Exploiting z/OS

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November 5, 2013
Session VA

Agenda

- Health Checker
- HyperPAV
- zIIPs/zAAPs
- zFS
- HiperDispatch
- zHPF
- BCPii
- EAVs
- OPERLOG
- zPCR
- z/OSMF
- ITSO Pubs
- Exploiting z/OS 2.1 Today

Exploiting z/OS – Health Checker

- Health Checker (77%)
  - Primary complaint – too many alerts; too little time
  - Primary misconception – their systems are well run and Health Checker won't find anything of value
  - References -
    - IBM Redpaper REDP-4590-01 – *Exploiting the IBM Health Checker for z/OS Infrastructure*
    - SHARE SF Session 13118, Marna Walle, *Introduction and Getting Started with the IBM Health Checker for z/OS*
    - Website – www.ibm.com/systems/z/os/zos/hchecker/
    - SA22-7994-13 – *IBM Health Checker User's Guide*

Exploiting z/OS – Health Checker

- Health Checker (cont.)
  - Benefit -
    - Detect problems early; avoid outages
    - Provide more stable, reliable, and available systems
    - Teaches Best Practices
  - My recommendation -
    - If too many alerts, then maybe you REALLY need HC!
    - Run on test or development system first and work through most of the alerts
    - EVERY site should implement this on all production systems
    - Implement APARs for new checks when they come out – PSP bucket HCHECKER
    - Review checks on a yearly basis in case you've bypassed some that should be activated

Exploiting z/OS – HyperPAV

- HyperPAV (55%)
  - Primary complaint – couldn't justify cost
  - Primary misconception – non-IBM storage vendors don't support it (but they do – just ask)
  - References –
    - ATS White Paper WP101175 – *DS8000 HyperPAV UCB and Alias Analysis Case Study*
    - IBM Redbook SG24-8886-02 - *IBM System Storage DS8000 Architecture and Implementation*
    - SHARE 2009 Denver session 2178, Anthony Mungal, *On the Importance of I/O Parallelism, I/O Priority Structures and Partitioning in z/OS Environments*

Exploiting z/OS – HyperPAV

- HyperPAV (cont.)
  - Benefits –
    - Reduces number of PAV-aliases needed for each logical subsystem (LSS)
    - Reduces IOSQ time on volumes, especially on extended address volumes (EAVs)
    - Provides automatic configuration when workload changes
  - My recommendation –
    - Ask your IBM rep to run a free HyperPAV study using your SMF 70-78 record
    - Consider sharing cost and justification with zLinux and z/VM LPARs

Exploiting z/OS – zIIPs/zAAPs

- zIIPs/zAAPs (76%/25%)
  - Primary reason for no plans – not running DB2 or Java work
  - Primary misconception – zIIPS/zAAPs are ONLY useful for DB2 or Java work
  - References –
    - SHARE SF session 12446, Catherine Moxey, *CICS and Java: How the JVM Server Transforms Java in CICS*
    - Website - www.ibm.com/systems/z/hardware/features/ziip and http://www.ibm.com/systems/z/hardware/features/zaap

Exploiting z/OS – zIIPs/zAAPs

- zIIPs/zAAPs (cont.)
  - Benefits –
    - Lets work run on cheaper MIPS (e.g. $51/MIPS vs $1000/MIPS)
    - Reduces software costs more than enough to pay for the specialty processors

Exploiting z/OS – zIIPs/zAAPs

- zIIPs/zAAPs (cont.)
  - My recommendation –
    - Start running zAAPs on zIIPs; zEC12 last model to support zAAPs; software now lets you use both for evaluation
    - If you don't have a zIIP now, re-evaluate why not; more applications can let you run on a zIIP (z/OSMF is one)
    - Look into vendor products that exploit zIIPs (e.g. SHARE SF session 12424, Russ Teubner of HostBridge Technologies, *CICS Integration & Optimization: Tales from the Trenches*)

