# A Different Way to Perform z/OS Maintenance

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# Why Different from Other Successful Maintenance Practices?

- Small Shop, Small Staff
- z/OS includes Unix and Java and z/OSMF
- Big Data so Big SYSRES and Big DLIB Volumes
- SYSRES libraries and file systems are not SMS-managed
- SYSRES data sets are indirectly cataloged (except VSAM)
- Monthly RSU APPLY

# Why Different from Other Successful Maintenance Practices?

- **Users Exist To Provide A Test Load**

# Agenda

- Our Environment
- z/OS Installation Setup
- APPLY Maintenance Before Cloning New SYSRES
- Create and Customize a New Test System SYSRES
- Clone Test System SYSRES for Other LPARs
- APPLY RSU Maintenance on a Live System
- APPLY Service to Other LPARs in a Sysplex
- Various Tools
- APPLY Service Between RSUs
- Summary

# Our Environment

- **SAS Product Build and Test is Our Real Production**
  - z9-BC for Production, Sandbox, Licensing LPARs
  - z196-706 for Product Development and Testing LPARs
    - 6 CPs and 1 ICF
    - 2 zIIPs (zAAP enabled)
- **3 Sysplexes Running z/OS in One GRS Ring**
  - Production Sysplex with One LPAR
  - Test Sysplex with One LPAR
    - System Programmer "Sandbox"
  - Development System with Four LPARs
    - One LPAR is Primarily for System Programmer Use

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# z/OS Installation Setup

- **z/OS at SAS**
  - Include$ RACF, DFrmm, DFhsm, DFdss, DFSort, RMF, Print Support Facility and Fonts
  - Include$ HLASM Toolkit, C/C++, COBOL, FORTRAN, PL/1, Pascal, WebSphere MQ
  - Includes Ported Tools, Java (4 releases, two flavors of each), XML V10
  - Includes z/OSMF (and its WASOEM with Java)
  - Include$ JES3 (for use by z/OS guests under z/VM)

# z/OS Installation Setup

- **Big SYSRES - One 3390-27 Volume**
  - All SMP/E-managed Target libraries are here
  - All SMP/E-managed z/OS Unix file systems are here
    - 14 File Systems (about 206,000 tracks (13734 Cylinders is bigger than 3390-9))
    - Version root (with merged FSes for Ported Tools (perl, php, ported, IHSA (Apache webserver)), cobol, pli, esa (Electronic Service Agent))
    - z/OSMF, WASOEM for z/OSMF are separate file systems
    - 8 Java variations (V5, V6, V6.0.1, V7; all in 31- and 64-bit flavors)
    - XML V10, MQSeries, Tivoli Storage Manager also have FS

# z/OS Installation Setup

- **Big SYSRES – One 3390-27 Volume** (continued)
  - SYS1.PARMLIB and SYS1.PROCLIB for shop use
  - SMP/E-managed SYS1.IBM.PARMLIB and SYS1.IBM.PROCLIB
  - ServerPac SYSRES has Other products and Data Added for our z/OS guests that run under z/VM
    - In-house Program Libraries
    - Third Party Products
    - z/OS Guest Setup and Housekeeping Jobs As Examples for the Guest owner
    - Private System Programmer Userid so We Can Help When Needed

# z/OS Installation Setup

- **Big DLIB - One 3390-27 Volume**
  - 500+ z/OS Distribution data sets
  - All SMP/E-managed Distribution and DLIBZone libraries are here
  - All z/OS Globalzone data sets are here
    - At least 3 SMPPTS data sets (not PDSE)
    - 4369 Cylinders (65535 tracks) each
  - Operational Data Sets (PAGE, LOGREC, /etc file system, others) are here for running ServerPac system under z/VM
    - Created by ServerPac Full Replacement Process

