



VM Workshop 2021

Opening

Online around the World

Dianne Griffin, VM Workshop Chairperson



Welcome

“Thanks for inviting us (back) into your home, your office, your home-office.”

- Over 200 people registered
- From 19 Countries
- Over 100 Companies
- Hardware, Linux, z/VSE, and z/VM Content
- 2 Days
- 16 Technical Sessions



VM Workshop

Since 1977*

- Grassroots, non-profit organization
- Professional Volunteers and Proud Sponsors
- Committed to the sustainability of:
 - z/VM
 - Linux on IBM Z and LinuxONE
 - z/VSE
- Cost effective, efficient, fully functional
- Networking, education, and fun

* Except 1999 through 2010

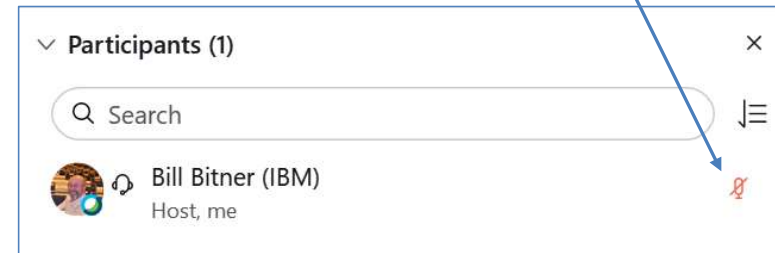
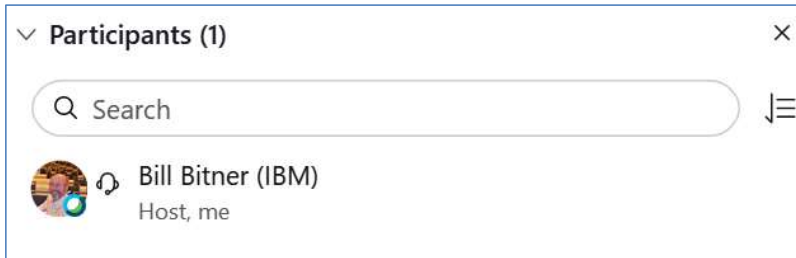


Webex Logistics

Mute is off.



Mute is on.

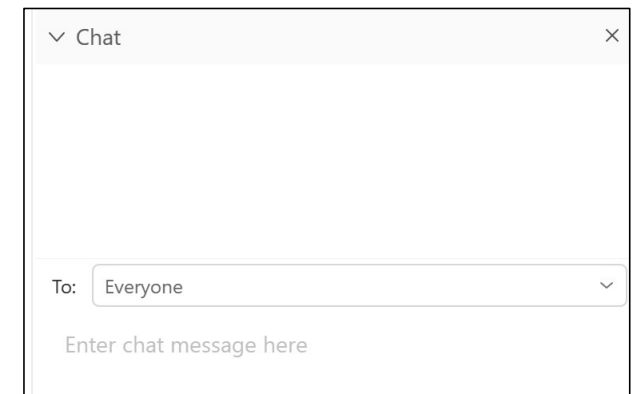
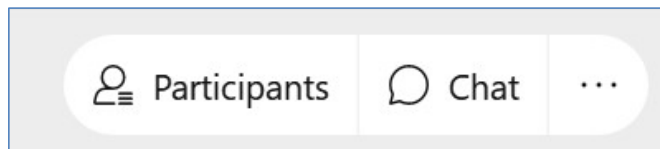


Please stay on mute if not asking a question or presenting.



Interact

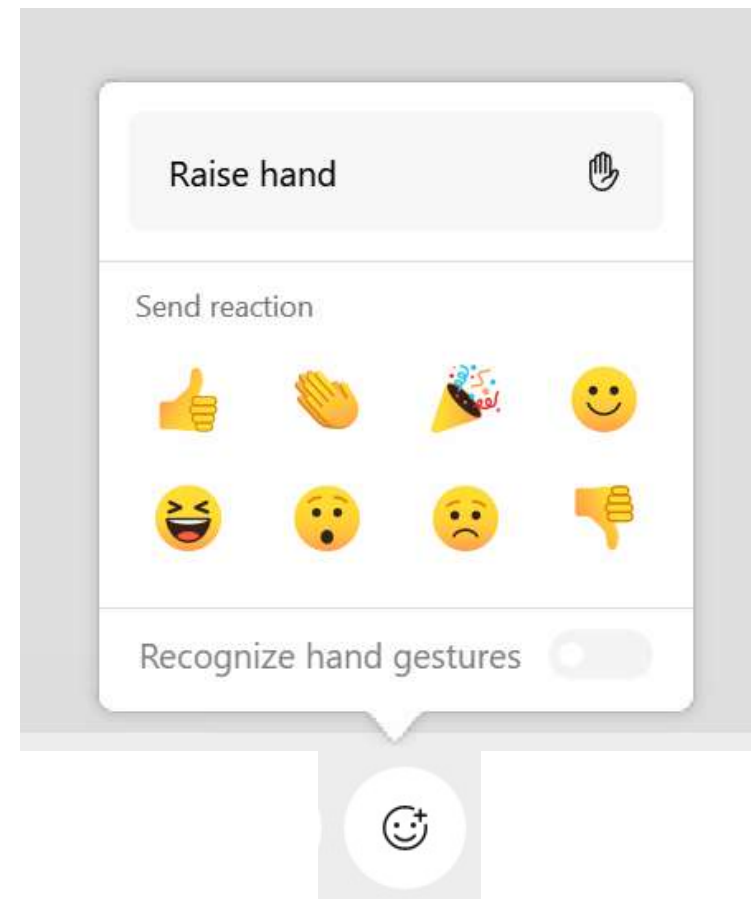
- Webex Chat function – bottom right of screen
 - Participants Icon – clicking brings up the list of participants
 - Chat Icon – clicking brings up window for chatting
 - Chat to “Everyone” or to individuals
 - Ask questions, chat during breaks, make a friend





Reactions

- Reaction allows you to send a temporary emoji or to raise/lower your hand
- Click the smiley face near bottom for menu





