The Cheryl and Frank Zroadshow

Sacramento 2018
Session 21802

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Welcome

- Thank you for attending this session – we hope to give you lots of valuable tips and ideas to bring home.
- Who are we?
  - Watson & Walker Inc established 1986; Cheryl has been working on IBM mainframes since 1965. Frank joined Watson & Walker on the first day of the Winter 2014 SHARE. And Mario Bezzi (the 'new boy') joined us on the first day of the Winter 2018 SHARE!
  - Publish Cheryl Watson's Tuning Letter (since 1991).
    - Now available to subscribers online at www.watsonwalkerpublications.com
  - We also teach classes, consult, have 2 software products, and the SCRTPro Service Offering
  - z/OS evangelists, Subject Matter Experts in Software pricing, Parallel Sysplex, and Workload Manager. That's Cheryl – I'm "the guy that works for Cheryl…."
- If you have questions, please ask as we go along.

Agenda

- SMF
- z14 Tips and Experiences
- Pervasive Encryption
- Sub-capacity software pricing and SCRT support for ISVs.
- Container Pricing – IBM's latest pricing option
- Cloud Pricing – is it *really* that simple??
- JES2/SMF and VSAM tidbits
- COBOL
- JES2
- z/OS Platform Install Strategy
- z/OS Migration
- z/OSMF
- THE MOST IMPORTANT ANNOUNCEMENT….

John Ehrman Award

- Anyone that ever attended the SHARE Assembler bootcamps will remember John Ehrman and his love for the language and for passing his passion on to the next generation. Sadly, John passed away on Feb 20. To honor his memory and his love of teaching, SHARE created the *John R. Ehrman Award for Sustained Excellence in Technical Education*.

- John's Assembler textbook is available at http://idcp.marist.edu/enterprisesystemseducation/assemblerlanguageresources-1.html

- For more information about John, refer to https://groups.google.com/forum/#!msg/mainframe-assembler/FvKYmNh-N4M/yPcRhMr3AQAJ

John Ehrman Award

- The first two recipients of the award were Rob Rannie and our own Cheryl Watson:

Someone said that Cheryl is the shortest giant he ever met – is this what he meant?

SMF – Could there be a more appropriate venue??

z14 Tips and Early Experiences

- The z14 was announced on July 17, 2017.
  - Rumor has it that if you ask nicely, IBM *might* be willing to sell you one.
- If you are or will be considering purchasing one or more z14s:
  - Make sure that you use zPCR to help you identify the best fit. See **John Burg's** zPCR Lab Session 22194.
  - See **Scott Chapman's** *Planning For Your Next Mainframe Processor* Session 22071.
  - Use **Alain Maneville's** LPAR Design tool, as described in Tuning Letter 2017 No. 4.
    - Remember that weights are (generally) NOT the same as caps, but they DO influence your HD topology (VHs, VMs, and VLs).
- As shown in **David Hutton's** *The Hitchhiker's Guide to MIPS and Capacity Planning*, Session 22230, the z14 is more amenable to High RNI workloads than the z13 was.
  - See **Todd Havekost's** excellent *Optimizing Processor Cache on z13 & z14 Processors*, Session 21820 for a comparison of z13 to z14 in two customer situations.
- Thus far, we have not heard, or heard of, a single z14 performance complaint.

z14 Tips

- When you run zPCR, make sure that you always download the latest level of CP3KEXTR **and include the type 113 SMF records**.
- The following JCL illustrates how to create the EDFs for multiple systems in a single run:

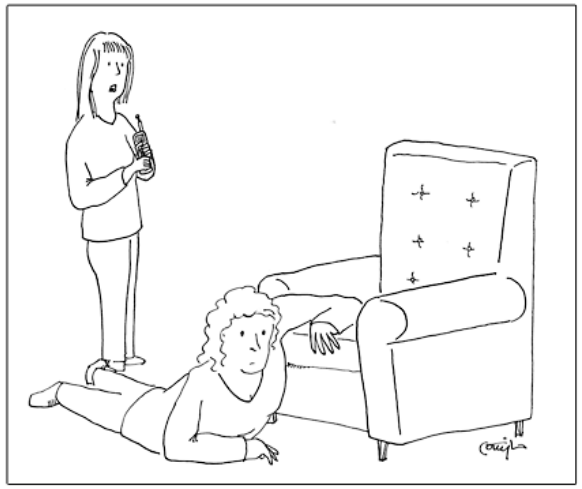
```
//EXTR     EXEC PGM=LOADER
//SYSLIN   DD   DISP=SHR,DSN=YOUR.CPSTOOLS.JCL(ZOBJEXTR)
//SYSOUT   DD   DUMMY,SYSOUT=*
//SYSLOUT  DD   DUMMY,SYSOUT=*
//SMFIN    DD   DISP=SHR,DSN=YOUR.SMF.INPUT.FILE
//EDF001   DD   DISP=SHR,DSN=YOUR.EDFI.OUTPUT.FB80(SYSA)
//PRINT001 DD   SYSOUT=*
//EDF002   DD   DISP=SHR,DSN=YOUR.EDFI.OUTPUT.FB80(SYSB)
//PRINT002 DD   SYSOUT=*
//SYSIN001  DD  *
ENT='CUSTOMER DATA'      YOUR COMPANY NAME (REQUIRED)
SYSID=SYSA               SMF SYSID  (REQUIRED)
DURATION=01:00           DURATION MUST BE A MULTIPLE OF RMF INTERVAL
SORT=YES                 IF SMF RECORDS ARE NOT IN SORTED ORDER
/*
//SYSIN002  DD  *
ENT='CUSTOMER DATA'      YOUR COMPANY NAME (REQUIRED)
SYSID=SYSB               SMF SYSID  (REQUIRED)
DURATION=01:00           DURATION MUST BE A MULTIPLE OF RMF INTERVAL
SORT=YES                 IF SMF RECORDS ARE NOT IN SORTED ORDER
```

Did I mention that you should capture AND KEEP your SMF 113 records?

Encryption

- You probably didn't notice, but IBM also had a low-key announcement for a new set of capabilities called Pervasive Encryption.
- Why you should care – because prison or HUGE fines are Not Nice Things.
  - AND because your Executives probably care.
- You have a few things to consider:
  - Performance/overhead.
    - IBM measurements show average overhead of 11.6% on z13 vs 2.6% on z14. Naturally, YMMV.
    - SMF 42.6 records have been enhanced (OA52132, OA52133, OA54663) to allow zBNA (1.8.1) to provide very accurate data set-level predictions (called 'projection support').
    - Data is decrypted/encrypted when it moves in or out of z/OS. So I/O-intensive workloads experience higher-than-average overhead. Seems like this would be an ideal application of the benefits of large memory. However, IBM have not performed any measurements yet to determine whether this is the case, or to what extent.

Encyrption



It's Google. They say you left your keys in the left-hand pocket of your other pants.

- Few things to consider ….
  - Key management
    - This is a critical topic, especially if you would like to be able to access your data x years in the future.
    - For more information, see **Ceci Lewis'** *Protect Your Data at Rest with z/OS Data Set Encryption,* Session 22521.
  - Start getting ready NOW.
    - PDSs are not and will not be supported by encryption.
    - Non-Extended Format sequential and VSAM data sets are not supported.
    - Don't wait until your CIO asks you to "flip the Pervasive Encryption switch". At a minimum, stop the challenge from getting even worse by switching *new* allocations to use PDSEs and EF sequential and VSAM data sets NOW (also required for zEDC).
    - Enable CPU MF Crypto counters on HMC and F HIS command
    - For an up-to-date list of unsupported data set types, see ???

- For a guide for those of us that *don't* have super computer brains, see draft Redbook *Getting Started with z/OS Data Set Encryption*, SG24-8410.
- If you would like a very simple, basic, set of JCL to allocate encrypted data sets, send me an email.

Sub-capacity software pricing

- One of the presenters during the week said that his company spends more on software upgrade fees than they do on the hardware when they upgrade their CPCs.
- Software licenses based on full capacity make no sense.
  - Nearly all vendors that we are aware of will agree to charging for software on a sub-capacity basis (like z/OS) either voluntarily, or if pressed.
  - But the time to negotiate this is NOT on the last day of the quarter, when you are just about to sign for the CPC upgrade. Start these discussions *now*. If the vendor refuses to be flexible, that gives you time to migrate to an alternative product/vendor before your next CPC upgrade.
- To make the administration of such agreements easier, IBM added support to SCRT in 2017 to let ISVs use SCRT, and to let you create SCRT reports showing only that vendor's products.
- If you would like this capability, **Tell Your Vendors <u>Now</u>**. It will take them time to develop the code and the infrastructure, so you need to give them a reasonable lead time.