# z/OS Installation Setup

- **Order and Install New Release of z/OS**
  - Place Shopz Order for ServerPac Internet Delivery
  - When ready, use ServerPac Dialog to download the package
  - Use the ServerPac Dialog to customize SYSRES and DLIB volumes
    - Merge Previous ServerPac z/OS configuration
    - Make HLQ updates, SPACE changes, merge file systems
    - Add additional SMPPTSn data sets and perhaps other USER-defined data sets
  - Get two 3390-27 Volumes (One SYSRES and One DLIB)
  - Run ALLOC and RESTORE and other ServerPac pre-IPL jobs

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# z/OS Installation Setup

- **Test New Release of z/OS Under z/VM**
  - Add or Update some Operational data sets on the SYSRES and DLIB for use under z/VM
    - Data sets required to execute ServerPac IVP jobs and tasks
  - IPL new z/OS ServerPac system under z/VM
  - Run ServerPac IVP jobs on the z/OS guest
    - Use ServerPac Dialog on My Current Driving System
    - Dialog-generated IVP Jobs are NJE'd to z/OS guest
  - Perform ServerPac IVP tasks on the z/OS guest
  - Shutdown z/OS guest

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# z/OS Installation Setup

- **Prepare Tested SYSRES for Cloning and Maintenance**
  - Run Selected Final ServerPac jobs
    - UPDDDUV
      - *Skip first step to preserve /SERVICE in DDDEF PATHs*
      - *Second step adds VOLSER and UNIT to DDDEFs and renames to non-SSA names*
    - Do NOT Run UPDDEF and UPDBCK jobs
    - DELDSN, DELCSI and DELSSA jobs are run to cleanup ServerPac Aliases and PATHs and Driving System Catalog entries
  - If RSU Service is available, APPLY Maintenance to ServerPac SYSRES before Cloning
    - Good Opportunity to Test new z/OS system with "real" work

# APPLY Maintenance Before Cloning New SYSRES

- **APPLY Maintenance Using New z/OS SYSRES**
  - RECEIVE ORDER CONTENT(ALL) Into New GLOBALZONE
    - Run On Driving System
  - IPL z/OS Guest with New SYSRES and DLIB
    - Still a bare bones ServerPac system
  - Stop LLA to reduce PDSE caching issues
  - Via NJE, run RSU APPLY CHECK on the Guest
  - Review output, particularly ACTION and ENH HOLDs
  - Via NJE, run RSU APPLY on the z/OS Guest
    - Might find some allocation or other environmental problems that can be corrected before cloning

# APPLY Maintenance Before Cloning New SYSRES

- **APPLY Maintenance Using New z/OS SYSRES** (continued)
  - Run SMP/E Error SYSMODs Report
    - Capture SMPPUNCH output and put PTFs listed in a SMP/E LIST MCS command
    - Review the LIST MCS output to determine if any PE or HIPER PTFs need to be applied
    - APPLY any PTFs that you want (still run jobs on the z/OS guest)
  - Run Cross-Zone Compare between new z/OS release and previous z/OS release Target Zones
    - APPLY any PTFs or APARs as needed or desired
  - Shutdown z/OS guest

# Create the New SYSRES for Test System

- **Clone ServerPac SYSRES to Test System SYSRES**
  - Full Volume Copy
  - Delete all VSAM (VVDS, CSI, file systems)
    - ALTER mcat REMOVEVOLUMES(newsysresvolume) is very fast
  - Recreate VVDS in desired location on new SYSRES
  - Selective Data Set Copy with Rename of CSI and File Systems
  - Unique SMP/E Target Zone for Each SYSRES
    - ZONERENAME the new CSI with new target zone name
    - ZONEEDIT DDDEF to change SYSRES VOLUME and selected data set names (SMPLOG, MTS, STS, LTS, SCDS)

