

Exploiting z/OS

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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

–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)

–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!)
- 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 per I/O))
- Applicable to DB2, VSAM, PDSE, HFS, zFS, IMS, indexed VTOCs (CVAF), catalog VVDS/BCS, and non-extended format data sets
- Can also reduce in fewer fiber, switch ports, and control unit ports
- Can benefit EAVs by increasing I/O rates as volumes expand
- Might 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 Newsletter - 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 if 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*



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■ 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 (EAV) - 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 easier 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/atmastr.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

■ 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:
 - Changes in memory size
 - Changes in channel subsystem/DASD controllers
 - Effect of changes in speed of coupling facility processors (depends on the amount of use of data sharing)
 - Changes in channels, such as FICON Express
 - Changes in subsystem releases or versions
 - Not turning on HiperDispatch
 - Addition of zFlash or solid state devices
 - Changes in queuing due to HyperPavs
 - 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

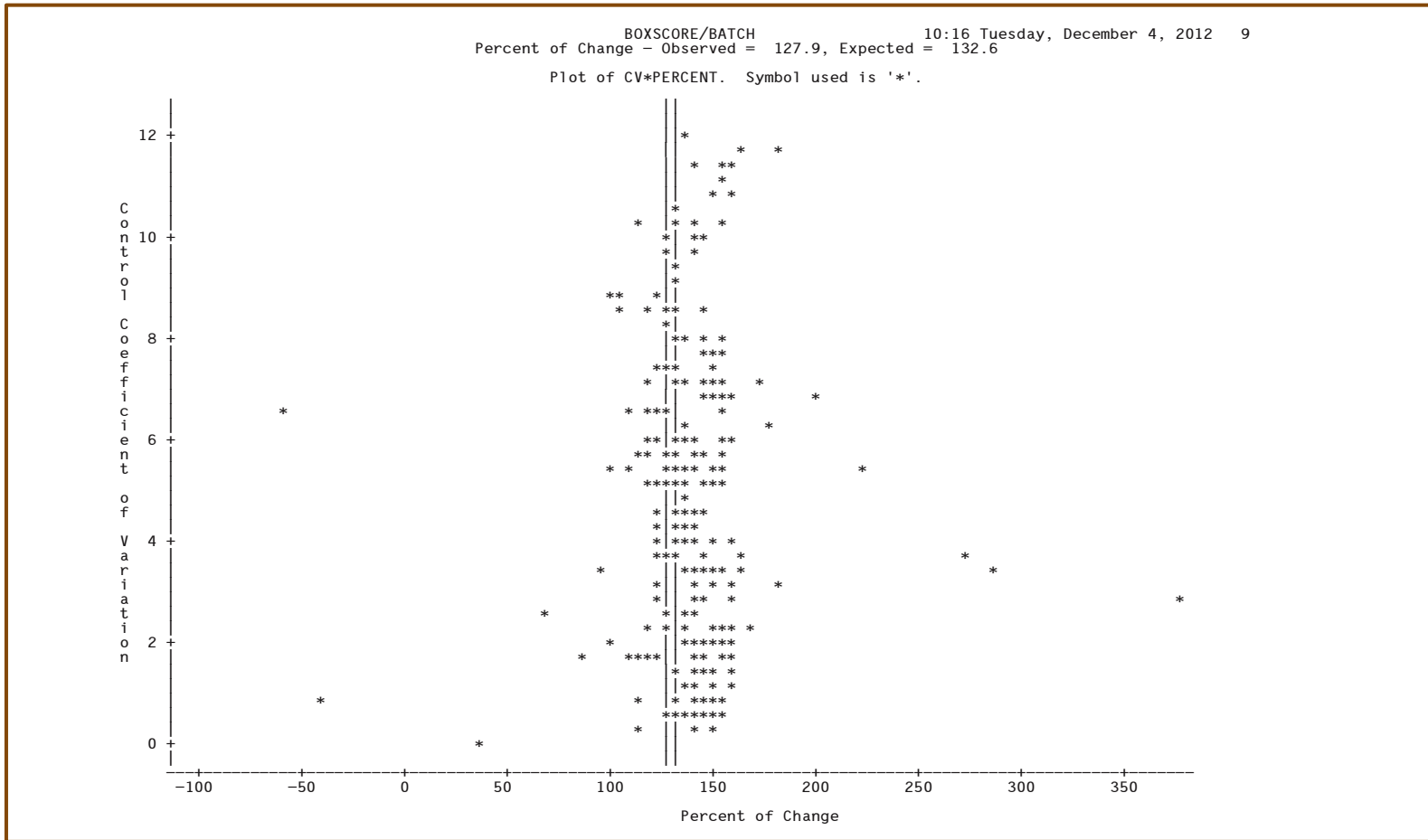


Exploiting z/OS – zPCR – Caution!

- 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
- 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”

- This 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 on small LPAR



Exploiting z/OS – z/OSMF

■ My recommendation –

- Install PTFs for December 2012 enhancements; see WSC [Flash10794](#)
– *IBM z/OSMF V1.13 Service Updates Available*
- 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 Measurement Facility (CPU MF)

■ CPU 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 Measurement Facility (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 IXCNONE 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
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