Container Pricing

- In July 2017, IBM previewed *two* things:
  - A set of infrastructure enhancements that make WLM the hub for associating workloads with pricing options, and to cascade that association through z/OS, into SCRT, and on to IBM.
  - Workloads can run in dedicated LPARs, or collocated with other workloads – your choice.
  - Identification of workloads is currently at the address space or enclave level.
  - WLM tracks CPU consumption of each 'container'.
    - Container is a logical construct that contains all work associated with that pricing option. It has NOTHING to do with Docker Containers, Secure Service Containers, etc.
    - The Container is used to track CPU consumption and can be used to cap the workload.
  - R4HA MSUs for each container are available using new fields in SMF Type 70 records.
  - SCRT subtracts container R4HA MSUs from 'real' R4HA MSUs.
    - Note that the MSUs reported in RMF PP Workload Activity report are 'real' MSUs, **not** R4HA MSUs. To get R4HA MSUs for the container, you must use the RMF Overview report. See page 51 of *RMF – The Latest and Greatest* by **Peter Muench**.
  - Overall effect should be roughly as if the container work was moved to another environment.

Container Pricing

- The other thing was a set of three new pricing options that exploit this new infrastructure:
  - A Test/Dev option. We believe that this will be of interest to the largest set of customers of the three currently-announced offerings.
    - For more information about how this works, see Slides 11 and 12 of **Andrew Sica's** *Container Pricing for IBM Z and Sub-Capacity Reporting*, Session 22548.
  - A New Application Solution option. ONLY for new applications. z/OS price is 50% of zNALC price, but all subsystems must be licensed on IPLA basis.
  - Payments Solution. Based on IBM Financial Transaction Manager, the monthly charge is based on number of payments processed, not the MSUs consumed.
- In all cases, you pay for the workload as if it was in a self-contained environment – that is, regardless of whether the work runs in the peak hour or in the R4HA 'white space', you must pay for it (**think CLOUD**).
  - This means that, while attractive in some situations, it is NOT a no-brainer.

Cloud Pricing

SHARE
EDUCATE • NETWORK • INFLUENCE

- We *LOVE* the cloud…

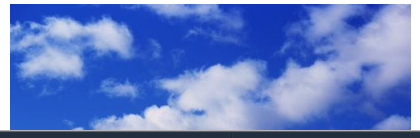
- After all, the first cloud ran z/OS' great-great-grandfather! (If only IBM had called it 'cloud' back then….)
- *Other* people LOVE the cloud too….

aws

Google Cloud Platform

Microsoft Azure

- Cloud computing is projected to increase from $67B in 2015 to $162B in 2020 attaining a compound annual growth rate (CAGR) of 19%.
- Gartner predicts the worldwide public cloud services market will grow 18% in 2017 to $246.8B, up from $209.2B in 2016.
- 74% of Tech Chief Financial Officers (CFOs) say cloud computing will have the most measurable impact on their business in 2017.



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Cloud I

Amazon Web

Compute
- Amazon EC2
- Amazon EC2 Auto Scaling

Networking & Content Delivery
- Amazon VPC
- Amazon CloudFront

Developer Tools
- AWS CodeStar
- AWS CodeCommit
- AWS CodeBuild

- AWS Elastic Beanstalk
- AWS Fargate
- AWS Lambda

- Amazon Simple Storage Service (S3)
- Amazon Elastic Block Storage (EBS)
- Amazon Elastic File System (EFS)
- Amazon Glacier
- AWS Storage Gateway
- AWS Snowball
- AWS Snowball Edge
- AWS Snowmobile

