IBM Mainframe Ushers in New Era of Data Protection

-- Breakthrough: Pervasively encrypts data, all the time at any scale

-- Addresses global data breach epidemic; helps automate compliance for EU General Data Protection Regulation, Federal Reserve and other emerging regulations

-- Encrypts data 18x faster than compared x86 platforms, at 5 percent of the cost [1]

-- Announces six IBM Cloud Blockchain data centers with IBM Z as encryption engine

-- Delivers groundbreaking Container Pricing for new solutions, such as instant payments

ARMONK, New York, July 17, 2017 /PRNewswire/ -- IBM (NYSE: IBM) today unveiled IBM Z, the next generation of the world's most powerful transaction system, capable of running more than 12 billion encrypted transactions per day. The new system also introduces a breakthrough encryption engine that, for the first time, makes it possible to pervasively encrypt data associated with any application, cloud service or database all the time.

Experience the interactive Multichannel News Release here: https://www.multivu.com/players/English/8013251-ibm-z-mainframe-data-protection/

IBM Z's new data encryption capabilities are designed to address the global epidemic of data breaches, a major factor in the $8 trillion cybercrime impact on the global economy by 2022. Of the more than nine billion data records lost or stolen since 2013, only four percent were encrypted, making the vast majority of such data vulnerable to organized cybercrime rings, state actors and employees misusing access to sensitive information.

In the most significant re-positioning of mainframe technology in more than a decade, when the platform embraced Linux and open source software, IBM Z now dramatically expands the protective cryptographic umbrella of the world's most advanced encryption technology and key protection. The system's advanced cryptographic capability now extends across any data, networks, external devices or entire applications – such as the IBM Cloud Blockchain service – with no application changes and no impact on business service level agreements.

"The vast majority of stolen or leaked data today is in the open and easy to use because encryption has been very difficult and expensive to do at scale," said Ross Mauri, General Manager, IBM Z. "We created a data protection engine for the cloud era to have a significant and immediate impact on global data security."

Technology Breakthrough: Industry-First Pervasive Encryption for the Cloud Era

A recent study found that extensive use of encryption is a top factor in reducing the business impact and cost of a data breach. To put that in context, the IBM X-Force Threat Intelligence Index reported that more than four billion records were leaked in 2016 (a 556 percent increase from 2015).

However, encryption is often largely absent in corporate and cloud data centers because current solutions for data encryption in x86 environments can dramatically degrade performance (and thus user experience), and can be too complex and expensive to manage. As a result, only about two percent of corporate data is encrypted today, while more than 80 percent of mobile device data is encrypted [1].

IBM Z pervasive encryption reflects a call to action on data protection articulated by Chief Information Security Officers and data security experts worldwide, and more than 150 IBM clients around the world who participated and provided feedback in IBM Z's system design over three years.

As a result of this collaboration, IBM Z brings significant advances in cryptography technology, building on a proven encryption platform that safeguards the world's banking, healthcare, government and retail systems. IBM Z pervasive encryption delivers breakthroughs including:

- **Pervasive encryption of data – all the time.** IBM Z makes it possible, for the first time, for organizations to pervasively encrypt data associated with an entire application, cloud service or database in flight or at rest with one click. The standard practice today is to encrypt small chunks of data at a time, and invest significant labor to select and manage individual fields. This bulk encryption at cloud scale is made possible by a massive 7x increase in cryptographic performance over the previous generation z13 – driven by a 4x increase in silicon dedicated to cryptographic algorithms. This is 18x faster than compared x86 systems (that today only focus on limited slices of data) and at just five percent of the cost of compared x86-based solutions [1].
- **Tamper-responding encryption keys.** A top concern for organizations is protection of encryption keys. In large organizations, hackers often target encryption keys, which are routinely exposed in memory as they are used. Only IBM Z can protect millions of keys (as well as the process of accessing, generating and recycling them) in "tamper responding" hardware that causes keys to be invalidated at any sign of intrusion and can then be restored in safety. The IBM Z key management system is designed to meet Federal Information Processing Standards (FIPS) Level 4 standards, where the norm for high security in the industry is Level 2. This IBM Z capability can be extended beyond the mainframe to other devices, such as storage systems and servers in the cloud. In addition, IBM Secure Service Container protects against insider threats from contractors and privileged users, provides automatic encryption of data and code in-flight and at-rest, and tamper-resistance during installation and runtime.
- **Encrypted APIs.** IBM z/OS Connect technologies make it easy for cloud developers to discover and call any IBM Z application or data from a cloud service, or for IBM Z developers to call any cloud service. IBM Z now allows organizations to encrypt these APIs – the digital glue that links services, applications and systems – nearly 3x faster than alternatives based on compared x86 systems [2].

