

SHARE August 4, 2010: Session 2240 z/OS Problem Determination Update

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Technology - Connections - Results

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Problem Determination Update - Agenda

- Requirements for Problem Determination Improvements
- z/OS Problem Determination Simplification
 - Soft error detection: Predictive Failure Analysis
 - Problem identification: Runtime Diagnostics
 - Problem Data Management: z/OSMF Incident Log
- Recent z/OS Service Aids enhancements
- Related SHARE sessions
 - z/OSMF:
 - Manage your workloads and performance with z/OSMF:
 - z/OSMF 1.12 Overview:
 - z/OSMF 1.12 Implementation and Configuration:
 - z/OSMF Roundtable Discussion:
 - Predictive Failure Analysis:
 - Detecting Soft Failures using z/OS PFA:

Tuesday, 4:30-5:30 pm Wednesday, 9:30-10:30 am Wednesday, 11 am-12 noon Wednesday, 12:15-1:30 pm

Tuesday 11am-12:30pm



Meet Zach and Alice: *Today's* z/OS System Programmers

- 20 plus years experience with a lot of on the job training.
- Team lead: 3 experienced System Programmers, 1 Jr. System Programmer.
- Responsible for running JK Enterprise's mainframe IT environment
 - Maintain z/OS systems and Problem Determination

Zach Sr. System Programmer Mentor

- Deployment
 - Planning for Installation
 - Ordering
 - Installation
 - Configuration
 - Testing
- Education



- B.S. in Information Technology with 1 year experience.
- Works with mentor, Zach and other members of her system programming team.
- Responsible for a subset of planning, ordering, testing and problem determination tasks performed in shop today.
 - Subset varies depending size of shop





z/OS Problem Determination Scenario – Alice's Task Flow





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z/OS Problem Determination Scenario – Alice's Tools and Information





Conclusions: Problem Determination in a complex environment

Installation Pain Points

Reduce risk to the business by mitigating the impact of symptoms, reduce risk of recurrence

- Minimize impact in getting system stabilized
- "Sick but not dead" situations

Complexity of performing the task (number of steps, jargon)

Need to troubleshoot a live system, recover from an apparent failure

Data collection very time-consuming

Significant skill level needed to analyze problems, interact with IBM and ISVs to obtain additional diagnostic info

Focus Areas



Detect when "sick, but not dead" event occurring

Diagnose cause in real time to allow operations to mitigate event inquiries

Manage / capture data to determine cause of problem

• Allow problem to be fixed to prevent recurrence

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PD Simplification

Simplifying Alice's tasks



z/OS Service Aids

- Dumps
- Logs
- Traces
- Tools

Soft Error Identification: Predictive Failure Analysis (PFA)

- Common Storage Usage
- Frames and Slots Usage
- Logrec Arrival Rate
- Message Arrival Rate
- SMF Arrival Rate

System Symptom Analysis: Runtime Diagnostics

- Analyze a sick system,
- upon request (operator command)
- Component errors
- Address space behavior (ENQ, CPU consumption, Loops)

Problem Data Management: Incident Log

- Improve FFDC for system-detected problems
- Diagnostic data "snapshots" for transient data
- FTP Incident with all diagnostic data
- User interface to display summary, detail, drive actions

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IBM Systems and Technology Group Soft Error Identification: **PD** Simplification **Predictive Failure Analysis (PFA)** - Common Storage Usage - Frames and Slots Usage Simplifying Alice's tasks - Logrec Arrival Rate - Message Arrival Rate - SMF Arrival Rate System Symptom Analysis: **Runtime Diagnostics** z/OS Service Aids Analyze a sick system, Dumps upon request (operator command) • Logs Component errors Traces • Address space behavior (ENQ, CPU consumption, Loops) Tools **Problem Data Management: Incident Log** Improve FFDC for system-detected problems Diagnostic data "snapshots" for transient data • FTP Incident with all diagnostic data • User interface to display summary, detail, drive actions



Soft Failures: What is a soft failure?

