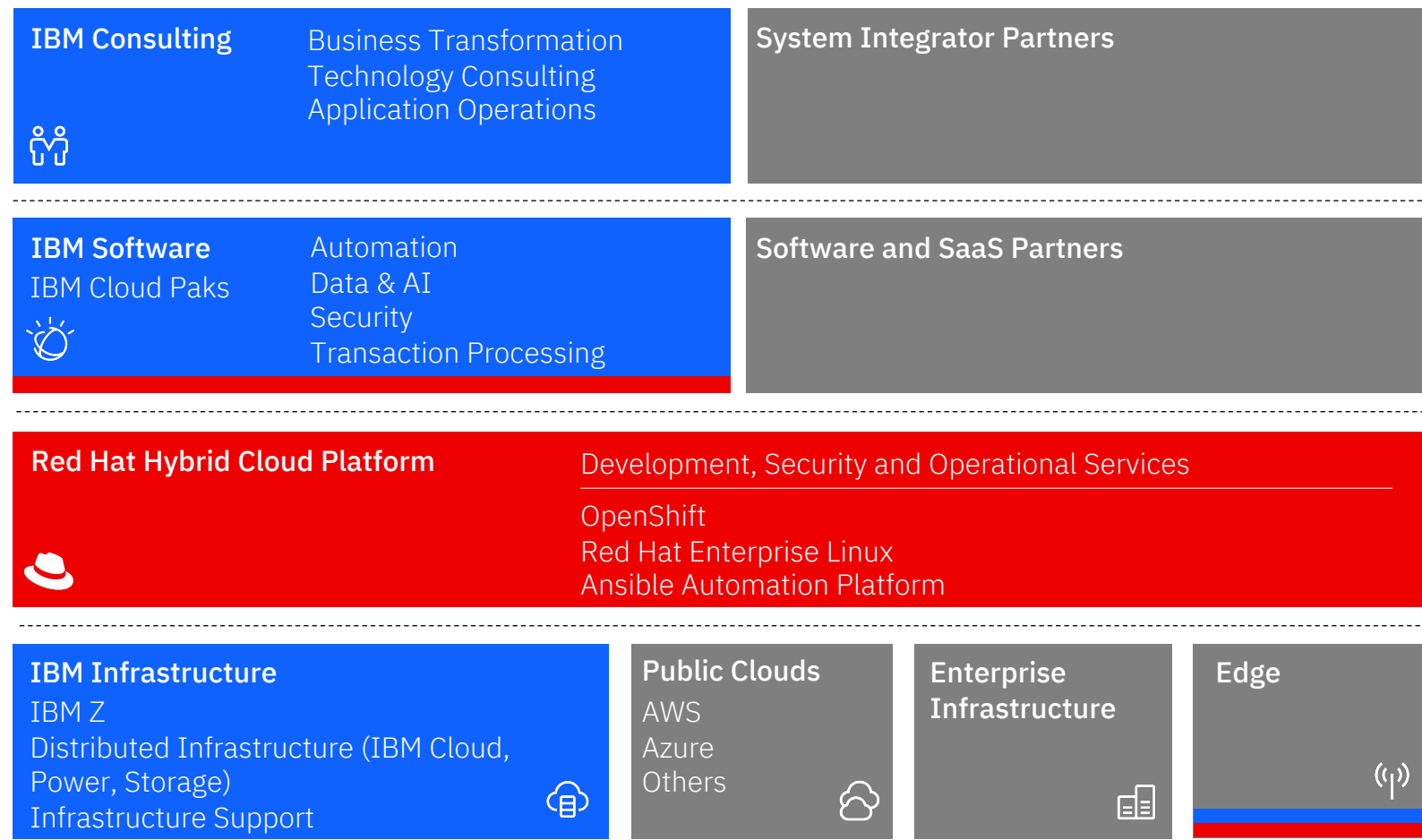
Kevin Stoodley

CTO & IBM Fellow : IBM Z



IBM approach for Hybrid Cloud and AI

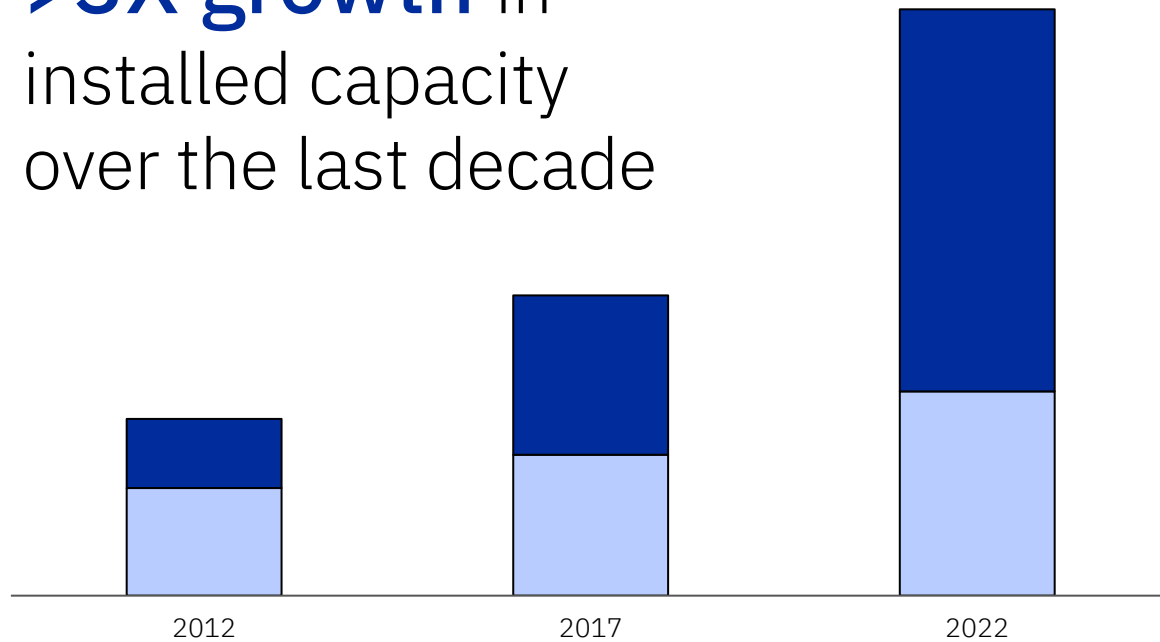
Be the catalyst that makes the world work better





IBM Z: Increasing momentum in the era of Hybrid Cloud

>3X growth in installed capacity over the last decade



Workload as measured by installed Million Instructions Per Second (MIPS)