Your 2021 VM Workshop Committee

Bill Bitner	Gerard Howells	Bill Munson
Chip Davis	Brian Hugenbruch	Tony Noto
Len Diegel	Brian Jagos	Mike Riggs
Glen Doogle	Dave Jones	Len Santalucia
Marianne Eggett	Wilhelm Mild	Eric Schuler-Dalverny
Mike Giglio	Jim Moling	Marc Smith
Dianne Griffin	Chuck Morse	Rich Smrcina
Andy Hartman	Gonzalo Muelas Serrano	Kate Stringfield
		Phil Tully



**The VM Workshop
is possible because of the
support of our
Sponsors**

<http://www.vmworkshop.org/2021spon.shtml>



<http://velocitysoftware.com>



<http://www.broadcom.com>



<http://www.vicominfinity.com>



<http://www.bsitcip.com>



<http://www.ibm.com>



<http://www.opticatech.com>



<http://www.mainline.com>



<http://www.csi-international.com>



<http://www.sinenomine.net>



<http://www.log-on.com>

RECOVERYPOINT

<http://www.recoverypoint.com>



<http://www.enterprisesystemsmedia.com>

TechChannel

<http://www.techchannel.com>



Happy Hour

- At the end of each day
- Join in discussions in the chat or if you can behave, come off mute
- Glen Doogle may make an appearance





Presentations

- Charts will be posted by June 14th
 - <http://vmworkshop.org/2021pres.shtml>
- Recordings will be posted by June 21st
 - <https://ibm.biz/vmworkshopyoutube>
 - Two other bonus sessions that could not fit in the agenda will be included in those recordings:
 - z/VM Platform Update: VM Workshop Style
 - GDPS Update



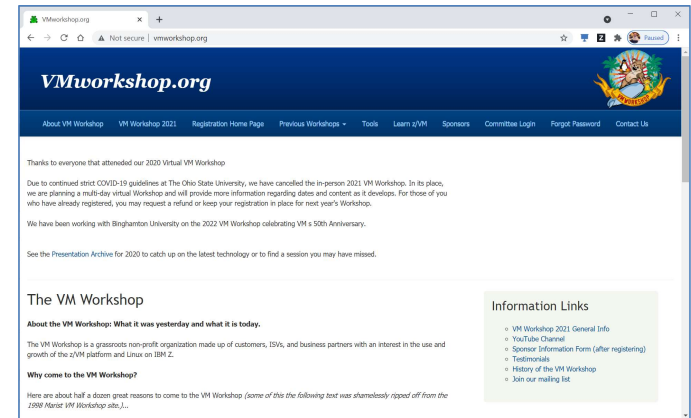
VM Workshop Web Site

- <http://vmworkshop.org>
— Past archives, tools, etc

Mike Poil's Presentations and Tools

Date	Title
27 May 2021	DFHSTAT_20210527.zip The enhanced version of DFHSTAT as described by my performance presentations. Please note that programs DFHSTAS and DFHVSAM are now called DFHSTAS and DFHVSAM, hence existing CSD PROGRAM definitions will need to be changed to use the new DFHSTAT phase.
13 May 2021	VSEMON_20210513.ZIP VSEMON is a z/VSE performance monitor that looks at cpu utilization and cpu delays at the z/VSE and Partition levels and has been used to help solve real customer z/VSE and CICS performance issues. It writes CSV format output at intervals of 1 second to 1 hour and can warn about excessive Partition cpu utilization.
06 May 2021	CME Enhancements.zip This ZIP file contains unofficial Usermod to enable additional wait times to be added to the CICS Monitoring Facility SMF 110 Task Performance record to reduce the amount of unexplained task wait/suspend time. The record structure is not changed and hence will not cause problems to existing user and Vendor code that reads them. However, the SZNWAIT (group DFHDFP) clock is now used to record the wait time for the three EXEC CICS WAIT commands that was not included in the record before these fixes. As usual, you use them at your own risk.
26 Apr 2021	EXCWAIT USERMOD.zip This is a Usermod to enable VSAM FCXWAIT Exclusive Control Wait time to be accounted for in the CICS task p shown as "EXCC".
08 Apr 2021	GSE Europe 2019 VSAM CICS TS for z/VSE Design and Best Practice.pdf This presentation looks at some of the CICS design, especially that of the CICS Dispatcher. It is an updated version of
23 Mar 2021	CICS TS for z/VSE Dispatcher Priority ZAP.pdf This MSHP ZAP is designed for customers who would like the CICS Dispatcher to prioritise the workload based solely at your own risk.
20 Mar 2021	z/VSE DMF Presentation A presentation about using DMF in z/VSE.
07 Mar 2021	Handling CICS TS for z/VSE Storage Violations.pdf This is the presentation for an accompanying video about Storage Violation debugging for CICS Transaction Server f The video is in two parts: Part 1 Part 2
03 Mar 2021	DFHVSADM SYNC DUMP BBH CICS TS VSE System Dump Serialisation Usermod This is a Usermod for phase DFHEVSADM, which produces all CICS System Dumps. VSE's dump routine is very slow, <i>more time into memory to dump</i> , so that the <i>more time into memory to dump</i> presentation <i>more time into memory to dump</i> with <i>more presentation to dump</i> <i>more time into memory to dump</i> that occurs on a different output (SO) to the one that is used for almost all transaction processing (QR), and often results in a problem with the internal trace data content because QR is adding trace data as the trace table is being dumped, with trace data required to solve an S0000, ahead of being overlaid. The file is a VSE Binary Job (BBH) that can be FTPed to the POWER RDR queue in Binary mode, and contains a LINKED step. By default, DFHEVSADM is linked into PRD2.CONFIG but a PAUSE is added to allow you to enter a different LIBDEF PHASE.CATALOG statement. Although the eye-etcher indicates that it was produced for CICS TS 1.1.1.1 (internal release 411), it can be used on any release. The fix was not "clean" enough to be considered as an APAR and a PTF - but it works!