"Sick, but not dead" or Soft failures



- 80% of business impact, but only about 20% of the problems
- Long duration
- Infrequent
- Unique
- Any area of software or hardware
- Cause creeping failures
- Hard to determine how to isolate
- Hard to determine how to recover
- Hard for software to detect internally
- Probabilistic, not deterministic



How PFA detects soft failures

- Causes of "sick, but not dead"
 - Damaged systems
 - Recurring or recursive errors caused by software defects anywhere in the software stack
 - Serialization
 - Priority inversion
 - Classic deadlocks
 - Owner gone
 - Resource exhaustion
 - Physical resources
 - Software resources
 - Indeterminate or unexpected states

- Predictive failure analysis uses
 - Historical data
 - Machine learning and mathematical modeling
 - to detect abnormal behavior and the potential causes of this abnormal behavior
- Objective
 - Convert "sick, but not dead" to a correctable incident





Predictive Failure Analysis Enhancements by Release

• z/OS 1.10 (SPE)

- -Common storage usage check
 - CSA + SQA below the line
 - eCSA + eSQA above the line
- -LOGREC arrival rate check
 - Key 0
 - Keys 1 to 7
 - Keys 8 to 15

• z/OS 1.11

- -Frames and slots usage check
 - Persistent address spaces

–Message arrival rate (WTO/WTOR) check

- Chatty persistent address spaces
- Non-chatty persistent address spaces
- Non-persistent address spaces
- Total system

For more information, see the chapters on PFA found in the *z/OS Problem Management Guide*

- <u>http://publibz.boulder.ibm.com/epubs/pdf/e0z1k131.pdf</u>
 - Predictive Failure Analysis section
- PFA presentation delivered at this SHARE

- z/OS 1.12
 - SMF arrival rate check
 - Chatty persistent address spaces
 - Non-chatty persistent address spaces
 - Non-persistent address spaces
 - Total system
 - Modeling improvements
 - More granular Common storage usage check

 CSA, SQA, eCSA, eSQA, CSA+SQA, eCSA+eSQA
 - Supervised learning (excluded jobs list)
 - Dynamic modeling
 - Performance and serviceability enhancements

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PD Simplification

Simplifying Alice's tasks

z/OS Service Aids

Dumps

Traces

Tools

• Logs



Soft Error Identification: Predictive Failure Analysis (PFA)

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Runtime Diagnostics

- Analyzes a sick but not dead system in a timely manner
 - Minute or less
 - Provides suggested next steps to take
- Performs similar analysis as to what a very experienced system programmer would do
 - But faster goal of 30 seconds
 - More comprehensive
 - Provides suggested next steps
- Detailed analysis of system looking for specific evidence of "soft failures"
 - Not automation or a monitor
 - Takes no corrective action
 - No background processing

Component Analysis

Global Resource Contention

Important Addr Space Execution

Analyzes Operlog for list of messages identified by components

Information about Enqs

Execution information looking for CPU usage, lock usage, TCB loops



Runtime Diagnostics - Benefit

- Use Runtime Diagnostics ...
 - When the help desk or operations reports a problem on the system
 - Use Runtime Diagnostics to get ready for the "bridge call"
- Reduces the skill level needed by a system programmer when examining z/OS for "unknown" problems the system to appear "sick"
 - Provides timely, comprehensive analysis at a critical time period
- Useful when PFA analysis detects abnormal behavior to
 - Identify which PFA suggested villain is the cause
 - Determine what action to take
- Using Runtime Diagnostics, you can quickly discover next actions to take
 - Jobs to cancel
 - Further investigation on classes of resources, or a single address space using a monitor like RMF or Tivoli Omegamon