Exploiting z/OS – zFS

- zFS (64%)
  - Primary complaint – performance problems, especially with a large number of entries in directory; vendors still ship HFS; HFS easier to use; can't migrate without an outage
  - References –
    - Redbook SG24-6580-05, *z/OS Distributed File Service zSeries File System Implementation z/OS V1R13* (Oct2012)
    - Redpaper REDP-4328-00, *HFS to zFS Migration Tool*
    - Redpaper REDP-4769-00, *zFS Reorganization Tool*

Exploiting z/OS – zFS

- zFS (cont.)
  - Benefits –
    - HFS will stop being supported at some point in the future
    - Performance, error handling, and administration are greatly improved in z/OS 1.13
    - z/OS 2.1 provides a new file format to support very large directories (but even smaller directories see 33% improvement in directory updates)

Exploiting z/OS – zFS

- zFS (cont.)
  - My recommendation –
    - If you haven't migrated, wait until z/OS 2.1 to use new zFS file format
    - If you have migrated, be sure that you're getting the z/OS 1.13 improvements
    - If you have large directories (over 2,000 entries), don't migrate yet

Exploiting z/OS – HiperDispatch

- HiperDispatch (46%)
  - Primary complaint – there are too many bugs; management is afraid
  - Primary misconceptions – there are still bugs; it's not useful for single-book installation (all hogwash!)

Exploiting z/OS – HiperDispatch

- HiperDispatch (46%)
  - References –
    - SHARE SF session 13101, Kathy Walsh, *Configuring LPARs for Performance*
    - Redbook SG24-7853-00, *z/OS V1R12 Implementation*
    - SHARE Anaheim session 11609, Horst Sinram, *z/OS WLM Update for z/OS V1.13 and V1.12*
    - ATS White Paper WP101229, Kathy Walsh & Steve Grabarits, *z/OS: Planning Considerations for HiperDispatch Mode*

Exploiting z/OS – HiperDispatch

- HiperDispatch (cont.)
  - Benefits –
    - Reduction in CPU time (up to 10%) and improvement in response time
  - My recommendation –
    - Turn HiperDispatch on unless told to turn it off by IBM (very few examples of this)
    - Why throw away CPU cycles? This is a no-brainer
    - Use the default of HD=YES in z/OS 1.13 on a z196 and newer machines

Exploiting z/OS – zHPF

- zHPF (30%)
  - Primary complaint – couldn't justify cost or hardware didn't support it
  - Primary misconception – some thought it wasn't available on 1.11 and 1.12
  - Requirements: z/OS 1.11+; z10 (Driver 76 or higher) or newer through zBC12; DS8800 or DS8700 (min level 7.6.2) with zHPF feature; FICON Express2 or above. DB2 list prefetch needs FICON Express8S channels.

Exploiting z/OS – zHPF

- zHPF References
  - ATS White Paper WP101175 – *DS8000 HyperPAV UCB and Alias Analysis Case Study*
  - IBM Redbook SG24-8886-02 - *IBM System Storage DS8000 Architecture and Implementation*
  - SHARE 2009 Denver session 2178, Anthony Mungal, *On the Importance of I/O Parallelism, I/O Priority Structures and Partitioning in z/OS Environments*
  - SHARE Boston session 14281, Howard Johnson, Lou Ricci, *FICON Buffer to Buffer Credits, Exchanges and Urban Legends*

Exploiting z/OS – zHPF

- zHPF Benefits
  - Reduces number of channels (e.g. 90 to 16 channels)
  - Improve response times for high-activity applications (especially for small block I/Os (4k))
  - Applicable to DB2, VSAM, PDSE, HFS, zFS, IMS, indexed VTOCs (CVAF), catalog VVDS/BCS, and non-extended format data sets
  - Can also reduce switch ports, and control unit ports
  - Can benefit EAVs by increasing I/O rates as volumes expand
  - Can get reduced response times for DB2