- <http://www.vmworkshop.org/mikepoil/>
— Mike Poil's z/VSE CICS Page of Tools & Presentations





Z-V-M-G-O

VM Workshop style B-I-N-G-O

Get a standard card at:

<http://vmworkshop.org/zvmgo.shtml>

Or download the VMARC file to your z/VM system to build a random one

<http://vmworkshop.org/2021/present/zvmgo.vmarc>

Z	V	M	G	O
Turn it over to "someone"	Someone w/ a British accent	We're short on time	Wilhelm: Lets have a talk	YouTube
Can you see my screen?	Len, are there?	Dog barking in background	Someone w/ German accent	Zed Vee Emm
Rich, turn off your camera	Do you hear an echo?	**FREE**	Chip, was that you?	Brian, we hear you snoring
Could you repeat the question?	zLinux	We'll take questions	It Depends	OpenShift
LinuxONE	Let's wait a minute.	Binghamton University	Are you on Mute?	Glen Doogle



See you in person in 2022!



See you next year, June 15th to 18th
Binghamton, NY

2022 is also the 50th Anniversary of VM



Workshop Chair



- Dianne Griffin
 - Marriott Corporation
 - 2020 and 2021 Chair
 - First female chair in modern era
 - First chair in a pandemic
 - First chair to do 2 Webex Events
 - First chair to not use angry words
- Gerard Howells
 - America First Credit Union
 - 2022 Chair
 - First chair with a British accent and west of the Mississippi River
 - First chair that is as much a Linux person as a z/VM person
 - See 2020 session at:
<https://youtu.be/Ds4Z4jrCmNs>



Webex Meetings



Webex Meetings



VM Workshop Committee change - “Company-lift” for Gonzalo Muelas Serrano



*Product Manager for Virtualization
on IBM Z & LinuxONE*



*VP, z/VSE R+D,
Center Of Excellence Germany*



GonzaloM@21csw.com

[Learn more at 21csw.com](http://21csw.com)

IBM Z and LinuxONE

VM Workshop
June 2021

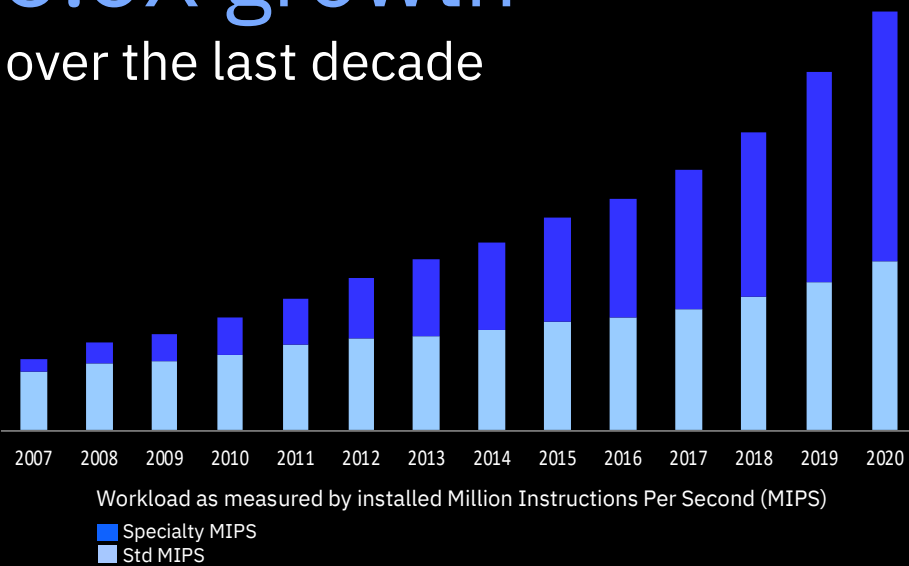
Kara Todd
Director of Linux, IBM Z and LinuxONE
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Marcel Mitran
Distinguished Engineer – CTO, IBM Z & LinuxONE
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mmitran@us.ibm.com



IBM Z: Increasing momentum in the era of cloud

3.5X growth
over the last decade



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 out of the top 10 telcos



18 of the top 20 countries by GDP*

Linux anniversary



20

Years of Linux on Z

5

Years of LinuxONE

1

Year of Red Hat OpenShift for IBM Z and LinuxONE



- 1999: IBM unveils Linux Software and Services for S/390 Server
- 2000: IBM announces plan to invest \$1B in developing and marketing Linux
- 2000: SUSE Linux S/390 Released
- 2001: Major ISVs available for Linux on Z including SAP and Oracle 9i
- 2002: IBM publishes collection of patches and additions to enable Linux* for System/390*
- 2003: Red Hat Enterprise Linux 3 becomes available
- 2004: Red Hat* to Deliver Linux Solutions for IBM's S/390 Mainframe Computer
- 2005: Biggest Linux on IBM eServer* zSeries* client now runs more than 290 IFLs
- 2006: 1,000 ISV applications available for Linux on Z
- 2007: Linux on Z is used for mission-critical applications by clients
- 2008: IBM Big Green Consolidation of 3900 x86 servers to 30 Linux on Z
- 2009: Security and performance improvements with IBM System z10*
- 2010: IBM Enterprise Linux Server, based on IBM Z*
- 2011: 400 IBM software products now available for Linux on Z
- 2012: IBM celebrates 100 years of innovation – including support for Linux
- 2013: IBM Systems™ Magazine special edition about Linux on Z
- 2014: 3,000 ISV applications available for Linux on Z
- 2015: IBM Launches LinuxONE
- 2015: Open Mainframe Project launched by Linux Foundation
- 2015: MongoDB announces support for IBM z Systems*
- 2015: IBM Blockchain for Linux on Z and LinuxONE
- 2016: KVM available for Linux on Z
- 2016: OpenStack available for Linux on Z
- 2016: Ubuntu 16.04 LTS for IBM LinuxONE and IBM z Systems is now available
- 2017: IBM Cloud Private brings containers and Kubernetes to Linux on Z and LinuxONE
- 2018: IBM Cloud™ Hyper Protect Services launched, built on LinuxONE
- 2018: IBM Hyper Protect Accelerator startup program launched
- 2019: IBM and Red Hat join forces to advance hybrid cloud
- 2019: IBM and Red Hat commit to bring OpenShift* to Z & LinuxONE
- 2019: IBM launches new IBM z15™ & LinuxONE III™ servers
- 2020: Red Hat OpenShift available on Linux on Z and LinuxONE
- 2020: Red Hat Runtimes and IBM Cloud Pak for Applications 4.2 available on Linux on Z and LinuxONE
- 2020: Biggest Linux on Z client now runs more than 3,000 IFLs
- 2020: IBM advances IBM Cloud for Financial Services