Runtime Diagnostics - Invocation

- Invoke via a START command
 - START HZR,SUB=MSTR
 - Invokes HZR PROC
 - Will only run on R12 system but other systems in the Sysplex do not need to be R12
 - Can override HZROUT to specify a data set, for example:
 - //HZROUT DD DISP=SHR,DSN=MY.DATA
 - START HZR,SUB=MSTR,DSN=MY.DATA,DISP=SHR
- Operlog is suggested to allow complete analysis
 - Can run message analysis against a different system's messages in the same OPERLOG
 - START HZR, SUB=MSTR, OPTIONS=(SYSNAME=SYS2)
 - ENQ analysis done for the specified system, but other address space analysis is bypassed
- The output of Runtime is a multi-line WTO
 - The output of Runtime Diagnostics can also be directed to a sequential dataset
 - HZROUT DD
- DEBUG option for use under IBM Service guidance
 - Takes a dump to help debug analysis
 - START HZR,SUB=MSTR,OPTIONS=(DEBUG=(LOOP,ENQ))



Analysis Done

- Component problems emitted as critical messages in OPERLOG (needles in the haystack)
 - For some messages, additional analysis is done
 - Groups related messages into a single event
 - Weeds out shortage and relieved critical messages
 - In some cases, will only show the last message if a critical message for the same resource name is repeated, say every 10 minutes

ENQ contention for system address spaces

- HZR looks for system address space that is an ENQ "waiter" for over 5 seconds, lists both waiter and blocker
- Address spaces with lock contention
 - HZR lists any address space where its local lock suspension time is over 50%
- Address spaces using high CPU
 - HZR takes two quick samples and any task using over 95% of a single CPU is listed as a
 possible problem
- Address spaces that appear to be in a TCB enabled loop
 - HZR looks at a snapshot of the system trace for possible TCB loops



Output Response Examples

• Runtime Diagnostics reports system symptoms it finds in the **EVENTS:** portion of the message report:

HZR0200I RUNTIME DIAGNOSTICS RESULT SUMMARY: SUCCESS REQ: 001 TARGET SYSTEM: SY1 HOME: SY1 2009/01/13 - 10:57:01 INTERVAL: 60 MINUTES EVENTS: FOUND: 01 - PRIORITIES: HIGH=01 MED=00 LOW=00 TYPES: CF=01



QUALIFIED SUCCESS in the SUMMARY portion of the report

(inability to complete processing for one or more events)

SY1 HZR0200I RUNTIME DIAGNOSTICS RESULT 805
SUMMARY: QUALIFIED SUCCESS - SOME PROCESSING FAILED
REQ: 001 TARGET SYSTEM: SY1 HOME: SY1 2010/01/09 - 15:00:27
INTERVAL: 60 MINUTES
EVENTS:
FOUND: 02 - PRIORITIES: HIGH=02 MED=00 LOW=00
TYPES: HIGHCPU=01
TYPES: LOOP=01
PROCESSINC FAILURES:

PROCESSING FAILURES:

OPERLOG....IXGCONN REQ=CONNECT ERROR.....RC=00000008 RS=0000080B

EVENT 01: HIGH - HIGHCPU - SYSTEM: SY1 2010/01/09 - 15:00:28 ASID CPU RATE: 99% ASID: 002D JOBNAME: IBMUSERX STEPNAME: STEP1 PROCSTEP: JOBID: JOB00044 USERID: IBMUSER JOBSTART: 2010/01/09 - 15:00:13 ERROR: ADDRESS SPACE USING EXCESSIVE CPU TIME. IT MAY BE LOOPING. ACTION: USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.

EVENT 02: HIGH - LOOP - SYSTEM: SY1 2010/01/09 - 15:00:23 ASID: 002D JOBNAME: IBMUSERX TCB: 004E6868 STEPNAME: STEP1 PROCSTEP: JOBID: JOB00044 USERID: IBMUSER JOBSTART: 2010/01/09 - 15:00:13 ERROR: ADDRESS SPACE APPEARS TO BE IN A LOOP. ACTION: USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.