Standard MIPS 
Specialty MIPS 

67 of the Fortune 100

45 of the world's top 50 banks

8 of the top 10 insurers

4 of the top 5 airlines

7 of the top 10 global retailers

8 of the top 10 telco's

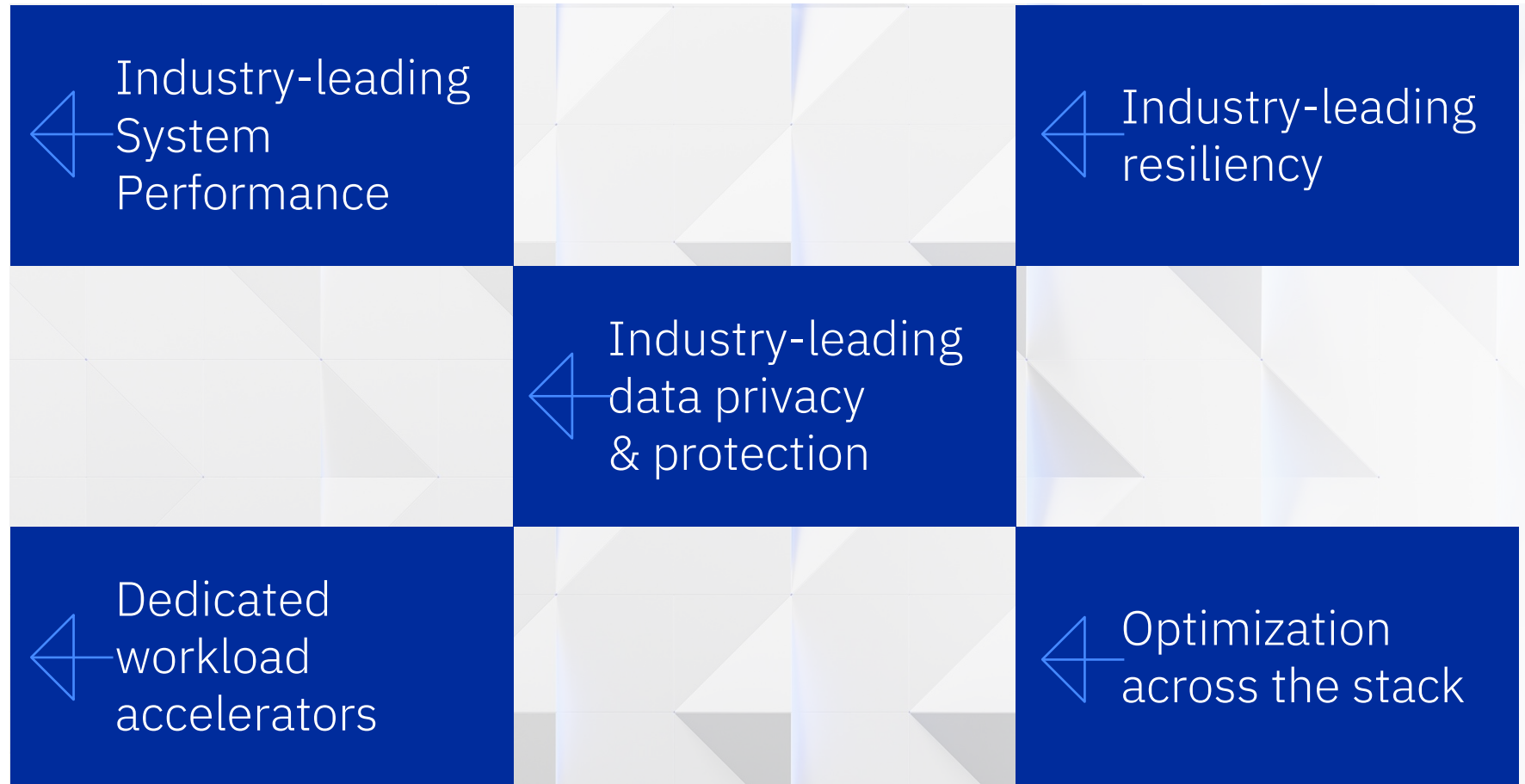
24 of the top 25 countries by GDP*

*24 of the top 25 global countries ranked according to their GDP have public sector organizations that run on IBM Z or IBM LinuxONE



IBM Z Strategic Imperatives

Ensure IBM Z remains the premiere data serving and transaction processing platform through ...





IBM Z is a strategic investment for IBM

z14



GA 9/2017
14 nm

- Pervasive encryption with On-chip Crypto Acceleration
- Pause-less garbage collection
- Hyperlink I/O
- Virtual Flash Memory