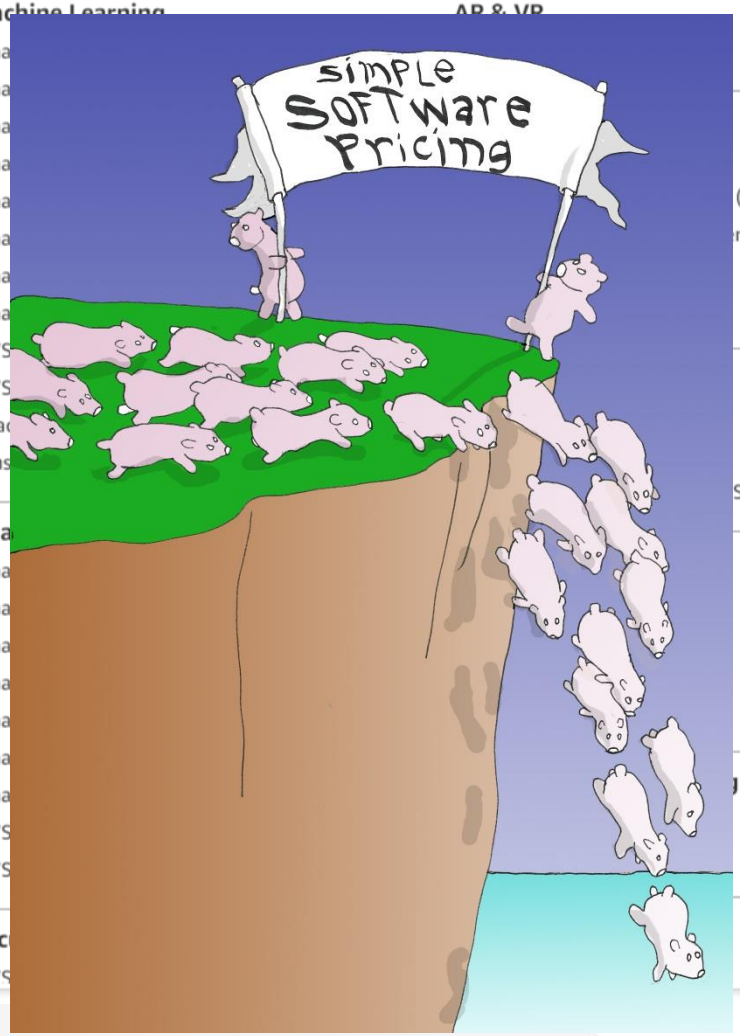
Management Tools
- Amazon CloudWatch
- AWS Auto Scaling
- AWS CloudFormation
- AWS CloudTrail
- AWS Config
- AWS OpsWorks
- AWS Service Catalog
- AWS Systems Manager

Database

https://aws.amazon.com/products/?nc2=h_ql_p&awsm=ql-1

AND, you get to select from this list of chargeable products and services for *each* and every one of your applications!! Is that great or what??!!

I wonder how well all of these Amazon products run when I want to move all my Cloud workload to Google because they have a Black Friday special?

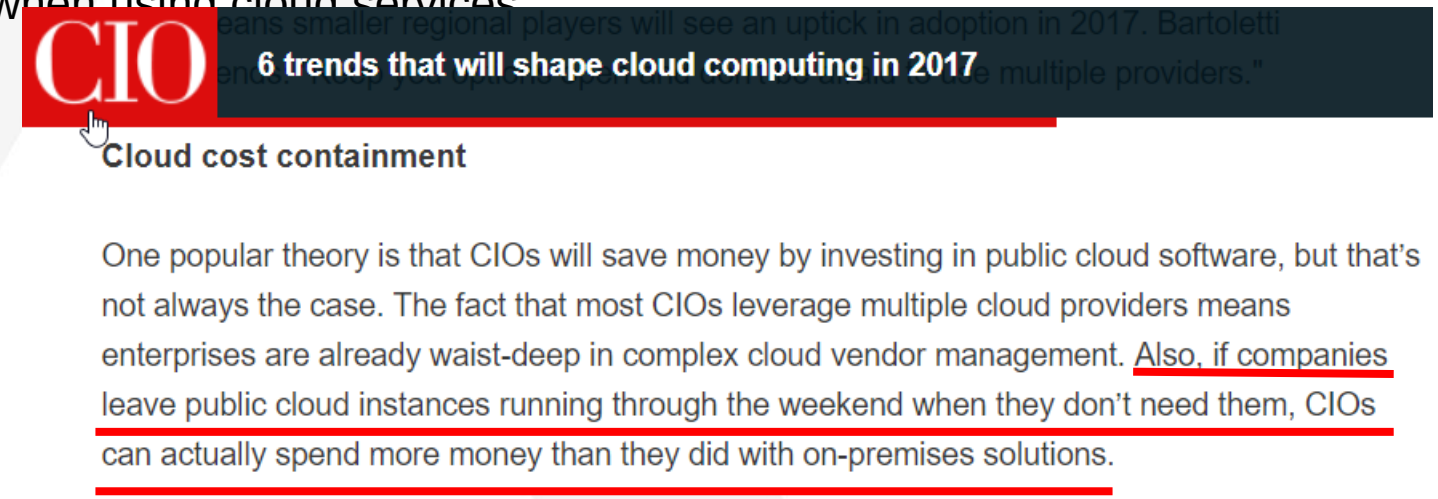


Cloud Pricing

The cloud is ~~SIMPLE~~ CHEAP!