Local lock suspension and CPU analysis

EVENT 01: **HIGH - LOCK** - SYSTEM: SY1 2009/09/02 - 14:59:22 HIGH LOCAL LOCK SUSPENSION RATE - ASID: 0002 JOBNAME: PCAUTH STEPNAME: PCAUTH PROCSTEP: IEFPROC JOBID: +++++++ USERID: ++++++ JOBSTART: 2009/09/02 - 14:50:15 ERROR: ADDRESS SPACE HAS HIGH LOCAL LOCK SUSPENSION RATE. ACTION: USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID. EVENT 02: HIGH - HIGHCPU - SYSTEM: SY1 2009/09/02 - 14:59:22 ASID CPU RATE: 096% ASID: 0033 JOBNAME: IBMUSERG STEPNAME: STEP1 PROCSTEP: IEFPROC JOBID: JOB00111 USERID: IBMUSER JOBSTART: 2009/02/17 - 13:30:16 ERROR: ADDRESS SPACE USING EXCESSIVE CPU TIME, IT MAY BE LOOPING. ACTION: USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.



Loop detection

EVENT 07: HIGH - LOOP - SYSTEM: SY1 2009/06/12 - 13:28:46 ASID: 0027 JOBNAME: DAVIDZ TCB: 004E6850 STEPNAME: DAVIDZ PROCSTEP: DAVIDZ JOBID: STC00042 USERID: ++++++ JOBSTART: 2009/06/12 - 13:28:35 ERROR: ADDRESS SPACE APPEARS TO BE IN A LOOP. ACTION: USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.

If HIGHCPU & LOOP events list the same job name, there's a high probability that a task in the job is in a loop. Normal corrective action is to cancel the job.



Component analysis: Buffer shortages

EVENT 03: MED - STORAGE - SYSTEM: SY1 2010/07/13 - 12:51:31 IEE766E BUFFER SHORTAGE FOR SYSTEM LOG - 60% FULL ERROR: SYSLOG BUFFERS ARE 60% FULL. ACTION: ENTER CONTROL M,LOGLIM (K M,LOGLIM) TO INCREASE WTL BUFFERS. ACTION: INCREASE LOGLIM VALUE IN CONSOLxx PARMLIB BEFORE NEXT IPL.

Problem, actions identified



Sample Runtime Diagnostics Scenarios

Problem	Symptoms	Current / skilled analysis	Runtime Diagnostics
Transactions not processing on 1 or more systems in sysplex; Sympathy sickness	System msg: stalled connector (Job name)	Locate message: XES external hang detect (stalled connector) •Locate job name in message •If found, –Determine if the jobname in the message is using high CPU (in a loop) –Determine if the jobname is blocked by ENQ contention –Determine if the jobname is waiting on any locks	Analysis done automatically
Loop in RRS caused IMS shared queue hang	IMS systems hung; transactions waiting in RRS	Look for RRS UR exceptions	TCB Enabled Loop Detection
Transactions start to process slowly as tran rate increases		 Notice Extremely high paging rate detected LPAR incorrectly configured with too little real storage 	Analysis done automatically
Systems backing up; not clear which system at fault		Look for components with high CPU; Guess if looping	 High CPU in authorized system component Detect loop from examining system trace Analysis done automatically
Console buffer shortages	Console was unresponsive with no indication why	Look for messages	The buffer shortage was reported, automatically
Jobs using excessive CPU	Systems were hung up, many log streams were backed up & failing to offload.	Trying to logon resulted in LOGON PROCEEDING many times.	Runtime Diagnostics reported system using excessive amounts of CPU Cancelled workload, some WTORs DOM'd themselves.



Installation / Configuration

- Update PARMLIB member IEFSSNxx indicating HZR is a subsystem
- Copy HZR from SYS1.PROCLIB to your installation's PROCLIB
 - Update proc HZR for DDNAME HZROUT to have the output of Runtime Diagnostics go to a sequential data set
 - The HZR proc cannot be renamed. It must be HZR
- Update your security product like RACF to give HZR read access to OPERLOG
- Excellent instructions in the Runtime Diagnostics section of the R12 z/OS Problem Management book for
 - The specifications of HZROUT
 - Example RACF syntax for giving HZR access to OPERLOG
 - Other configuration considerations



Runtime Diagnostics

- ➢ Give it a try once you're on z/OS R12 !
- Send technical feedback to Bob Abrams, <u>abrams@us.ibm.com</u>