"The pervasive encryption that is built into, and is designed to extend beyond, the new IBM Z really makes this the first system with an all-encompassing solution to the security threats and breaches we've been witnessing in the past 24 months," said Peter Rutten, analyst at IDC's Servers and Compute Platforms Group.

Designed for Tough New Data Protection Regulations

The IBM Z also helps clients build trust with consumers and comply with new standards such as the EU's General Data Protection Regulation (GDPR) that will increase data protection requirements for organizations doing business in Europe starting next year. GDPR will require organizations to report data breaches to the regulatory authority within 72 hours and face fines of up to four percent of annual worldwide revenues or 20 million Euro, unless the organization can demonstrate that data was encrypted and the keys were protected. At the U.S. Federal level, the Federal Financial Institutions Examination Council (FFIEC), which includes the five banking regulators, provides guidance on the use of encryption in the financial services industry. Singapore and Hong Kong have published similar guidance. More recently, theNew York State Department of Financial Services published requirements regarding encryption in the Cybersecurity Requirements for Financial Services Companies.

IBM Z, deeply integrated with IBM Security software, automates and dramatically streamlines security and compliance processes. For example, auditors are expected to manually inspect and validate the security of databases, applications and systems. Organizations can now immediately demonstrate that data within the scope of compliance is protected and the keys are secure. This can significantly reduce the mounting complexity and cost of compliance for auditors. The system also provides an audit trail showing if and when permissioned insiders accessed data.

Creating the Most Secure Blockchain Service

As blockchain applications become increasingly integrated into core business processes, client's concerns are naturally shifting to security, encryption, and resiliency. The IBM Cloud is constantly evolving with industry leading compute options. Now it is

evolving again to bring IBM Z onto the IBM Cloud, launching initially as an encryption engine for cloud services and to run IBM Blockchain services to provide the highest commercially available levels of cryptographic hardware. New blockchain services in centers in Dallas, London, Frankfurt, Sao Paolo, Tokyo and Toronto are secured using IBM Z's industry-leading cryptography technology.

"The powerful combination of IBM Z encryption and secure containers differentiates IBM Blockchain services on the cloud by supporting the trust models new blockchain networks require," said Marie Wieck, general manager, IBM Blockchain. "Enterprise clients also benefit from the ease of use making management transparent to the application and the user."

AngelHack, in collaboration with IBM, today launched "Unchain the Frame," a global virtual hackathon with more than $50,000 USD in prizes. Developers from around the world are invited to show off their skills and creativity using technologies such as blockchain, open source applications, financial industry APIs and machine learning on IBM Z.

New: Predictable and Transparent Container Pricing
IBM also announced three groundbreaking new Container Pricing models for IBM Z, providing clients greatly simplified software pricing that combines flexible deployment with competitive economics vs. public clouds and on-premises x86 environments:

- **New microservices and applications** that enable clients to maximize the value from security-rich on-premises enterprise systems in real time. Clients can now co-locate applications to optimize qualities of services that are priced competitively with public cloud and on-premises platforms.
- **Application development and test** with the freedom to triple capacity of all development environments on z/OS to support latest DevOps tooling and processes. Clients can triple capacity with no increase in monthly license charge.
- **Payment systems** pricing based on the business metric of payments volume a bank processes, not the available capacity. This gives clients much greater flexibility to innovate affordably in a competitive environment, particularly in the fast-growing Instant Payment segment.