A *small* sampling of the things you get to *pay* for when using cloud services:

- Committed capacity.
- Additional capacity.
- Additional capacity at peak hours.
- Additional capacity at peak loads.
- Disk space.
- Disk reads.
- Disk writes.
- Each application call to the database manager.
- Each database manager response to the application.
- Each byte that goes in and out of each server.
- Placing the application and database servers in the same data center.
- The pièce de résistance – suites of products/services to help you understand your super-simple Cloud bills!



CIO

6 trends that will shape cloud computing in 2017

Cloud cost containment

One popular theory is that CIOs will save money by investing in public cloud software, but that's not always the case. The fact that most CIOs leverage multiple cloud providers means enterprises are already waist-deep in complex cloud vendor management. Also, if companies leave public cloud instances running through the weekend when they don't need them, CIOs can actually spend more money than they did with on-premises solutions.

Cloud Pricing

- We are not saying that enterprises should not exploit the cloud. Like everything, there are scenarios that it is perfect for. And others that it is not.
- Just don't believe all the hype. Cloud pricing is not as simple as you might be led to believe.
- If your company is contemplating a move to the cloud, ensure that someone does a fair, side-by-side comparison of all the costs of a cloud service to the known costs of your existing service.
- PS. Have you heard of 'hackers'? Are you comfortable handing over the keys to your corporate jewels to someone else?
- PPS. As far as I know, they have not released IMS for Windows (or even Linux) yet. So don't forget to budget a few $s to rewrite all your mainframe applications….

JES2/SMF

By default, the SMF type 30 records for a job are saved in the EVENTLOG JES2 data set for each job.

If you know how to allocate the EVENTLOG data set, you can use IEBGENER to copy the SMF records, making it SO EASY to process the SMF records for a job – no need for exits or waiting for SMF data to be offloaded…

Tom Wasik kindly gave us a sample Assembler program to get us started, and Mario converted that into a Rexx exec.

- The next issue of the Tuning Letter will contain the exec and describe our experiences.
- It will also contain a sample SDSF Rexx exec that goes into DA for a job/STC, presses enter every x seconds, and saves selected fields in a data set.

VSAM

Prior to z/OS 2.3, CA Reclaim:

- Defaulted to OFF at the system level (controlled via CA_RECLAIM parm in IGDSMSxx)
- Defaulted to ON at the data class level (controlled via CA_RECLAIM attribute in data class).

Starting with z/OS 2.3, system-level default changes to DATACLASS. If you accept all the defaults, this has the effect of enabling this for all new data set allocations.

There is also a new HealthCheck (VSAM_CA_RECLAIM) in z/OS 2.3 that complains if CA Reclaim is not turned on at the system level.

- HealthCheck is rolled back to z/OS 2.1/2.2 with OA51002.

For more information, see **Barb McDonald's** *VSAM and RLS New Functions in z/OS V2R3* Session 22525.

COBOL Hints & Tips

- Current IBM recommendation – Migrate to COBOL V6.2 (GA 9/8/2017 which supports z14 and new Vector Packed Decimal Facility)
- Our recommendation – Migrate to COBOL V6.2 for programs run during peak R4HA (Rolling 4-Hour Average), applications that are being changed a lot, and new applications
- End of Service for COBOL V4 ‘might’ be earlier than 2020
- 25% of customers migrating to V5/V6 have problems as a result of COBOL programs processing invalid data at run time due to compiler differences
- Cannot combine COBOL V5/V6 with OS/VS COBOL; some problems with VS COBOL II communication, so use CBT 321 program COBANAL/COBANALZ to identify load modules compiled with old versions of COBOL