20

Years of Linux on Z

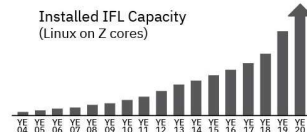
5

Years of LinuxONE

1

Year of Red Hat OpenShift for IBM Z and LinuxONE

IBM Z: An Open Platform



52% of IBM Z enterprises have Linux



IBM and Red Hat join forces to advance hybrid cloud

- IBM and Red Hat commit to bring OpenShift* to Z & LinuxONE
- IBM launches new IBM z15™ & LinuxONE III™ servers
- IBM Cloud™ Hyper Protect Services launched, built on LinuxONE
- IBM Hyper Protect Accelerator startup program launched

Continuing the momentum in 2021

LinuxONE III Express

GA:
May 25th

LinuxONE III Express simplifies getting started with LinuxONE by providing a pre-configured server with a set numbers of cores, memory, networking cards and other features

Starting at \$135K, the single configuration LinuxONE III Express runs your enterprise data for less cost than when running on compared mid-market x86 servers



OpenShift Try & Buy

New deals
starting in 2Q

Everything needed to run OpenShift for **90 days**:

1 to 6 IFL cores loaned *via microcode*

Activation of memory that is already installed on the machine

OpenShift 4.5 or newer

IBM Cloud Infrastructure Center

z/VM* 7.2 + key features

Simplicity

Flexibility

Price

Route

Velocity

The new normal is **hybrid and open**

7.9

clouds are being used by an enterprise
(on average) (IBV)

92%

of customers have both public and private
cloud environments installed (IDC)

IBM Z[®]

fully integrated into a hybrid cloud infrastructure

IBM Z Hardware Platform Strategy

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

Acceleration and new capabilities for existing and new workloads via unique features and functions: security, AI, clustering, I/O, etc.

Optimization across the entire stack: from processor and system design, to compilers, virtualization, Operating System and Middleware development.

Continuous performance improvements for workload growth via increased drawer capacity and per-processor speed.

Industry leading resiliency (99.99999%) via constant advances in Reliability, Availability and Serviceability.

Zero to minimal application changes required!