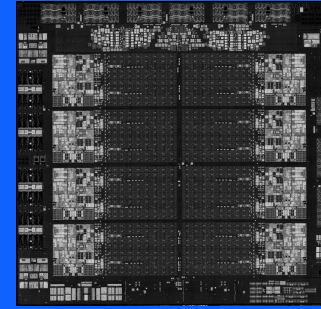
z15



GA 9/2019
14 nm

- On-chip compression & sort acceleration
- System Recovery Boost
- Data Privacy Passports
- Fibre Channel Endpoint Security
- ECC crypto acceleration
- 19" rack form factor

z16



IBM Telum Processor

GA 2Q2022
7 nm

- On-chip AI Accelerator
- Quantum-Safe Cryptography
- Evidence-based Compliance
- Middleware Recovery Boost
- Sysplex performance and scale
- Flexible Infrastructure

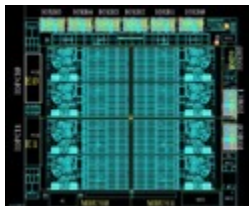
zNext

zFuture



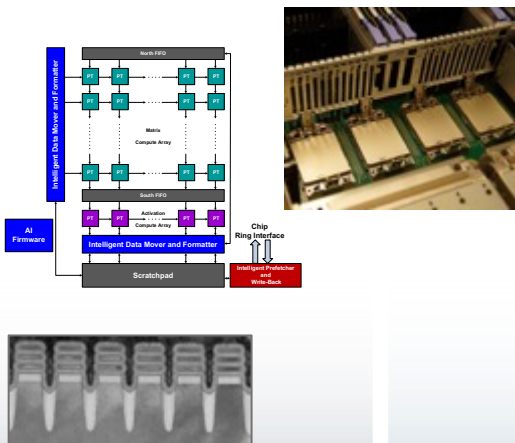


IBM Z: Innovation – Integrated by design



z16

DS8900



¹ Open Source and Linux bring a wealth of new management tools, languages, databases, etc. to IBM Z— there are just a few listed on this chart