Exploiting z/OS – zHPF

- zHPF Recommendations
  - This is normally applicable to medium to large sites who need to reduce response times or reduce the number of channels
  - See if zHPF enabled with ‘D M,DEV(…) or D M,CHP(…)
  - Use the FICON Aggregation Tool in zCP3000 to consolidate work onto fewer FICON channels
  - Use the Redbooks and configuration manuals for implementation

Exploiting z/OS – BCPii

- BCPii (7%)
  - Base Control Program internal interface (BCPii) lets authorized programs use APIs to query, modify and perform HMC-like functions
  - Requirements: z/OS 1.10+, any System z processor. Unix system services can get event notification using CEA.
  - API support available for C and Assembler. REXX available in 2.1.

Exploiting z/OS – BCPii

- BCPii References
  - IBM ATS Conference Presentation TC000050 (Spring2010) - *Parallel Sysplex Partitioning Using BCPii*
  - IBM Manual SA22-7613-10 - *z/OS MVS Programming: Callable Services for High Level Languages*
  - IBM Redbook SG24-7817-00 - *System z Parallel Sysplex Best Practices*
  - IBM Redbook SG24-7946-00 (27Mar2012) - *z/OS Version 1 Release 13 Implementation*
  - IBM z/OS Hot Topics - August 2009 - Stephen Warren - *The application doesn't fall far from the tree BCPii: Control your HMC and support element directly from z/OS apps*
  - IBM z/OS Hot Topics Newsletter - August 2012 - Stephen Warren - *Seeing BCPii with new eyes*

Exploiting z/OS – BCPii

- BCPii References
  - SHARE 2011 in Anaheim - Session 8665 -Steve Warren - *BCPii for Dummies: Start to finish installation, setup and usage*
  - SHARE 2011 in Orlando - Session 9704 - Mark Brooks and Nicole Fagen – *Parallel Sysplex Resiliency*
  - SHARE 2011 in Orlando - Session 9865 - Steve Warren - *Simple BCPii Programming for the z/OS System Programmer*
  - SHARE 2012 in Anaheim - Session 12088 - Brian Valentine - *IBM System z HMC (Hardware management Console) Security Basics & Best Practices*

Exploiting z/OS – BCPii

- BCPii References
  - SHARE 2013 in San Francisco - Session 12504 - Mike Shorkend - *Back to the Future: Creating Consistent Copies at Isracard*
  - SHARE 2013 in San Francisco - Session 13035 - Steve Warren - *BCPii Programming Beyond the Basics for the z/OS System Programmer*
  - SHARE 2013 in Boston - Session 13847 - Frank Kyne – *Recent z/OS Enhancements You Can Use to Reduce Down Time*
  - SHARE 2013 in Boston – Session 13836 – Steve Warren – *What's New in BCPii in z/OS 2.1? Full REXX Support and Faster Data Retrieval*

Exploiting z/OS – BCPii

- BCPii Benefits
  - When exploited, BCPii usually provides for more stable systems
  - Current exploiters:
    - Capacity Provisioning Manager (CPM) can add or delete temporary capacity based on WLM policy
    - XCF System Status Detection (SSD) Partitioning Protocol (SYSSTATDETECT) can determine is system is truly dead
    - HCD uses BCPii
    - Several ISVs
    - Customers write their own
- BCPii Recommendation
  - Implement BCPii as soon as you can

Exploiting z/OS – EAVs

- EAVs (30%)
  - Extended Address Volumes (EAVs) allow DASD volumes to have more space (over 54 GB) than traditional DASD volumes.
  - This reduces the number of 4-digit device numbers needed.
  - Requirements: z/OS 1.10+, DS8000 storage controller. z/OS 1.12-1.13 allow up to 1 TB EAVs and support for DS8700.
  - Storage above 54 GB is called extended address space (EAS).
  - Control of which data sets can use EAS is determined by SMS storage groups or esoteric names.