IBM Hybrid Cloud and AI Solutions

IBM services



System integrator
partners

IBM software

IBM Cloud Paks



Software and
SaaS partners

Red Hat hybrid cloud platform



IBM Cloud



Public Clouds

AWS • Azure • Others



IBM Systems

Z • Power • Storage



Enterprise
Infrastructure

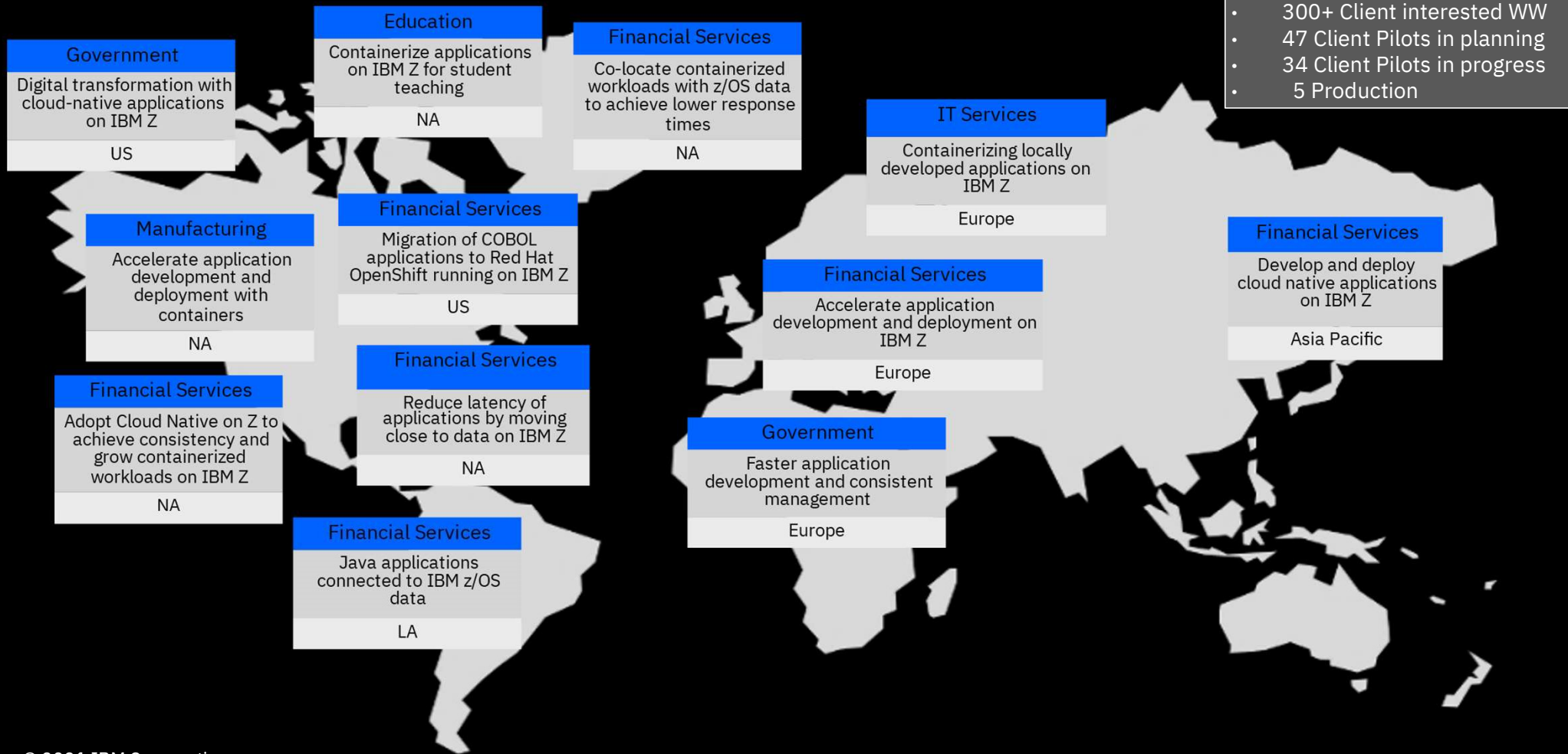


Edge



A hybrid cloud transformation that integrates IBM Z
can drive **2.5X the value** of a public-only approach

Proof-of-Concept Momentum for Red Hat OpenShift and IBM Cloud Paks on LinuxONE



OpenShift & CloudPaks with IBM Z & LinuxONE

Benefits on Z

Low Latency and Large Volume **Data Serving** and **Transaction processing**

Enterprise class infrastructure – **Elastic, Scalable, Available and Resilient**

Highest levels of **Security and Compliance**



Adoption Patterns

Enterprise scale **Private Cloud-in-a-Box**
2.4M containers-per-box

Digital Transformation and Modernization for z/OS
7x shorter batch windows
5x better transaction response times

Extreme Consolidation and scalable Data Serving
75% lower Op-Ex

99.99999%
system availability

4:1 better data-center footprint **2:1**
lower power envelope

3.8x better Java throughput,
24x faster Java Garbage Collection

Enterprise grade. Open by design. **Secured** by IBM Z.

Example : Large NA FSS Company

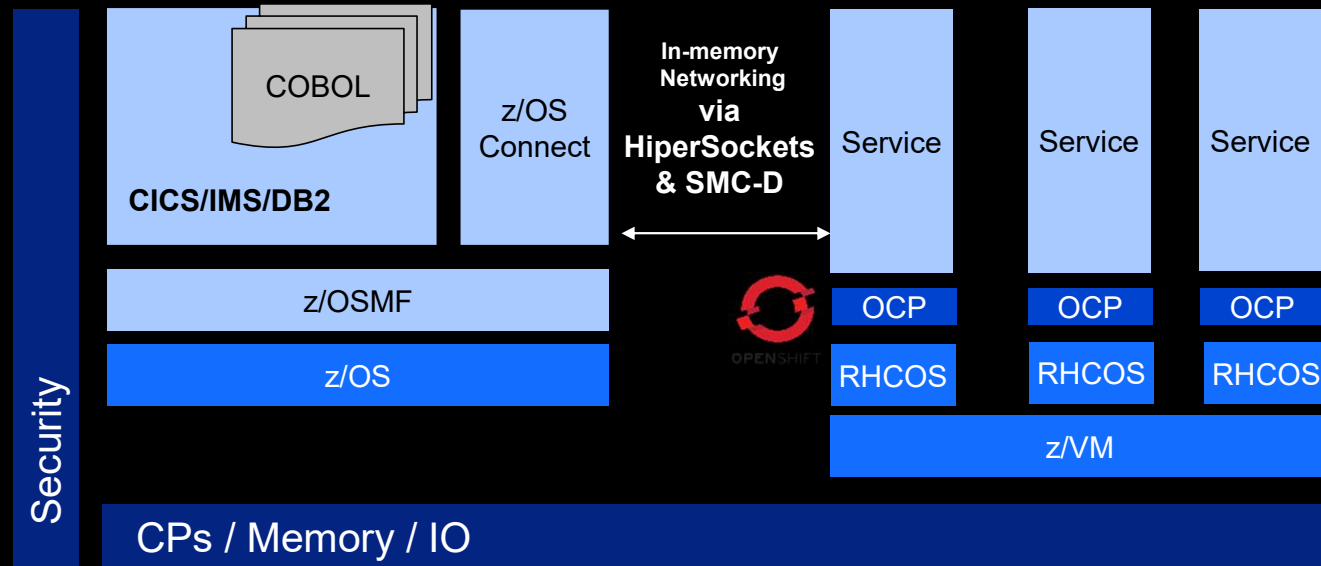
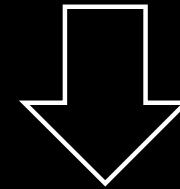
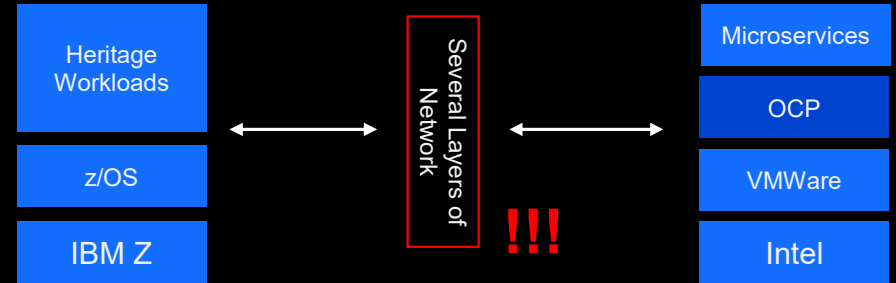
Accelerate enterprise digital transformation

- Containerized services running in Linux on Z are co-located on the same hardware with z/OS Db2 data and CICS for low latency, high volume transaction processing
- **Achieve up to 7.3x lower latency co-locating applications on Z compared to connecting to an x86 server**

Modernize and digitally transform

- Modernize and extend mission-critical legacy assets incrementally while maintaining enterprise SLAs and keeping risk and cost low