COBOL Hints & Tips

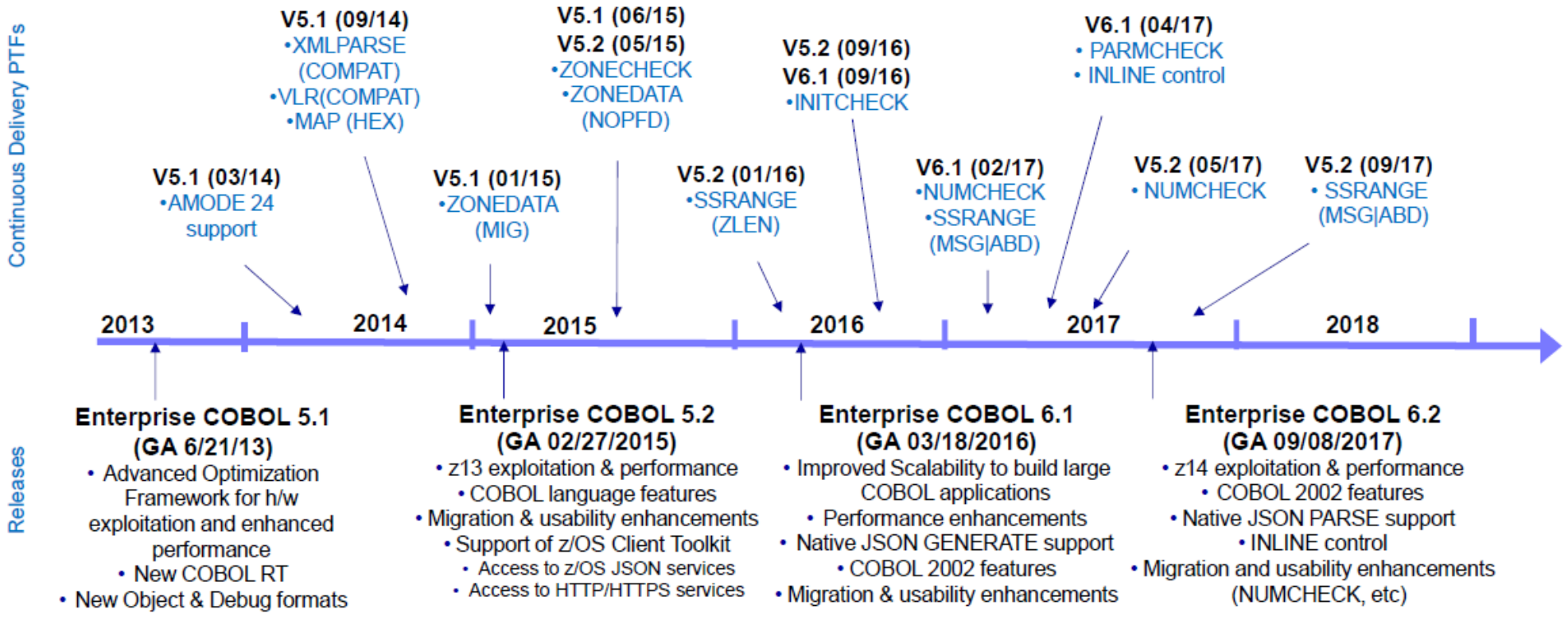
- Use new ARCH level for new hardware and recompile after moving to new machine
  - ARCH(11) for z13; ARCH(12) for z14
  - Can save 10-20% CPU and elapsed
  - Compile times and resources are higher
  - Don’t use ARCH level higher than your D/R machine
- CICS COBOL programs may not get any benefit due to initialization overhead
  - Migrate these last because no or little benefit

COBOL Hints & Tips

- From IBM Session 22328:
- *To find out if users have invalid data, IBM has recommendations for migrating to COBOL V6. The first time that you compile a program:*
  1. *Compile with SSRANGE, NUMCHECK,PARMCHECK and OPT(0) for initial code changes and unit test – To find table misuse, invalid data use and invalid parameter usage – OPT(0) programs are easiest to debug, quicker compiles – Look at runtime logs for NUMCHECK, etc, error messages*
  2. *Recompile with NOSSRANGE, NONUMCHECK, NOPARMCHECK and OPT(2) plus INITCHECK for quality assurance test and production – NOSSRANGE, NONUMCHECK and NOPARMCHECK are required for good performance – OPT(2) is preferred for good performance in production – Inspect listings for INITCHECK messages*

  Note: You may have to change to a 2-compile development process if you are not using one already