# Customize the New SYSRES for Test System

- **Customize the New Test System SYSRES**
  - Copy SYS1.PROCLIB and SYS1.PARMLIB from previous release SYSRES (for the target LPAR)
  - Review and update PROCLIB and PARMLIB members for z/OS changes
    - Compare with new IBM libraries, Sample Libraries
  - Use SAS to Compare VTOCs and Generate IDCAMS DEFINE statements to Catalog new SYSRES data sets
  - Add new SYSRES data sets to the Test System Master Catalog via DEFINEs with Indirect Volser Reference (VOL(******) UNIT(0000))

# Customize the New SYSRES for Test System

- **Customize the New Test System SYSRES** (continued)
  - Create new Version Root mountpoint in the "Read-Only" Sysplex Root file system
  - Perform Any Pre-IPL z/OS Migration Actions
  - IPL new SYSRES in Test LPAR
  - Add some Installation-specific symlinks to the Version Root
  - Add USERMODs (about 100 or so) ….
    - Harass co-workers to update USERMODs
  - Perform Any Post-IPL Migration Actions
  - Test System is Now Running new z/OS

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# Clone Test System SYSRES to Other Images

- **Clone Test System SYSRES to Other Images**
  - Very Similar to Clone of ServerPac SYSRES to Test System
  - Customize Each Image as Needed
  - IPL Each New SYSRES in Appropriate LPAR
  - Takes about 6-8 weeks from ServerPac IPL to All LPARs Running the New z/OS Release
    - PROD lags 2-4 months

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# APPLY RSU Maintenance On A Live System

- **Prepare to APPLY RSU to First System in Sysplex**
  - Daily Update of HOLDDATA and FIXCAT
  - Notified by Shopz and CST of New RSU
  - RECEIVE ORDER CONTENT(ALL) … on New Test System
    - RECEIVE into a large /tmp file system and, from there, into SMPPTS
  - APPLY CHECK Service for SMP/E Using FORFMID HMP1J00 (V3.6)
    - APPLY any RSU or Selected Service for SMP/E Itself Onto the Test System
    - Refresh LLA to implement Service

# APPLY RSU Maintenance on a Live System

- **Prepare to APPLY RSU to First System** (continued)
  - Create and Run an APPLY CHECK job
    - ZONEEDIT to Remove /SERVICE from DDDEF PATHs
    - APPLY CHECK RSU* plus IBM.Coexistence.z/OSMF.V1R13, IBM.Coexistence.z/OS.VvRnn and IBM.Function.HealthChecker plus z196 and zBX FIXCATs and any SELECTed PTFs that are of interest
    - ZONEEDIT to Add /SERVICE to DDDEF PATHs
  - Review CAUSER Report in SMPRPT Listing
    - Ignore PTFs HELD by ERROR
  - Carefully review SAS-customized output report of Actionable HOLDDATA (ACTION, ENH, EC, MULTSYS)

# APPLY RSU Maintenance on a Live System

- **Prepare to APPLY RSU to First System** (continued)
  - Create APPLY JOB
    - Create a new member from the APPLY CHECK JOB
    - ZONEEDIT to remove /SERVICE from DDDEF PATHs
    - Remove CHECK from APPLY and ID from BYPASS
    - Add COMPRESS of non-PDSE Data Sets (not LINKLIB or MIGLIB)
      - *Edit List of Affected Data Sets from SMPRPT*
    - Add REMOUNT of file systems as RDWR before SMP/E step
    - Add REMOUNT of file systems as READ after SMP/E step

# APPLY RSU Maintenance on a Live System

- **APPLY RSU to First System in Sysplex** (continued)
  - Full Volume Backup of SYSRES and DLIB volumes
  - Run SHUTDOWN process until OMVS SHUTDOWN COMPLETE and All Available Functions Complete messages
  - Restart VTAM and TSO (No TCP/IP)
  - Via Cross-Domain SNA, Logon TSO on Target System
  - Run Batch Jobs to compress SYS1.PARMLIB, SYS1.PROCLIB, SYS1.MIGLIB and SYS1.LINKLIB (via explicit VOLSER) on target system
  - Refresh LLA after MIGLIB and LINKLIB steps using our in-house MGCR tool