IBM Systems and Technology Group Soft Error Identification: **PD** Simplification **Predictive Failure Analysis (PFA)** - Common Storage Usage - Frames and Slots Usage Simplifying Alice's tasks - Logrec Arrival Rate - Message Arrival Rate - SMF Arrival Rate System Symptom Analysis: **Runtime Diagnostics** z/OS Service Aids Analyze a sick system, Dumps upon request (operator command) • Logs Component errors Traces Address space behavior (ENQ, CPU consumption, Loops) Tools **Problem Data Management: Incident Log** Improve FFDC for system-detected problems Diagnostic data "snapshots" for transient data FTP Incident with all diagnostic data • User interface to display summary, detail, drive actions

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IBM z/OS Management Facility

- IBM z/OS Management Facility (z/OSMF), a new zero priced product, will simplify, optimize and modernize the z/OS system programmer experience
- z/OSMF will deliver solutions in a task oriented, Web browser based user interface with integrated user assistance
- Benefit:
 - z/OSMF will make the day to day operations and administration of the mainframe z/OS systems easier to manage for both new and experienced system programmers.
 - The focus is to help improve system programmer productivity, and make the functions easier to understand and use.





z/OSMF Problem Determination – Incident Log

- Auto-capture basic diagnostic materials, triggered when the dump is written to a data set, managed via parmlib member
 - Initial focus: Abend and user initiated SVC dumps
 - Diagnostic data "snapshots" for transient data:
 - Snapshots of 30 min Operlog or Syslog, 1 hr Logrec detail, and 24-hour Logrec summary
 - Diagnostic log snapshots based on the SYSLOG and LOGREC data sets (R12), as well as the OPERLOG and LOGREC sysplex log streams (R11)
 - Allow doc to be tersed and FTP'd to IBM (or ISV) without having to keep track of where logs are archived via easy to use interface
- Incident Log User Interface:
 - Display list of incidents (Filter/ sort/ configure/ delete)
 - Display details for selected incident view list of diagnostic details, dump & log DSNs
 - Associate problem number and tracking id (R11), Free form notes (R12), additional customization capabilities (R12)
 - Send diagnostic data via FTP: Manage FTP jobs status and define FTP Profiles (firewall) (R11), Leverage encrypted and parallel FTP (R12)
 - Send additional user-defined diagnostic data files (R12)
 - Enhance scope of diagnostic log snapshots created (R12) (Logrec capture improvements)
 - Inform DAE to take the next dump for the selected incident's symptom string



Additional Incident Log V1R12 enhancements

- The **Incident Log task** under the Problem Determination category is enhanced with the following new functions:
 - Encryption of the incident files, including dumps; transmission of these files to IBM in parallel through FTP to save time
 - To do so, the host and destination must have the z/OS Problem Documentation Upload Utility installed
 - Send additional documentation with an incident to an FTP destination
 - Providing free form Notes or comments for each incident
- Diagnostic data is improved
 - Logrec Summary Report now based on LOGDATAS
 - Hardware related Logrec reports are captured when I/O-related failing component

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Incident Log configuration

CEAPRMxx

```
SNAPSHOT(Y)
HLQ(CEA)
DUMPCAPTURETIME

(
SLIP(OPERLOG(00:30:00) LOGREC(01:00:00)
LOGRECSUMMARY(04:00:00))

DUMP(OPERLOG(00:30:00) LOGREC(01:00:00)
LOGRECSUMMARY(04:00:00))

ABEND(OPERLOG(00:30:00) LOGREC(01:00:00)
LOGRECSUMMARY(04:00:00))
)
COUNTRYCODE(xxx)
BRANCH(xxx)
STORAGE(STORCLAS(STANDARD))
```

- Requires Sysplex Dump Directory to be set up
- Automated diagnostic data capture assumes Operlog, Logrec log streams
 - Log Snapshots captured to DASD Log Streams
- Automatic Dump data set allocation recommended
- DAE recommended to be active
- AMATERSE in an APF authorized library
- System REXX used