Exploiting z/OS – EAVs

- EAV References
  - IBM Manual SC26-7400-14 - *z/OS 1.13 DFSMSdfp Advanced Services* (contains information about the EAV migration assistant tracker)
  - IBM Manual SC26-7473-11 - *z/OS 1.13 DFSMS Using the New Functions* (contains changes in each release and the implementation steps for each release)
  - IBM Redbook SG24-7617-00 (Updated 25Sep2009) - *DFSMS V1.10 and EAV Technical Guide*

Exploiting z/OS – EAVs

- EAV References
  - SHARE 2008 in San Jose - Session 2571 - Michael Graham - *Extended Address Volume (EAV) Performance*
  - SHARE 2009 in Austin - Session 3023 - James Cammarata - Extended Address Volume - *Overview, Usage and Invocation*
  - SHARE 2009 in Austin - Session 3024 - James Cammarata - *Extended Address Volume (EAV) - Migration, Coexistence, Installation*
  - SHARE 2010 in Seattle - Session 2417 - Scott Drummond - *What's New with Extended Address Volumes (EAV) in z/OS*
  - SHARE 2010 in Boston - Session 7525 - Tom Wasik - *z/OS 1.12 JES2 New Functions, Features, and Migration Actions*
  - SHARE 2013 in San Francisco - Session 13030 - David Jones - *z/OS JES3 Product Update and Review of Newer Features*

Exploiting z/OS – EAVs

- EAV Benefits
  - Reduces effort to manage large DASD farm.
  - Provides relief from 4-digit device limitation.
  - z/OS 1.10 support: VSAM (KSDS, RRDS, ESDS, Linear) data sets used by DB2 V8+, CICS, zFS, IMS V9+, NFS, SMP/E CSI.
  - z/OS 1.11 support: sequential extended format data sets, XRC journal data sets, ability to override system default for specific data sets using EATTR data set attribute.
  - z/OS 1.12 support: non-VSAM sequential (basic and large format), PDS, PDSE, BDAM, undefined DSORGs, XRC state, catalog VVDS and BCS. DFSMShsm, DFSORT support.

Exploiting z/OS – EAVs

- EAV Recommendation
  - Wait on EAVs unless you really, really need them.
  - Most ISVs have coded support for EAVs, but few customers are using EAVs. Therefore, not all products are thoroughly tested.
  - Many ISV products, especially old or small products, may never have EAV support.
  - Search FIXCAT of IBM.function.EAV for APARs. (There were over 60 for last year. Most were adding support to products or components.)
  - This is a MAJOR implementation effort and policies and procedures will have to be changed.
  - You should really consider using HyperPAVs to maintain performance when using EAVs.

Exploiting z/OS – OPERLOG

- OPERLOG (51%)
  - SYSLOG provides a single system log of messages (WTOs – write to operator messages) that is contained as a SYSOUT data set on JES SPOOL.
  - OPERLOG is a sysplex-wide log of messages that is written to a system logger log stream.
  - OPERLOG, if available, is used by the z/OSMF Incident Log feature to capture the messages surrounding an incident
  - zAware requires OPERLOG

Exploiting z/OS – OPERLOG

- OPERLOG References
  - IBM Manual SA22-7601-12 – *z/OS MVS Planning: Operations*
  - IBM Redbook SG24-6898-01 (Updated 29Mar2012) – *System Programmer's Guide to: z/OS System Logger*
  - SHARE 2012 in Anaheim - Session 11714 – Nicholas R. Jones – *System Logger Top 10 Problems*
  - SHARE 2012 in Anaheim - Session 11715 – Nicholas R. Jones – *System Logger Update*

Exploiting z/OS – OPERLOG

- OPERLOG Benefits
  - Provides backup in case JES SYSLOG is lost
  - Provides intermixed messages from multiple systems in parallel sysplex – can be a big help in debugging multi-system problems
  - Provides messages before JES is brought up and after JES comes down
  - SDSF has a FILTER command for OPERLOG, but not for SYSLOG
  - You don't need a CF for OPERLOG because you can use a DASD ONLY logstream
  - Logstreams are easier to backup for archive than SYSLOG
  - Message descriptor codes are available in OPERLOG, but not SYSLOG

Exploiting z/OS – OPERLOG

- OPERLOG Recommendation
  - Implement this as soon as you can, even if not in a sysplex
  - Have it ready for when you install z/OSMF!