COBOL Releases and Continuous Delivery



From SHARE Session 22341

COBOL Vector on z14

- Vector Packed Decimal Facility
  - From session 22328:
    - Support for 16-byte vector registers to perform the most common packed and zoned decimal calculations is available on the z14, providing significant CPU savings
    - 4.85X faster for Unsigned Packed Decimal Add
    - 135X faster for Large Decimal Divide
    - 39X faster for Large Decimal Multiply
  - New support in CPU MF provides counts of the numbers of decimal instructions

New

IBM

SHARE INFLUENCE

z14 New CPU MF Counters to indicate COBOL "Modernization"

- 3 New z14 Extended Counters – See SA23-2261-04
  - E224 - Count of floating point execution slots used for finished Binary Coded Decimal to Decimal Floating Point conversions
  - E225 – Count of floating point execution slots used for finished vector arithmetic Binary Coded Decimal instructions
  - E226 – Decimal instructions dispatched
- Above Counters are not directly comparable to B01 (Instructions) or among each other. They could be used as an indicator of COBOL compiler "modernization"
  - E226 – Decimal "instructions"
  - E224 – Decimal Floating Point Converted – COBOL ARCH(10 |11)
  - E225 - New z14 Vector Packed Decimal Facility and z/OS 2.3 – COBOL V6.2 ARCH(12)
- One could identify when most Counter activity is occurring, then identify Jobs / Programs (e.g. zBNA) to investigate / re-compile for most impact
- See Performance examples in Back Up

From SHARE Session 22208

COBOL ABO

- ABO – Automatic Binary Optimizer
  - Converts load objects to more efficient code based on ARCH level (e.g. z14 is ARCH(12)
  - Can reduce run time
  - IBM says ABO takes less testing than migration to COBOL V6, but we have found that not to be the case.
  - We’re looking for customers who have had good experiences; so far we’ve only found bad experiences (takes a lot of CPU time, costs more than it saves, output results not always equal)

COBOL

- References
  - 22341 – *Elevating Application Performance with Latest IBM COBOL Offerings*, **Tom Ross** – great success stories
  - Website – IBM Enterprise COBOL for z/OS Migration Assistant, steps you through migration (requires IBM ID), has great white paper by **Tom Ross** on PDSE
  - 22328 – *How to Take Advantage of the New COBOL v5/v6 Compilers – Migration!,* **Tom Ross** – contains COBOL Best Practices and migration steps (including using COBOL FIXCAT feature)
  - 22208 – *WSC Short Stories and Tall Tales*, by **John Burg**
  - WSC Techdocs White Paper WP102731 – *COBOL Applications: Techniques to Make Them Efficient*, **Kathy Walsh** & **Priyal H Shah**

JES2 Items of Interest

- JES2 V2R3
  - For all new items plus PTFs, see session 21805, z/OS V2R3 JES2 Product Update and Latest Status by **Tom Wasik**
  - My favorites are Email support for jobs/steps; $D LIMITS command; dynamic scheduling group; and Init Deck Checker (will do some checking beyond syntax)
  - New JES2 SMF record 84.21 Woohoo!!
  - Dynamically modify SMF buffer limit with $T SMFDEF,BUFNUM=nnn
  - Privileged space is a percent of resources held back for emergencies with normal space runs short; authorized user can logon to emergency subsystem (e.g. LOGON KYNE SUBSYS(HASP)) to clean up problems
  - Several computability/toleration PTFs needed BEFORE starting JES2 2.3
  - **Note: z/OSMF required for JES2 Email support**

New Installation Strategy

- 22357 – IBM's New z/OS Installation Strategy & Vendor Responses, panel of IBM, CA, Compuware, and BMC
  - Currently, you can order products in ServerPac or CBPDO. Parts of Europe also allow SystemPac, FunctionPac, and ProductPac. IBM wants to simplify this.
  - Goal is to have all products (SMP/E AND non-SMP/E) available in ServerPac by YE2019
  - z/OS 2.2 is the first release where z/OSMF is base element of z/OS and it has EOS in 4Q2018; this will be the 'base' for the new installation strategy
  - **NOTE - future software ordering, installing, and provisioning will all be done using the Software Management component of z/OSMF**