IBM Z: Designed for the future of digital business

Trusted, secure, resilient and ready for Hybrid Cloud and AI

Hybrid Cloud

Security & Compliance

Data & AI

Performance & Scalability

Availability

Sustainability

VM Workshop





IBM Z: Designed for the future of digital business

Trusted, secure, resilient and ready for Hybrid Cloud and AI

Hybrid Cloud

Agility and flexibility for new and existing services

Cloud Native DevSecOps deployment based on open standards

Build once, deploy anywhere with OCP

Developer agility through containers and Kubernetes/OpenShift

Security & Compliance

Data & AI

VM Workshop

Performance & Scalability

Availability

Sustainability

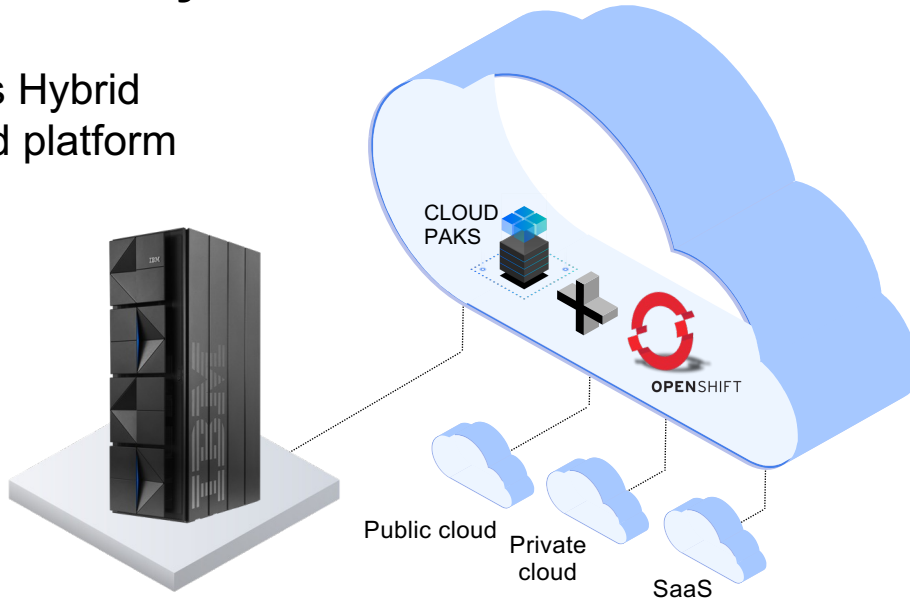




Achieve greater ROI with IBM Z in your Hybrid Cloud

IBM Z integrated in a Hybrid Cloud Platform

IBM's Hybrid Cloud platform



With IBM Z in the Hybrid Cloud:

- Reduce the talent gap with common tools and operating models across platforms
- Accelerate time to market for cloud native services with a consistent DevOps experience
- Easily access IBM Z data without moving off-platform
- Optimize costs with a cloud consumption model that extends to IBM Z



Collaborating with cloud providers on a hybrid cloud approach

Hyperscaler Collaboration

IBM
Cloud

- [Announcement](#) (Feb '22)
- [z/OS Dev Test available on IBM Cloud](#) (Jun '22)
- [Hybrid Cloud Blog](#)

Amazon Web
Services
(AWS)

- [Announcement Blog](#)
- IBM Z and Cloud Modernization Stack on [AWS Marketplace](#)

Microsoft
Azure

- [Announcement Blog](#)

Hybrid Application Modernization Patterns

- Secure applications and data in the cloud
- Hybrid storage with cloud storage
- Cloud-native developer experience for z/OS applications
- Simplify access from digital channels with APIs
- Enterprise automation across z/OS and Cloud
- Share near real-time information between z/OS apps and Cloud



IBM Z: Designed for the future of digital business

Trusted, secure, resilient and ready for Hybrid Cloud and AI

Hybrid Cloud

Agility and flexibility for new and existing services

Cloud Native DevSecOps deployment based on open standards.

Build once, deploy anywhere with OCP

Developer agility through containers and Kubernetes/OpenShift.