Exploiting z/OS – zPCR

- zPCR (45%)
  - zPCR estimates CPU usage when changing processors or LPAR configurations
  - Primary complaint – don't have confidence in it
  - Primary misconception – it's only for upgrading to new CECs
  - References –
    - Download from www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS1381
  - SHARE Boston session 14219, John Burg, *zPCR Capacity Sizing Lab – Part 1 of 2: Introduction and Overview*

Exploiting z/OS – zPCR

- Benefits –
  - It's free and keeps you from making capacity planning or configuration mistakes
  - It's the ONLY way you can estimate the impact of new hardware or hardware changes, such as the change in your LPAR configuration or use of specialty processors (zIIPs/zAAPs) – don't use MIPS tables for expectations
  - Can help you improve performance of your configuration

Exploiting z/OS – zPCR

- My recommendation –
  - EVERYBODY needs to install and learn to use this before making any type of configuration change
  - Turn on type 113 records as input to zPCR

Exploiting z/OS – zPCR – Caution!

- zPCR does NOT take into account the following:
  - Hardware Changes
    - Changes in memory size
    - Changes in channel subsystem/DASD controllers
    - Effect of changes in speed of coupling facility processors
    - Changes in channels, such as FICON Express
    - Not turning on HiperDispatch
    - Addition of zFlash or solid state devices
    - Changes in queuing due to HyperPavs
  - Software Changes
    - Changes in subsystem releases or versions
    - Changes in CPU busy
    - Changes in workload

Exploiting z/OS – zPCR – Caution!

- zEC12 User Presentations
  - At last SHARE, there were several user presentations showing a decrease in MSUs when moving to a zEC12 by 15% to 45%
  - My customers are experiencing this too
  - Why is this happening? MSUs are designed by IBM to provide equivalency between two machines.
  - BUT – IBM doesn't make all of the changes noted on the previous slides
  - If you add memory or increase the speed of a CF or provide faster channels or . . . . . , each job will take less CPU and, therefore, less MSUs