New Installation Strategy

- 22559 – CA and IBM Collaborating? Yes, it's true!
  - IBM, customers, and vendors want a common end-to-end software lifecycle management facility to acquire, install, maintain, report on, and remove system software products.
  - IBM provides product installation using Software Management in z/OSMF
  - CA created Mainframe Software Manager (MSM) in 2009 to manage installation of reporting on PTFS
  - So they've combined the features into a common tool using the z/OSMFcomponent as the base, allowing any vendor to participate
  - IBM, CA, and over 30 other vendors have been meeting during the last year to discuss and implement the APIs needed for this function
  - Supports three use cases: corrective service (install update to fix a problem), preventive service (install vendor-recommended updates), and FIXCAT service (software updates to provide new functions)

Change to IBM z/OS Support

- IBM is gradually moving support interfaces for other platforms to Salesforce-based systems.
- See https://www.ibm.com/developerworks/community/blogs/IBMElectronicSupport/entry/IBM_is_transforming_Support?lang=en and video at https://mediacenter.ibm.com/media/IBM+SupportA+Introducing+a+new+customer+portal/1_gumux5dp Not here for z yet, but coming soon to a PC near you…

Migration Notes

- 21793 – Migrating to z/OS V2R3: Part 1 of 2, Marna Walle
  - Excellent resource for anyone migrating
  - HFS not available after z/OS 2.3 – Convert all to zFS now!
  - Software ordering on tape not available after 7/1/2018
  - VERY important to activate the Migration Health Checks
  - If you have z/OSMF, use the z/OS V2.3 Migration Workflow
  - If you don't have z/OSMF, get it running!
  - github.com/IBM/IBM-Z-zos/ contains z/OSMF workflow files
  - **Marna says "Do not use the z/OS V2.3 Migration book, if you have z/OSMF!"**
  - **She also says "Goodbye book!"**
  - **You MIGHT need z/OSMF to install the next release after z/OS 2.3**

z/OSMF (z/OS Management Facility)

- z/OSMF – z/OS Management Facility is a browser-based management console for z/OS
  - Initially, z/OSMF was slow, took lots of resources, and was horrific to install
  - IBM improved all of those problems and it's now started up with z/OS 2.3 automatically
  - But customers are not over the initial impression and aren't trying it again
  - Additionally, as IBM has added function, some customers are finding that it's slow again
- But it's imperative that you install it and get accustomed to it:
  - JES2 Email facility requires z/OSMF
  - New common installation solution requires z/OSMF
  - Future migrations will require z/OSMF

z/OSMF (z/OS Management Facility)

- What can you do today?
  - Review 21803 – *What's New in z/OSMF 2.3?*, **Xiao Zhen (Joey) Zhu**
    - Learn about z/OSMF AUTOSTART
    - Learn about what's new in the product based on your z/OS release
  - Install it and become familiar with it
    - Try WLM first – the z/OSMF interface is easier to use than the old ISPF one
    - Wait on the Incident Log – it's harder to install
    - If you're on z/OS 2.3, exploit JES2 Email on z/OSMF
    - Start using the migration workflows

Some Excellent Sessions from this SHARE

- *This Title is Important and Other Presentation Hints and Tips*, by **Glenn Anderson**, Session 22214.
- *Container Pricing Overview and Sub-Capacity Reporting*, by **Andrew Sica**, Session 22548.
- *Optimizing Processor Cache on z13 & z14 Processors*, by **Todd Havekost**, Session 21820
- *DFSMS Latest and Greatest*, by **Barb McDonald**, Session 21778.
- *Objects in the Rear View Mirror - Cloud Storage for IBM Z*, by **Nick Clayton**, Session 22428.
- *ISPF Hidden Treasures and Recent Updates*, by **Sam Reynolds**, Session 21791.
- *z/OS V2R3 JES2 Product Update and Latest Status*, by **Tom Wasik**, Session 21085.

THE MOST IMPORTANT ANNOUNCEMENT

- This is BIG.
- This is REALLY BIG.
- But some of you still might not hav .
- base management system for z/OS, DB

Db2 !

- Yes, that's right, an ALL NEW DB2 (oops, Db2), AND, it is NOT EVEN A NEW VERSION!!!
- Who needs user requirements and hundreds of software developers when you can have a whole new ~~DB2~~ Db2 by simply doing "C DB2 Db2 ALL"??!!

Z End

- If you have any questions, suggestions, comments, or general abuse, please email us at technical@watsonwalker.com
- Thank you for coming, and please complete the online evaluation!
- Have a safe tip home, and we will see you in St Louis in August!

Thanks!!!