From

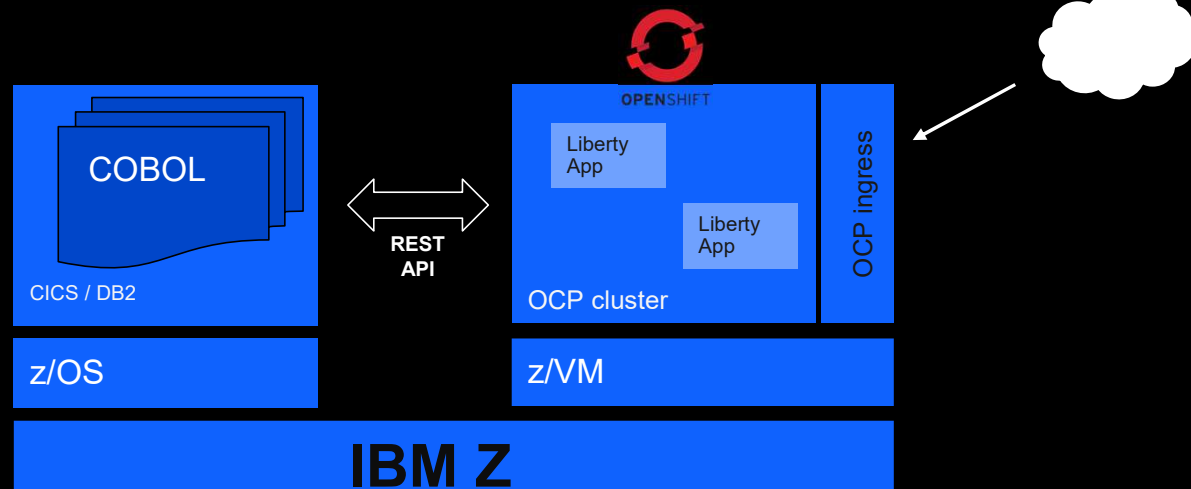


Example : Large Credit Bureau in Latin America

Accelerate Enterprise Digital Transformation

Customer driving digital transformation to a cloud and microservices world and needs reliability, security and performance, as well as an integrated and standard platform that allows software transformation and migration in an agile, flexible and easy way

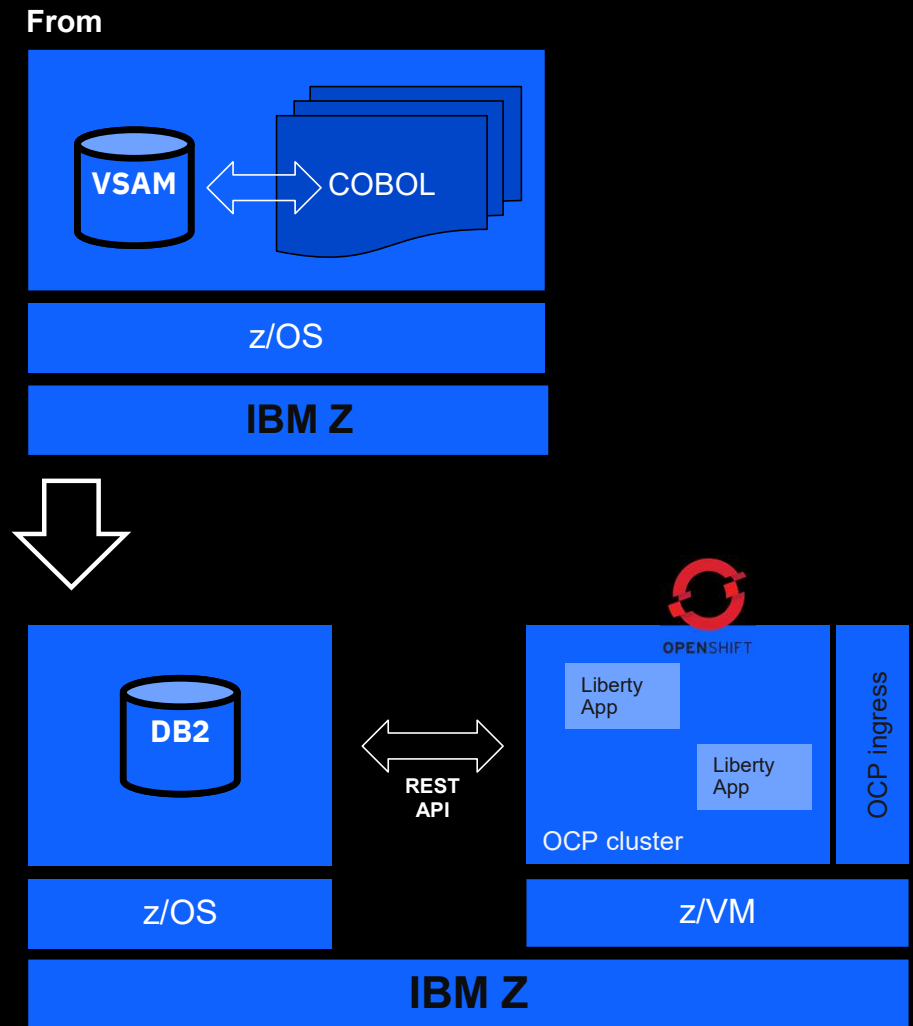
- *CI/CD Pipeline Integration With OpenShift on Z*
- *Application Portability*
 - *WebSphere (x86) to Liberty (s390x)*
- *Better Scalability With OpenShift On Z*
- *From 1500 Queries/Min to 650,000 Queries/Min*
 - *43X improvement*



Example: Large FSS client (NA)

Customer wanted **COBOL → Java modernization** to improve their developer velocity and time to market as well as VSAM → DB2 z/OS migration to improve data integration and **simplify their data model** while ensuring they meet SLAs.