# APPLY RSU Maintenance On A Live System

- **APPLY RSU to First System in Sysplex** (continued)
  - Start a JUSTIPLD task
    - Disables recovery automation for File System MOUNTs
  - F OMVS,RESTART,OMVS=(10) to restart z/OS Unix with a minimum configuration (SYSRES file systems plus /etc and /var)
  - Once OMVS is initialized, stop the JUSTIPLD task
  - Stop Network File System Client
    - F OMVS,STOPPFS=NFS
  - Restart z/OS Unix Automounter for file systems at /u/
  - Be sure job submitter's file system is or can be mounted in this sysplex

# APPLY RSU Maintenance On A Live System

- **APPLY RSU to First System in Sysplex** (continued)
  - Stop LLA to reduce PDSE caching problems
  - Perform any pre-APPLY actions
  - Run APPLY JOB
  - Fix any APPLY failures
    - Look at CAUSER section of SMPRPT
    - Usually out-of-space (PDS and PDSE "fixed" by DATOC)
    - Out of Directory Blocks (fixed via free PDS TSO command)
  - Rerun APPLY job to APPLY failed PTFs

# APPLY RSU Maintenance On A Live System

- **APPLY RSU to First System in Sysplex** (continued)
  - Perform any post-APPLY actions
    - Turn off Secondary Allocations in Linklist via DATOC
  - Run SMP/E Error SYSMODs Report (On first LPAR in Plex)
    - Take SYSPUNCH output and put in LIST MCS command
    - Review LIST MCS output Problem Descriptions
    - Run APPLY for selected PTFs if desired
  - Shutdown TSO, VTAM, OMVS, JES2, then Z EOD, GRS QUIESCE and V XCF,xxxx,OFFLINE,REIPL
  - Outage Time Depends But Usually 1.5 to 2 Hours

# APPLY RSU Maintenance On A Live System

- **APPLY RSU to First System in Sysplex** (continued)
  - After IPL (CLPA defaulted), Perform post-IPL Actions
    - z/OSMF or its WASOEM can require post-IPL actions
    - Others based on HOLDDATA review from earlier
  - We're Happy Now on current RSU level!

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# APPLY Service to Other LPARs in a Sysplex

- **Prepare to APPLY RSU to Other Systems in Sysplex**
  - Run APPLY CHECK with RSU* and SOURCEIDs and PTFs as Before
    - Run IOF Compare of SMPRPT from This APPLY CHECK with the SMPRPT of First LPAR APPLY CHECK
      - *Usually just catches RSU PTFs that have become PE*

# APPLY Service to Other LPARs in a Sysplex

- **Prepare to APPLY RSU to Other Systems** (continued)
  - Create APPLY JOB from the APPLY CHECK JOB
    - Remove ZONEEDIT so /SERVICE stays in DDDEF PATHs
    - Remove CHECK from APPLY and ID from BYPASS
    - Add COMPRESS ALL because target system is down
    - Add MOUNT of file systems as RDWR at /SERVICE before SMP/E step
    - Add UNMOUNT of file systems after SMP/E step

# APPLY Service to Other LPARs in a Sysplex

- **APPLY RSU to First System in Sysplex**
- Run SHUTDOWN process until Target System is Down (VARY XCF,yyyy,OFFLINE)
- Full Volume Backup of Target SYSRES
- From First LPAR in Sysplex
  - Run Batch Jobs to compress SYS1.PARMLIB, SYS1.PROCLIB, SYS1.MIGLIB, and SYS1.LINKLIB (via explicit VOLSER) on target system SYSRES
  - Be sure job submitter's file system is or can be mounted in this sysplex
  - Perform any pre-APPLY actions

# APPLY Service to Other LPARs in A Sysplex

- **APPLY RSU to Other Systems** (continued)
  - Run APPLY JOB
  - Fix any APPLY failures
    - Look at CAUSER section of SMPRPT
  - Rerun APPLY job to APPLY failed PTFs
  - Perform any post-APPLY actions
  - Run SMP/E ZONE Compare
    - Run APPLY for Missing PTFs and APARs if appropriate
  - IPL Updated Target SYSRES into the Sysplex