Help

Incident Log – Summary Information

Welcome 🖾 👘 Incident Log 🔘

Incident Log

Incidents

Actions 🔻

	Incident Type Fiter	Description Filter	Date and Time Past 300 days	Sysplex Filter	System Filter	Problem Number Filter	Tracking ID Filter	Notes Filter	Release Filter	Pro Filte
<u>.</u>	ABEND S0913	COMPON=COMPONENT TRACE,COMPID -SCTRC/SSUER-ITTRREC	Nov 17 2008 3:28:58 PM	PLEX1	SY1	12345	AR35730		V1R10	<u>^</u>
	User hitiated	DUMP4	Nov 17 2008 3:28:13 PM	PLEX1	SY1	test		Being worked	V1R10	
	User hitiated	DUMP3	Nov 17 2008 3:27:23 PM	PLEX1	SY1		aac		Y1R10	
	User hitiated	DUMP2	Nov 17 2008 3:25:29 PM	PLEX1	SY1			Sent on Nov 17 2008	V1R10	
	User hitiated	DUMP1	Nov 17 2008 3:23:09 PM	PLEX1	SY1				V1R10	
	ABEND S00C4	IEC999I IFGORROA,SUBIT ,STEP1 4C6E18	Aug 22 2008 7:36:35 PM	PLEX1	SY1				V1R10	
	ABEND S00C4	IEC999I IFG0RR0A,SUBIT ,STEP1 4C6E18	Aug 22 2008 7:35:13 PM	PLEX1	SY1				V1R10	
	ABEND S00F8	COMPON=CEA,COMPID=SCCEA.JSSUEF	Aug 14 2008 1:19:49 PM	PLEX1	SY1				V1R10	1
100	User hitiated	SLIP DUMP ID=X0F8	Aug 14 2008 1:19:43 PM	PLEX1	SY1				V1R10	
	ABEND S00F8	COMPON=CEA,COMPID=SCCEA,JSSUEF	Aug 14 2008 1:57:05 AM	PLEX1	SY1				V1R10	1
100	User hitiated	SKIP-DUMP-049	Aug 13 2008 2:51:55 PM	PLEX1	SY1				V1R10	
	User hitiated	SKIP-DUMP-048	Aug 13 2008 2:51:44 PM	PLEX1	SY1			n - 1	V1R10	
	************		(1							V
				III						>

Total 12, Filtered: 12, Selected: 0

Refresh Last Refresh: Nov 17 2008 1:17:55 PM



Incident Log – Incident Details

Welcome 🛛	Inciden	tLog 🛇		
Incident Log	→ View E	Diagnostic Details		Help
View Diag	gnostic	Details		
General	Diagnos	tic Data		
Incident ty Incident d Date and Sysplex na	pe: escription: time: ame:	ABEND COMPON=COMPONENT TRAC Nov 17 2008 3:28:58 PM PLEX1	CE,COMPID=SCTRC,ISSUER=ITTRREC	
System na Problem r	ame: iumber:	SY1 12345	If the problem number is an IBM PMR number, check this box to verify the syntax.	
Tracking I	D:	AR35790		
Compone	nt name:	COMP TRACE		
Compone	ntID:	5752SCTRC		
z/OS relea	se:	V1R11		
Product:		BCP		
Abend cos	te:	S0913		
Reason c	ode:	00000038		
CSECT:		ITTPPARS		
Load mod	lule:	ITTCTSER		
Symptom	string:	MOD/ITTCTSER CSECT/ITTPP REGS/038A6 HRC1/00000038	ARS PIDS/5752SCTRC AB/S0913 REXN/ITTRR FI/41003B5E0A0D010D4DE03AF4 REGS/0E76E SUB1/COMPONENT#TRACE	
Notes:				
ОК Ар	ply Ca	ancel		



For more information on Incident Log

- *z/OSMF Configuration Guide*, SA38-0652
- z/OSMF presentations delivered at this SHARE

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z/OS R10, R11, R12 Serviceability enhancements