Security & Compliance

The most secure platform today and in the future

Meets the highest compliance requirements

Enterprise-grade Cyber Security

Confidential Computing

Quantum-Safe Crypto

Data & AI

VM Workshop

Performance & Scalability

Availability

Sustainability





IBM Z security- Innovation driven through platform strategy

April 7th, 1964 – April 5th, 2022
4 Generations of Technology
12 Families of Innovation

IBM z14™



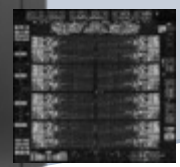
Crypto Express6s
CPACF

IBM z15™



Crypto Express7s
CPACF
Compression
Fibre Channel
Endpoint Security

IBM z16™



IBM Telum Processor

Crypto Express8s
CPACF
Compression
Memory Encryption

IBM Z Security Leadership

Approach: Security integrated into all levels of the stack

Data Protection

Data Privacy
Confidential Computing

Cyber Resiliency
Continuous Compliance
Quantum Safe



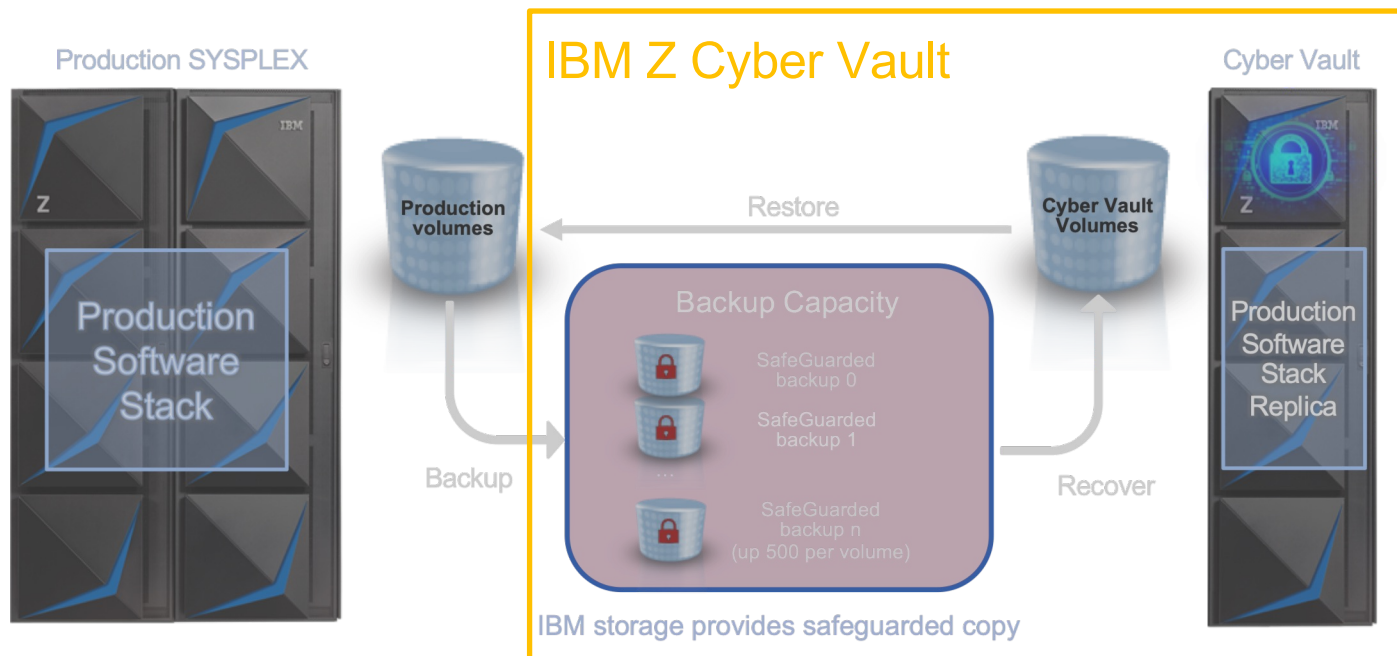
IBM Z Cyber Vault

Principal Idea:

Reduce the time to recover from days to minutes, by implementing a Data Corruption Protection solution.

Cyber Vault Environment:

- IBM DS8K with Safeguarded Copy provides immutable, consistent point-in-time copies of data.
- GDPS LCP manages the creation, recovery, and restoration of the copies and provides automation to manage those processes.
- IBM z Systems hardware and software provides a secure, isolated environment to perform data validation, forensic analysis, and create offline backups.





IBM Z: Designed for the future of digital business

Trusted, secure, resilient and ready for Hybrid Cloud and AI

Hybrid Cloud

Agility and flexibility for new and existing services

Cloud Native DevSecOps deployment based on open standards.

Build once, deploy anywhere with OCP

Developer agility through containers and Kubernetes/OpenShift.