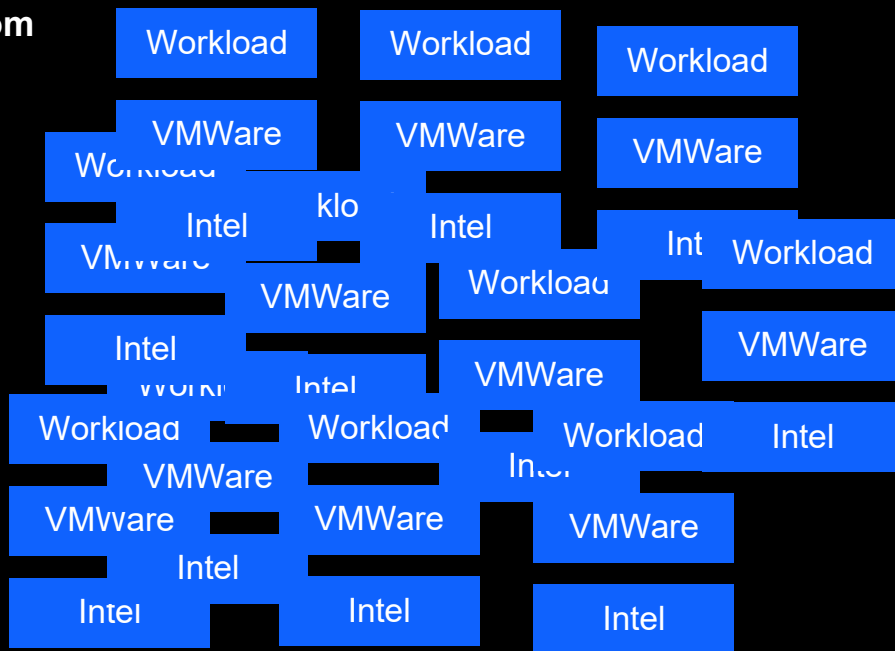
The Java (Liberty) microservices had **3x higher throughput per node** running on OpenShift on Z vs Intel.



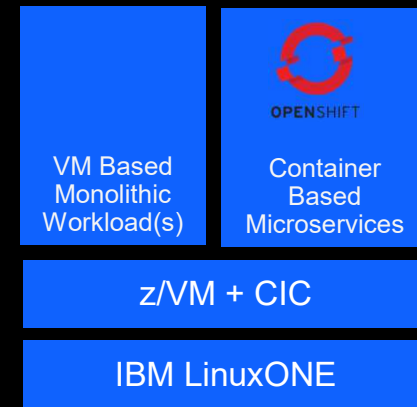
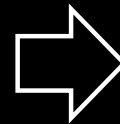
Example: Large FSS Client (NA)

Customer wanted to **consolidate** 1000's of Intel cores worth of workload to **reduce OpEx and datacenter sprawl**. With IBM LinuxONE, the client consolidated and workloads and saw a large TCO reduction. Other customers have seen up-to a 22:1 consolidation.

From



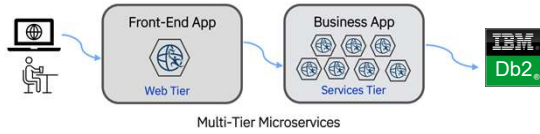
1000s of servers



Multi-tier Java microservices running in OpenShift on IBM LinuxONE III LT2 deliver 4x better per core performance and cost 34% less than x86

When driving throughput based on an SLA, which platform delivers the best performance and lower cost?

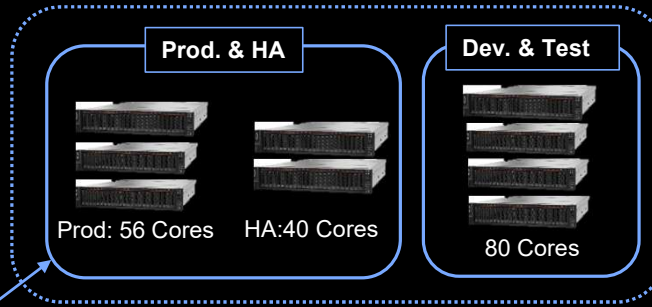
OpenShift multi-tier banking workload



SLA: 236 ms
Response Time @ 95%
Percentile

Cost analysis assumptions:

- For a new LinuxONE III LT2 system with 17 IFLs to run OpenShift on Linux
- Includes high availability, development & test environments on both x86 and LinuxONE III LT2
- VMWare ESXi virtualization used on x86 and z/VM used on LinuxONE III LT2
- High Availability is included both x86 and LinuxONE cases



Total 176 cores (56+40+80)
 across 9 new x86 servers



Prod. & HA: 14 IFLs
 Dev & Test: 3 IFLs

\$2,054,786
 (3-year TCO)

RPS per core meeting SLA: 281
 Cost per request meeting SLA: \$129
 Year 2 and Year 3 OPEX: \$507,407

34% Lower
 TCO

\$1,363,069
 (3-year TCO)

RPS per core meeting SLA: 1122
 Cost per request meeting SLA: \$100
 Year 2 and Year 3 OPEX: \$125,131

4x Better Throughput
 per Core

75% Lower
 OPEX

Disclaimer: This is an IBM internal study designed to replicate multi-tier banking OLTP workload usage in the marketplace on an IBM LinuxONE III LT2 using 14.4.7 GHz IFLs across three LPARs. Seven IFLs and a total of 320 GB memory were allocated to one LPAR for two OpenShift masters and two worker nodes. Another six IFLs and a total of 320 GB memory were allocated to a second LPAR for one OpenShift master and two workers. One IFL and a total of 128 GB memory were allocated to a third LPAR for the OpenShift load balancer. IBM Storage DS8886 was used to create four 100 GB minidisks for four z/VM guest and four 250 GB DASD minidisks for another 4 z/VM guests running in the LPARs. The OpenShift cluster version 4.5.5, using Red Hat Enterprise Linux CoreOS (RHCOs) for IBM LinuxONE, was running across seven z/VM guests and the remaining eighth z/VM guest was running the OpenShift load balancer. SMT was enabled across all IFLs. The x86 configuration was comprised of two servers running VMWare ESXi 6.7 with 7 guests (three masters and four workers) for the OpenShift cluster version 4.5.6 with RHCOs and a third server for the load balancer on RHEL 8. For x86 storage each guest operating system was configured with a 120 GB of virtual disk. Each guest had access to all vCPUs of the physical server on which it was running. Compared x86 models for the cluster were all 2-socket servers containing a mix of 8-core Sandy Bridge, 12-core Haswell, 8-core Skylake x86 processors using a total of 56 cores with a total of 1280 GB memory. The load balancer was a 2-socket 8-core Sandy Bridge server with a total of 384 GB memory. Both environments used JMeter to drive maximum throughput against four OLTP workload instances and were sized to deliver maximum throughput of 15,786 responses per second (RPS) with IBM LinuxONE III LT2 and 15,744 RPS with x86 at a service level agreement response time of 236 milliseconds. The results were obtained under laboratory conditions, not in an actual customer environment. IBM's internal workload studies are not benchmark applications. Prices, where applicable, are based on U.S. prices as of 09/20/2020 from our website and x86 hardware pricing is based on IBM analysis of U.S. prices as of 09/20/2020 from IDC. Price comparison is based on a three-year total cost of ownership including HW, SW, networking, floor space, people, energy/cooling costs and three years of service & support for production and non-production (devtest and high availability) environments.