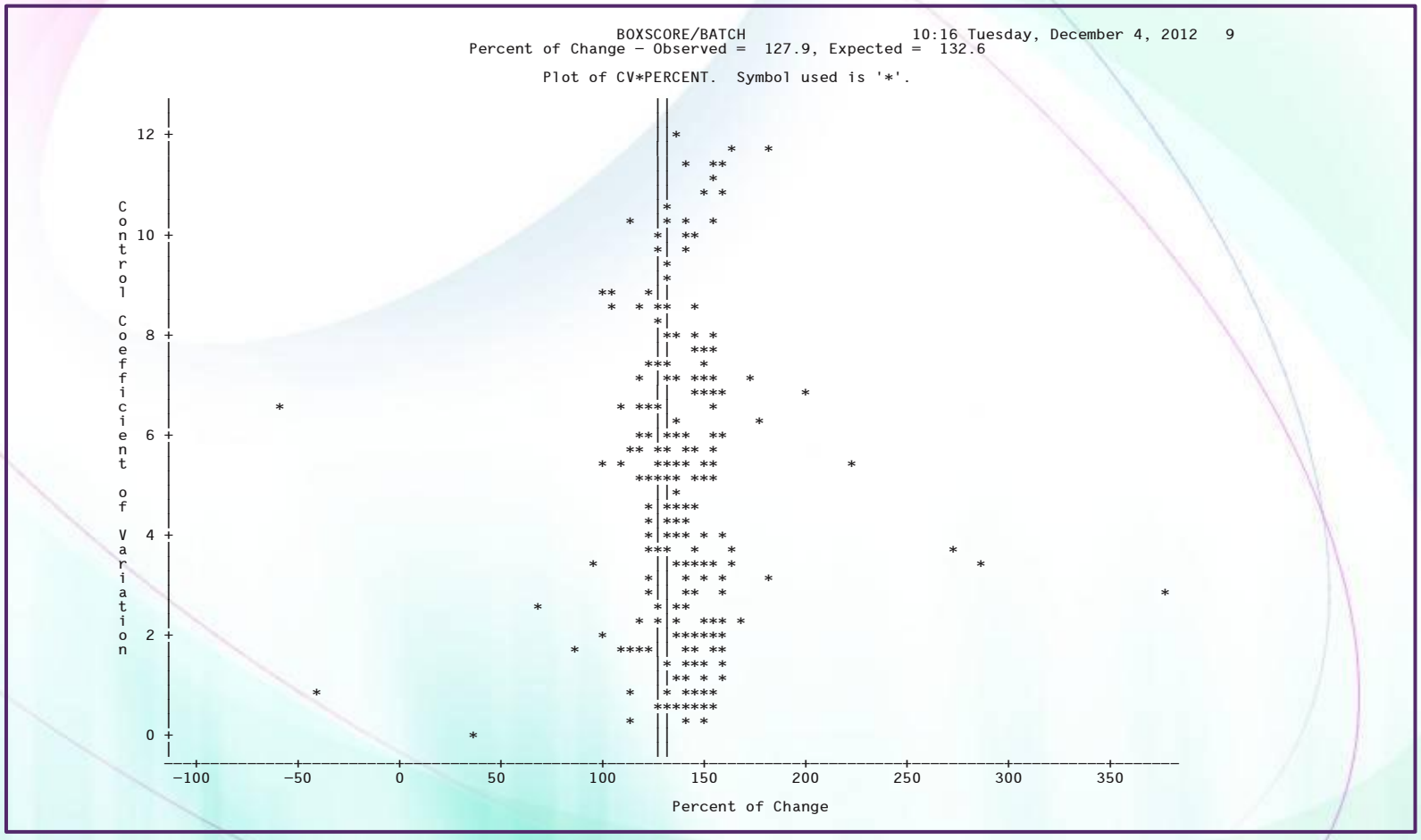
Exploiting z/OS – zPCR – Caution!

- Chargeback
  - What does this mean to chargeback?
  - You can't necessarily modify your charging by normalizing between the MIPS or MSUs based on just zPCR
  - Prices will vary, and you need to be prepared to deal with that

Exploiting z/OS – zPCR – Caution!

- This breaks golden rule of performance management: Never make more than one change at a time.
  - Measure, make a single change, measure again, report change.
  - When you make multiple changes, you don’t know WHY there is a change in results

CPU Variability



Exploiting z/OS – z/OSMF

- z/OSMF (24%)
  - Primary complaint – takes too many resources; and "I have my own way of doing things"
    - Resource usage is corrected in z/OS 2.1
  - Primary misconception – it's only for new sysprogs
  - References –
    - z/OSMF website
      - www.ibm.com/systems/z/os/zos/zosmf/
    - IBM z/OSMF User's Guide – SA38-0652

Exploiting z/OS – z/OSMF

- References (cont.) –
  - SHARE Boston sessions:
    - 14247, Anuja Deedwaniya, *z/OSMF Configuration Made Easy*
    - 14253, Anuja Deedwaniya, *Diagnosing Problems on my z/OS System – New Technologies*
    - 14249, Greg Daynes, *z/OSMF Software Management Capabilities*
    - 14267, Geoff Smith, Dan Hui Fan, *Engaging Users and Reducing Complexity: z/OSMF Software Deployment Project Usability Discussion*
    - 14230, Anuja Deedwaniya, *The New and Improved z/OSMF 2.1*

Exploiting z/OS – z/OSMF

- References (cont.) –
  - SHARE SF sessions:
    - 13052, Toshiba Burns-Johnson, *Engaging Users and Reducing Complexity: z/OSMF Software Deployment Project Usability Discussion*
    - 13061, Anuja Deedwaniya, *z/OSMF Advanced Functionality*
    - 13099, Juergen Baumann, *Capacity Provisioning Update for z/OS*
    - Several labs this week