Large System Effects

Release	Problem	Solution area
R10	System Trace growth	System Trace buffers move above the Bar
R10	Unable to capture large IEATDUMP	>2G TDUMPs (&DS in data set names)
R10	Reduce time to initialize SADMP	Export dump directory created by COPYDUMP IPCS COPYDDIR
R10	Run out of room dumping storage in ascending order before dumping critical data → WAS 64-bit users with large heaps can end up with dumps where the system and LE stacks needed to debug them are truncated	SDUMP support for 64-bit storage - Priority established for high virtual memory objects - SDUMP honors that priority - Below the bar storage dumped as before - SDATA SQA/CSA/LSQA/RGN include high virtual
R11	Running out of AUX space when taking SVC Dumps	AUXMGMT=ON/OFF (in CHNGDUMP cmd) - alternative to MAXSPACE (honored when specified)
R11	SDUMP system non-dispatchability running too long	Limit SDUMP non-dispatchability with huge dumps - MAXSNDSP (default = 15 seconds)



Large System Effects ...

Release	Problem	Solution area
R12	Address spaces not in summary list tend to be higher ASIDs and not captured (out of space, stopped the dump)	Stand Alone Dump ASID prioritization - Add addr space names of value to the "summary list" (ADDSUMM: ASIDs, job names) - ANTMAIN, CONSOLE, XCFAS, IOSAS, SMXC, WLM, CATALOG, GRS, SMF, ALLOCAS, ANTAS000, DEVMAN, DUMPSRV, GRS, IEFSCHAS, IXGLOGR, JESXCF, JES2, JES3, OMVS, PCAUTH, RASP, SMSPDSE, SMSPDSE1, SMSVSAM, TRACE
R12	Significant amount of time in addr space non- dispatchability while global dump exits running - on DUMP command, getting a consistent view of Global & addr space storage may not be as critical - Cases where impact of stopping the addr spaces make system problem worse	 Reduce impact of DUMP command dump to system Defer setting tasks non-dispatchable on DUMP command CHNGDUMP DEFERTND DEFERTND also on DUMP command Delay setting addr space non-dispatchable until after global capture completed
R12	z/OS's capability of supporting more main storage, more CPUs and CPUs that are both faster and more diverse in purpose has warranted enhancements in diagnostic aids → more filtering options on IPCS SYSTRACE command via new keyword SORTCPU(time, number of entries)	IPCS System Trace formatting - SORTCPU: Number trace entries before & after specified date/time for each CPU - Performance reporting based on Sys Trace



SDUMP Availability

Release	Problem	Solution area
R10	 Only 1 SDUMP capture can be in progress at a time SDUMP could not be taken because system indicates a dump is in progress, but there's no dump in progress. Current dump collection may not complete, but future dumps are put on hold indefinitely Canceling DUMPSRV results in lost captured dumps You don't know SDUMP is locked until a dump is needed and cannot be taken 	Hung SDUMP Detection - System detects DUMPSRV hang situation - Takes a IEATDUMP from DUMPSRV, issues message - Issues message, warning installation that DUMPSRV can be recycled



Configuration / Usability

Release	Problem	Solution area
R10	Confusion over what needs to be extracted from Stand Alone Dump	Simplified running COPYDUMP - Defaults set, can be overridden on panel
R11	Configuration gotchas	Health Checks - Determine if AUTOIPL used in GDPS environment - Determine if AUTOIPL is configured - Validate devices specified for SADMP & MVS AUTOIPL - DAE data set configuration
R12	Want to run IPCS, save results to pass to other analysts, reduce overall time spent on problem	Extract & store important info in PDS, PDSE - Stand Alone Dump or SDUMP - Allocate PDS to IPCSPDS DD - SETDEF PDS SETDEF NOPDS - Output of each IPCS subcommand (or REXX exec) written to separate member - Supports IPCS subcommand and REXX execs (not CLISTs)



Summary

Problem Determination Simplification

Built on z/OS's robust (and continually evolving) RAS technology

- Predictive Failure Analysis
- Runtime Diagnostics
- z/OSMF Incident Log
- Base Serviceability functions



Machine-speed understanding
 Better tooling to identify the culprit
 Integrated Problem data management
 Enables faster / correct recovery actions