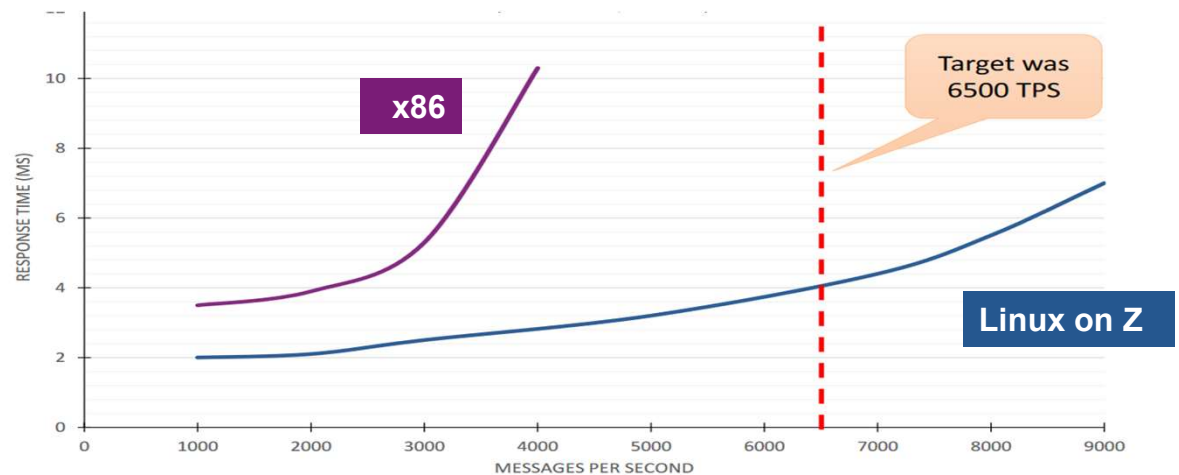


With over 7,000 properties and a new hotel opening every 14 hours, Marriott is the leading hospitality provider in the world today. Marriott turned to MongoDB to assist with sprawling reservation shopping demand. By using MongoDB in conjunction with Linux on Z, Marriott architected a reservation shopping platform that will allow for future scale and quicker time to market for new capabilities. Marriott also plans to use MongoDB for placing data geographically close to users for better performance and to meet the needs of GDPR.

© 2021 IBM Corporation

2019 MongoDB Innovation Awards Winners

4 Core PoC A Cloud Service (ACS) x86 vs. Linux on Z

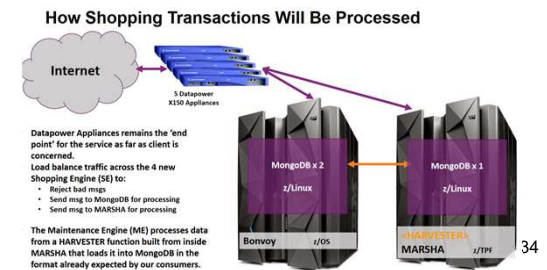


1 MongoDB instance on Z can handle our required load creating easy failover for HA

**Linux on Z was ~40% faster
Linux on Z provided ~66% more TPS,
bound by 1Gb OSA card not CPU**

**Linux on Z degraded gracefully (no errors)
ACS streamed errors at 3000 TPS**

http://www.tpflug.org/pdf/2019/2019_MongoDB_for_Marriott.pdf



Nowy Styl

<https://www.ibm.com/case-studies/nowy-styl-global-alliance-financing>

Smart system consolidation — accelerating performance with style

Nowy Styl consolidated its Oracle® Database workload and IFS ERP on the IBM® LinuxONE platform, increasing business-critical processing speeds by an average of 450% and adding layers of security and flexibility. Working with IBM Business Partner UpWare, Nowy Styl improved Oracle Database performance with IBM FlashSystem® 5100 storage and used IBM Global Financing to accelerate deployment.

- A shop material planning report that used to take 187 minutes to process is now completed in 60 minutes — a 68% shorter time.
- A key process replication report that used to take 62 minutes to prepare is now completed in 16 minutes — a 74% shorter time.
- A key production scheduling planning report that used to require 111 minutes to prepare is now available in 24 minutes — a 78% shorter time.

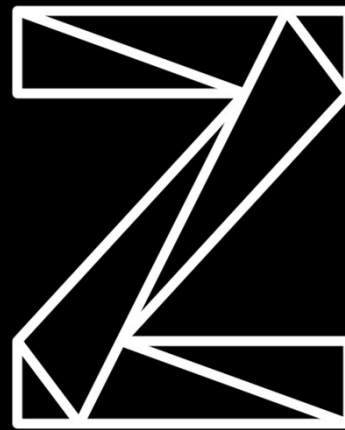
IBM Z: designed for the future of digital business

Confidential Computing

Designed with the world top banks to meet the most rigorous security, data protection and privacy requirements

Always on resiliency

The only platform with 7X9s availability and self learning based on AI to pro-actively avoid future failures



Targeted performance

Powerful high performance processors augmented by workload accelerators for massive transaction throughput

Accelerated agility

The best platform for modernizing core applications as part of your business transformation

Thank you!