Security & Compliance

The most secure platform today and in the future

Meets the highest compliance requirements

Enterprise-grade Cyber Security

Confidential Computing

Quantum-Safe Crypto

Data & AI

Best platform for processing large volumes of data and transactions with minimal latency

Accelerates decision making with real-time insights

World-class platform for AI inference for enterprise workloads

VM Workshop

Performance & Scalability

Availability

Sustainability





AI on IBM Z strategy:

Designed for Business Insights and Intelligent Infrastructure



REAL TIME BUSINESS INSIGHTS

Infuse AI in Real-time into Every Business Transaction



Db2 for z/OS® with SQL Data Insights

Uncover hidden insights in Db2 for z/OS data



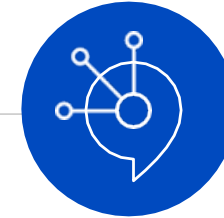
Watson® Machine Learning for z/OS

Unprecedented AI inferencing performance for every transaction while meeting SLAs



Cloud Pak for Data

Cloud native solution to put your data to work and generate meaningful insights



INTELLIGENT INFRASTRUCTURE

Improve Security, Data Privacy, IT Operations with AI



Cloud Pak for Watson AIOps & IBM z16 Anomaly Analytics

Deploy advanced, explainable AI across the ITOps toolchain



Db2 AI for z/OS

Enhance database performance with machine learning



Data Privacy for Diagnostics

Leverage machine learning to detect and redact PII from diagnostic dumps

Enable a leading AI portfolio & ecosystem

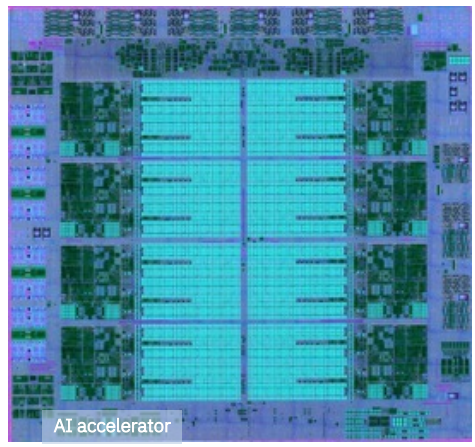


AI on IBM Z - Innovation delivered across the stack



AI at scale

INDUSTRY'S FIRST ENTERPRISE AI ACCELERATOR

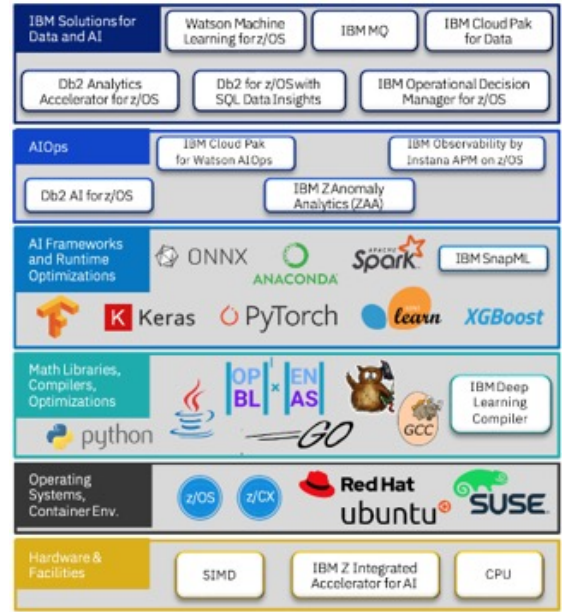


Game changing IBM z16 on chip inferencing delivers up to 300 billion requests per day with 1ms response time¹