Exploiting z/OS – z/OSMF

- Benefits –
  - Improves sysprog and performance analyst productivity
  - Provides easier training for new sysprogs
  - Implements “Best Practices”
  - Provides software management, which is a totally new feature unavailable through other techniques
  - Positions you for use of workflow scenarios to decrease the time to implement other features in z/OS 2.1

Exploiting z/OS – z/OSMF

- My recommendation –
  - Install this on your test or development system as soon as possible (caution – prior to z/OS 2.1, it might run as slow as molasses on a small LPAR, but just have patience and see the benefits)
  - For small production LPARs, wait until z/OSMF 2.1 where it's expected to use the WAS Liberty Profile:
    - z/OS 1.13 with WAS OEM – 4,481 cylinders down to 602 cylinders
    - z/OS 2.1 can start up in seconds versus minutes
  - Install PTFs for December 2012 enhancements; see WSC Flash10794 – *IBM z/OSMF V1.13 Service Updates Available*

Exploiting z/OS – z/OSMF

- My recommendation –
  - Implement WLM first because it is very easy and very popular;
  - …then software management because it's new information you haven't had;
  - …then configuration assistant for TCP/IP because the download version is going away;
  - …then incident log because it implements best practices and reduces sysprog time (even if it takes a little more setup);
  - …then ISPF because it's fun!

Exploiting z/OS – CPU MF

- CPU Measurement Facility (MF) (34%)
  - Primary complaint – haven't had time
  - Primary misconception – don't see a use
  - References –
    - SHARE SF session 13098, John Burg, *CPU MF – 2013 Update and WSC Experiences – Now More Than Ever*
    - SHARE SF session 13097, John Burg, *zPCR Capacity Sizing Lab – Part 1 of 2: Introduction and Overview*

Exploiting z/OS – CPU MF

- Benefits –
  - Provides much better data for determining LSPR workload
  - Helps zPCR provide better capacity estimates
- My recommendation –
  - EVERYBODY needs to turn on the type 113 records
  - See John Burg's session for volunteering data

Exploiting z/OS – ITSO Redbooks

- ITSO produces Redbooks – www.redbooks.ibm.com
- Two were specifically written to reduce outages and mean time to recovery (MTTR):
  - SG24-7328-00 – *z/OS Planned Outage Avoidance*
  - SG24-7816-00 – *Mean Time to Recovery (MTTR)*
- Sadly, less than 50% of responders had tried any of these Best Practices
- Benefit – More reliable and stable systems; less downtime; training in Best Practices

Exploiting z/OS 2.1 Today

- APARs let you exploit many 2.1 functions on z/OS 1.12 and 1.13 today
- z/OS 1.12 and above:
  - zHPF support for EXCP – OA38185
  - Increase spin data sets for JES2 – OA38944/PM59496
  - XCF performs additional validation – OA40966
  - Basic Hyperswap reduces false freezes – OA37632
  - RACF health checks – OA37164
  - zAAP on zIIP support works if zAAP is available – OA38829
  - Interrupt delay time facility on zEC12 – OA39993

Exploiting z/OS 2.1 Today

- z/OS 1.12 and above:
  - Add comments to parmlib members – OA38328
- z/OS 1.13:
  - System logger enhancement to use separate tasks – OA38613/OA40633/OA41465/OA41470
  - XCF IXCNOTE note pads – OA38450
  - z/OSMF software management – PM73833/PM80167
  - z/OSMF application linking – PM74502/PM74508/PM74517
  - z/OSMF capacity provisioning – PM74519
  - Additional text for DFSMS abends – OA37957/OS37505/OA39175

Thank you!

Cheryl Watson Walker with partner, husband, and best friend Tom Walker In Cuba in December (www.tomandcheryltravels.me)

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