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# Different Maintenance With Various Tools

- **Tools Used in Our Maintenance Processes**
  - "Systems Time" JES2 Command
    - Sets bit on or off in User CVT
    - Tested by JES2 Job Selection exit to restrict what jobs can run
    - Tested by TSO Logon Pre-Prompt Exit to stop unauthorized users
    - Future plan: Same or similar process to restrict z/OS Unix users (rlogin, FTP, and such)
  - DATOC
    - Program to alter fields in existing DSCBs in VTOC
  - SAS
    - HOLDDATA report customization

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# Different Maintenance With Various Tools

- **Tools Used in Our Maintenance Processes** (continued)
  - SNOUPDTE
    - Zapped version of CPPUPDTE program from ServerPac
    - Creates new RSU jobs from previous set (RDU1205x cloned and updated to be RDU1206x)
  - PDS TSO command
    - From cbttape.org
    - Easy to Add Directory Blocks with FIX subcommand
  - MGCR In-House program
    - In-house program that uses SVC35 (MGCRE) to issue z/OS Commands that are passed via PARM
    - Only authorized users can run MGCR

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# Different Maintenance With Various Tools

- **Tools Used in Our Maintenance Processes** (continued)
  - ISRSUPC used extensively throughout the Install and Maintenance process
    - Reports VOLSER of NEW and OLD data sets in Page Heading
      - *Add VTITLE to PARM for ISRSUPC to see VOLSER*
    - Via APARs OA38467 and PM38213 (PTFs UA63859 (ISPF R13) and UK74830 (HLASM-TK), respectively
  - ServerPac Install Modify Layout function
    - Change Primary SPACE allocations
    - Increase Directory Blocks
    - Will be merged into next ServerPac creation

# APPLY Maintenance Between RSUs

- **Select PTFs to be APPLYed**
  - Create and run a specific APPLY CHECK job for PTF or set of PTFs
    - Look at CAUSER section of SMPRPT
    - Read HOLDDATA particularly RESTART
    - Can the fix be implemented Dynamically?
  - Perform any pre-APPLY actions
  - Create and run a specific APPLY job built from APPLY CHECK job
  - Perform any post-APPLY actions

# APPLY Maintenance Between RSUs

- **Select PTFs to be APPLYed** (continued)
  - Implement Dynamically
    - Refresh LLA if Any Linklist Library is Updated
    - SETPROG LPA,ADD…. To Implement Simple LPA changes
    - z/OS Unix
      - *F LLA,REFRESH*
      - *SETOMVS SERV_LINKLIB=('SYS1.LINKLIB','sysres')*
      - *SETOMVS SERV_LPALIB=('SYS1.LPALIB','sysres')*
      - *F OMVS,ACTIVATE=SERVICE*
      - *D OMVS,ACTIVATE=SERVICE to summarize the results*

# A Different Way to Perform z/OS Maintenance

- **Summary**
  - Use Big SYSRES and DLIB
  - Write Up Your Current Process and See Where Improvements Can Be Made
  - RECEIVE ALL Service
    - Let SMP/E Filter the RSU* PTFs for you
  - Use Indirect VolSer Reference or Symbols in Catalog for SYSRES data sets
    - Be sure explicit VOLSER and UNIT in DDDEFs
  - APPLY Live Strategy Works with One SYSRES per Image

# A Different Way to Perform z/OS Maintenance

- **Summary**
  - Target System SMP/E libraries and CSI on SYSRES
  - Implement PTFs Dynamically
    - You can APPLY Service to A Live System

# A Different Way to Perform z/OS Maintenance

- Q and A

- Session 11581 Evaluation at www.SHARE.org/AnaheimEval

- Session Evaluation at this QR Code