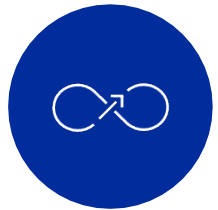
AI Ecosystem

ROBUST ECOSYSTEM OPTIMIZED FOR THE ACCELERATOR



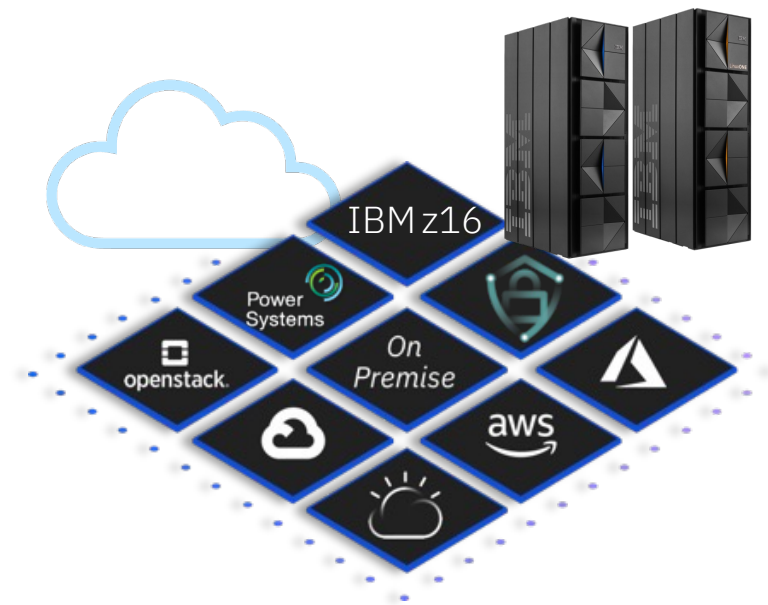
Data, transactions and accelerated AI in IBM z16 effectively eliminates latency in inferencing, with models built and trained with familiar open-source tools

VM Workshop



AI Agility

FRICITIONLESS AI



Train anywhere infer on IBM z16 and embrace democratic AI



IBM Z: Designed for the future of digital business

Trusted, secure, resilient and ready for Hybrid Cloud and AI

Hybrid Cloud

Agility and flexibility for new and existing services

Cloud Native DevSecOps deployment based on open standards.

Build once, deploy anywhere with OCP

Developer agility through containers and Kubernetes/OpenShift.

Security & Compliance

The most secure platform today and in the future

Meets the highest compliance requirements

Enterprise-grade Cyber Security

Quantum-Safe Crypto

Confidential Computing

Data & AI

Best platform for processing large volumes of data and transactions with minimal latency

Accelerates decision making with real-time insights

World-class platform for AI inference for enterprise workloads

VM Workshop

Performance & Scalability

Best Scale Up Server on the market

Availability

99.999999%

Sustainability

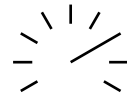
Reduce energy consumption by 75% compared to x86





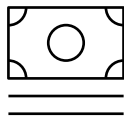
Linux on Z/LinuxONE: A single cloud platform for confidential computing

Performance



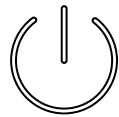
- Fastest cores @ 5.2 GHz
- I/O offloading
- Compression accelerator
- Encryption accelerator
- AI Accelerator
- Optimized for Java

- More transactions per floor tile
- Reduce energy consumption by 75%
- Only 1/16th as many cores needed compared to x86



TCO

- Mean time between failure (MTBF) of 50 years
- No downtime due to memory failures in 10 years
- 99.999999% availability



Availability



Cyber Resiliency

- Quantum-safe Technology
- Protected at rest, in flight, in use
- Hardware-based Trusted Execution Environments (TEEs)
- Protects VMs from each other
- Protect container contents from Kubernetes master



Scalability

Do the work of **2000** x86 cores in a single 19" LinuxONE frame





IBM Z Resiliency

IBM z16

System Recovery Boost
Accelerate restoration of services after planned or unplanned downtime

Storage Synergy

Integration by design to maximize technology advantages and over seven 9's availability



Parallel Sysplex

Maintain availability of online workloads when individual systems are down

GDPS

GDPS brings you to a state of data consistency at the Recovery site



Sustainability is a core principle of business strategy

74%

consider

Environmental, Social, and Governance (ESG) factors to be very important to the enterprise value of their company¹

85%

prefer to partner

with or buy from companies that have communicated a commitment to sustainability²

73%

of surveyed

organizations have set a net-zero goal with an average target date of 2044³

Today's IBM zSystems and LinuxONE are the ideal platforms for achieving your sustainability goals

Net Zero Greenhouse Gas Emissions

IBM commits to achieving net zero greenhouse gas emissions by 2030 in all 175 countries in which we operate

27-year history of energy efficiency

IBM zSystems has increased the total systems capacity per kW by more than 100x over the last 14 generations

Carbon footprint reduction

An IBM z16 can reduce the CO₂e footprint by approximately 75% each year versus compared x86 servers running the same Linux workloads under similar conditions. This is equivalent to taking about 39 gas powered passenger vehicles off the road for a year

Energy monitoring and management

IBM zSystems and LinuxONE make available tools to monitor and manage power consumption



1. IDC FutureScape: Worldwide Sustainability 2022 Predictions, IDC, October 2021
2. IDC IT Procurement Trends & Consumption Models Survey, IDC, August 2021
3. IBM Institute of Business Value: Sustainability as a transformation catalyst, January 2022