These precedent-setting Container Pricing options are designed to give clients the predictability and transparency they require for their business. The pricing models are scalable both within and across logical partitions (LPARs) and deliver greatly enhanced metering, capping and billing capabilities. Container Pricing for IBM Z is planned to be available by year-end 2017 and enabled in z/OS V2.2 and z/OS V2.3.

The Most Powerful Transaction System for the Cloud Era
IBM Z builds on the capabilities of the world's most powerful transaction engine at the center of global commerce today supporting:

- **87 percent** of all credit card transactions and nearly **$8 trillion** payments a year.
- **29 billion** ATM transactions each year, worth nearly **$5 billion** per day.
- **Four billion** passenger flights each year.
- More than **30 billion** transactions per day – more than the number of Google searches every day.
- **68 percent** of the world's production workloads at only **six percent** of the total IT cost.

Banks and others in the financial services industry process thousands of transactions per second to keep the world's financial systems running. The mainframe is more critical than ever for reliably handling high volumes of transaction data.

Ninety-two of the world's top 100 banks rely on the IBM mainframe because of its ability to efficiently process huge volumes of transactions. To help financial services organizations more effectively compete in the cloud era, enormous amounts of sensitive data produced by transactions can now be better protected against fraud and cybercrime, analyzed, and monetized using IBM Z – without causing disruption of day-to-day operations. For banks, this means encryption at the click of a button -- even while applications are running -- and the ability to migrate data from unencrypted to encrypted with no impact to service level agreements.

The IBM Z, the next generation of IBM's industry-leading CMOS mainframe technology, features the industry's fastest microprocessor, running at 5.2GHz, and a new scalable system structure that delivers up to a 35 percent capacity increase for traditional workloads and a up to a 35 percent capacity increase for Linux workloads compared to the previous generation z13. The system can support:

- More than **12 billion** encrypted transactions per day on a single system.
- The **world's largest** MongoDB instance with **2.5x faster** NodeJS performance than compared x86-based platforms.
- **Two million** Docker Containers.
- **1,000** concurrent NoSQL databases.

Other new available capabilities announced today include:

- **Three times the memory** of the z13 for faster response times, greater throughput and accelerated analytics performance. With 32TB of memory, IBM Z offers one of the largest memory footprints in the industry.
- **Three times faster I/O** and accelerated transaction processing compared to the z13 to drive growth in data, transaction throughput and lower response time.
- The ability to run Java workloads **50 percent faster** than x86 alternatives [3].
- Industry-leading Storage Area Network response time with zHyperLink, **delivering 10x latency reduction** compared to the z13 and cutting application response time in half – enabling businesses to do much more work such as real-time analytics or interact with Internet of Things (IoT) devices and cloud applications within the same transaction, without changing a single line of application code [4].

As part of today's announcement, IBM also previewed new z/OS software that provides foundational capabilities for private cloud service delivery, enabling a transformation from an IT cost center to a value-generating service provider. When available, these capabilities will include the support of workflow extensions for IBM Cloud Provisioning and Management for z/OS and real-time SMF analytics infrastructure support.

IBM Global Financing can help credit-qualified clients acquire the new IBM Z, lower their total cost of ownership, and accelerate return on investment. IBM Global Financing offerings for IBM mainframe solutions are available from IBM and IBM Business Partners, and provide flexible terms and conditions that can be customized to align cost to project benefits or other client needs.

Learn more about the IBM Z portfolio , the new IBM z14 mainframe or IBM Z enterprise security .