4. IBM z15 and LinuxONE III (GA1 and 1.5) Official Proof Points, March 2021
5. US EPA Greenhouse Gas Equivalencies Calculator



Modernizing their IT infrastructure to support their sustainability goals



Citi partnered with MongoDB and IBM to migrate their MongoDB instances to IBM LinuxONE

- Achieved** a big win for our sustainability strategy
- Enhanced** the security capabilities of our service offering
- Increased** performance by 15%
- Improved** customer service

“We leveraged innovative technologies that improved our customer experience, enhanced the security capabilities of our service offering and allowed us to make a significant mark in our drive to net-zero carbon emissions. Really all in all a great story”

Martin Kennedy, Managing Director
Mainframe and Host System Services
Technology Infrastructure, Citibank



IBM Z: Designed for the future of digital business

Trusted, secure, resilient and ready for Hybrid Cloud and AI

Hybrid Cloud

Agility and flexibility for new and existing services

Cloud Native DevSecOps deployment based on open standards.

Build once, deploy anywhere with OCP

Developer agility through containers and Kubernetes/OpenShift.

Security & Compliance

The most secure platform today and in the future

Meets the highest compliance requirements

Enterprise-grade Cyber Security

Quantum-Safe Crypto

Confidential Computing

Data & AI

Best platform for processing large volumes of data and transactions with minimal latency

Accelerates decision making with real-time insights

World-class platform for AI inference for enterprise workloads

VM Workshop

Performance & Scalability

Best Scale Up Server on the market

Availability

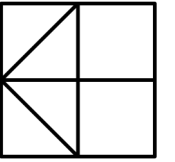
99.999999%

Sustainability

Reduce energy consumption by 75% compared to x86



IBM z16 product Portfolio



IBM z16 Multi Frame

Designed to support the growth in IT requirements for multi-frame clients, with superior scalability & efficiency with up to 200 cores



IBM z16 Single Frame

Designed for roll-in, roll-out single-frame clients, providing enriched capabilities and improved performance per core



IBM z16 Rack Mount

New entry point rack mount option, components designed for colocation with other technologies.

IBM-installed in customer-supplied rack

Trademarks

FICON*	IBM Cloud Paks	Parallel Sysplex*	z/VM*
GDPS*	ibm.com*	z14	z/VSE*
HyperLink	IBM logo*	z15	
IBM*	IBM Z*	z/OS*	

* Registered trademarks of IBM Corporation

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

IT Infrastructure Library is a Registered Trademark of AXELOS Limited.

ITIL is a Registered Trademark of AXELOS Limited.

Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and other countries.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

The registered trademark Linux® is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

OpenStack is a trademark of OpenStack LLC. The OpenStack trademark policy is available on the [OpenStack website](#).

Red Hat®, JBoss®, OpenShift®, Fedora®, Hibernate®, Ansible®, CloudForms®, RHCA®, RHCE®, RHCSA®, Ceph®, and Gluster® are trademarks or registered trademarks of Red Hat, Inc. or its subsidiaries in the United States and other countries.

RStudio®, the RStudio logo and Shiny® are registered trademarks of RStudio, Inc.

UNIX is a registered trademark of The Open Group in the United States and other countries.

VMware, the VMware logo, VMware Cloud Foundation, VMware Cloud Foundation Service, VMware vCenter Server, and VMware vSphere are registered trademarks or trademarks of VMware, Inc. or its subsidiaries in the United States and/or other jurisdictions.

Zowe™, the Zowe™ logo and the Open Mainframe Project™ are trademarks of The Linux Foundation.

Other product and service names might be trademarks of IBM or other companies.

Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

All client examples cited or described in this presentation are presented as illustrations of the manner in which some clients have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual client configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.

This information provides only general descriptions of the types and portions of workloads that are eligible for execution on Specialty Engines (e.g. zIIPs, zAAPs, and IFLs) ("SEs"). IBM authorizes clients to use IBM SE only to execute the processing of Eligible Workloads of specific Programs expressly authorized by IBM as specified in the "Authorized Use Table for IBM Machines" provided at www.ibm.com/systems/support/machine_warranties/machine_code/aut.html ("AUT"). No other workload processing is authorized for execution on an SE. IBM offers SE at a lower price than General Processors/Central Processors because clients are authorized to use SEs only to process certain types and/or amounts of workloads as specified by IBM in the AUT.