1. Source: "Pervasive Encryption: A New Paradigm for Protection," K. R. E. Lind, Chief Systems Engineer, Solitaire Interglobal Ltd., June 30, 2017.
2. Customers running WebSphere Liberty on z14 Linux on z using clear key encryption AES_128_GCM cipher can get up to 2.6X improvement in throughput per core with IBM Java 8 SR5 compared to x86. Performance results based on IBM internal tests running DayTrader 3 with WebSphere Liberty 8.5.5.9 using SSL clear key and TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 cipher. Liberty DayTrader 3 measurements were performed on a standalone dedicated LPAR on IBM z14 running SLES 12 SP1 with 4 IFLs configured with SMT for a total of 8 hardware threads. Liberty used IBM 64-bit SDK for z/OS, Java Technology Edition, Version 8 Service Refresh 5 (Java 8 SR5). The compared x86 DayTrader 3 on Liberty measurements were performed on a standalone WebSphere Liberty 8.5.5.9 server on Intel(R) Xeon(R) CPU E5-2690 v4 @ 2.60GHz, HyperThreading enabled, 4 cores/8 hardware threads, 97GB of memory, RHEL 7.2, and HugePages enabled. Liberty used OpenJDK 8_131. A second x86 system ran DB2 V10.1 used to persist application data. This second x86 system was an Intel(R) Xeon(R) CPU E7- 2830 @ 2.13GHz, No HyperThreading, CPUs: 8 physical cores and 8 logical cores, 16GB of memory, and RHEL 5.7. A third x86 system ran JMeter-2.12 to drive the DayTrader 3 workload. This third x86 system was an Intel(R) Xeon(R) CPU E5-2650 v2 @ 2.60GHz, HyperThreading enabled, CPUs: 16 physical cores & 32 logical cores, 197GB of memory, RHEL 7 GA x86-64. All network traffic was over 10GB Network.
3. Customers running WebSphere Liberty on z14 Linux on z without encryption can get up to 1.6X improvement in

throughput per core with IBM Java 8 SR5 compared to x86. Performance results based on IBM internal tests running DayTrader 3 with WebSphere Liberty 8.5.5.9 using SSL clear key and TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 cipher. Liberty DayTrader 3 measurements were performed on a standalone dedicated LPAR on IBM z14 running SLES 12 SP1 with 4 IFLs configured with SMT for a total of 8 hardware threads. Liberty used IBM 64-bit SDK for z/OS, Java Technology Edition, Version 8 Service Refresh 5 (Java 8 SR5). The compared x86 DayTrader 3 on Liberty measurements were performed on a standalone WebSphere Liberty 8.5.5.9 server on Intel(R) Xeon(R) CPU E5-2690 v4 @ 2.60GHz, HyperThreading enabled, 4 cores/8 hardware threads, 97GB of memory, RHEL 7.2, and HugePages enabled. Liberty used OpenJDK 8_131. A second x86 system ran DB2 V10.1 used to persist application data. This second x86 system was an Intel(R) Xeon(R) CPU E7- 2830 @ 2.13GHz, No HyperThreading, CPUs: 8 physical cores and 8 logical cores, 16GB of memory, and RHEL 5.7. A third x86 system ran JMeter-2.12 to drive the DayTrader 3 workload. This third x86 system was an Intel(R) Xeon(R) CPU E5-2650 v2 @ 2.60GHz, HyperThreading enabled, CPUs: 16 physical cores & 32 logical cores, 197GB of memory, RHEL 7 GA x86-64. All network traffic was over 10GB Network.

4. The 10x lower read latency projection was based on z14 and zHyperLink results with DS8886 and z13 measurements that provided results for I/O interrupt and dispatching. This response time projection was based on IBM internal measurements and projections that contrasted zHyperLink Express with a similar configuration using zHPF. The measurements and projections assume that assume 75% or more of the workload response time is associated with read DASD I/O and the storage system random read cache hit ratio is above 80%. The execution environment for both scenarios was a z14 with 10 CPs. The zHPF tests used FICON Express 16S+ connected to a DS8886. The zHyperLink tests were also conducted using DS8886. The actual performance that any user will experience may vary.

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