

# Testing and Debugging Your Installation's ACS Routines

Session 8961

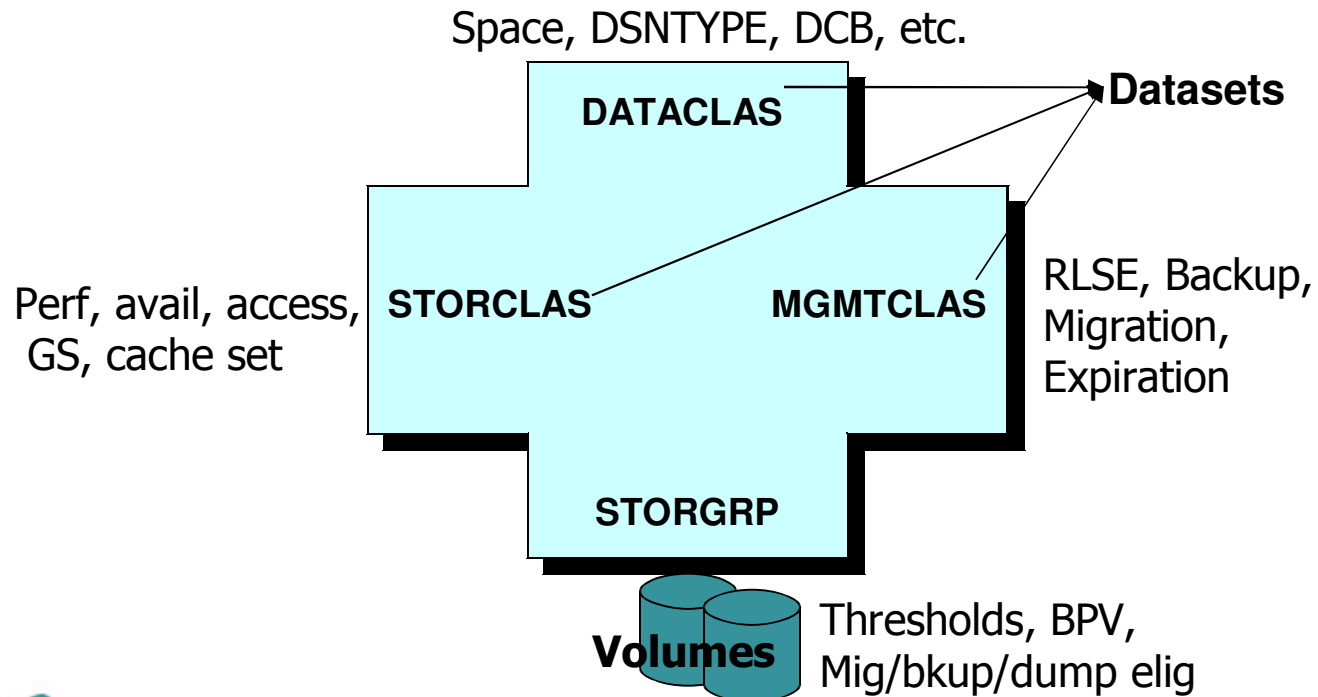
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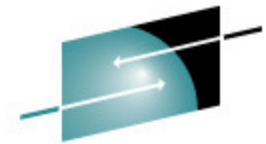
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# Automatic Class Selection is Important

- Implement storage management policy
- Executed for all new dataset allocations
  - SMS and non-SMS, all types of media





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# ACS Variables

&ACCT_JOB	&DEF_STORCLAS	&JOB	&MSPARM	&SIZE
&ACCT_STEP	&DSN	&LABEL	&MSPOLICY	&SPACE_TYPE
&ACSENVIR	&DSNTYPE	&LIBNAME	&MSPOOL	&SYSNAME
&ALLVOL	&DSORG	&LLQ	&NQUAL	&SYSPLEX
&ANYVOL	&DSOWNER	&MAXSIZE	&NVOL	&UNIT
&APPLIC	&DSTYPE	&MEMHLQ	&PGM	&USER
&BLKSIZE	&EXPDT	&MEMLLQ	&RECORG	&XMODE
&DD	&FILENUM	&MEMN	&RETPD	
&DEF_DATACLAS	&GROUP	&MEMNQUAL	&SECLABL	
&DEF_MGMTCLAS	&HLQ	&MSPDEST	&SECOND_QTY	

&DATACLAS	&STORCLAS	&MGMTCLAS	&STORGRP
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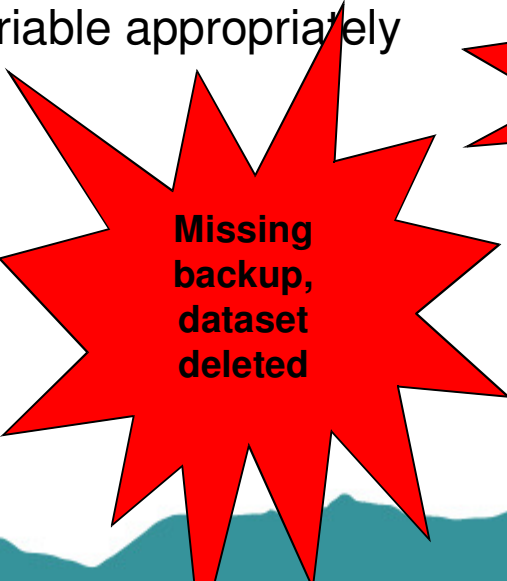
• *With OA32103 &ACSENVIR2 = 'FLASHCOPY'/null*

# ACS Routine Failures

- Coding Errors
  - Incorrect use of FILTLISTs or masks
  - Incorrect use of quotes
  - Incorrect use of GDG or special names
- Logic Errors
  - Using inappropriate R/O variables
  - Missing or early EXIT
  - Failure to SET R/W variable appropriately



**Wrong  
volume  
selected**



**Missing  
backup,  
dataset  
deleted**



**Unable  
to  
allocate**



**Poor  
performance**

# Problem Variables

- **&ALLVOL, &ANYVOL**
  - Volume reference values = 'REF=SD | ST | NS'
  - Recall or Recover and VOLCOUNT(ANY) = null
- **&DSN**
  - GDG = base name only, PDS = dataset name only
- **Data Class assignment may change R/O variables**
  - &RECORG, &NVOL, &DSNTYPE, &SIZE / MAXSIZE
  - above variables are also not available if LIKE=

# Problem Variables

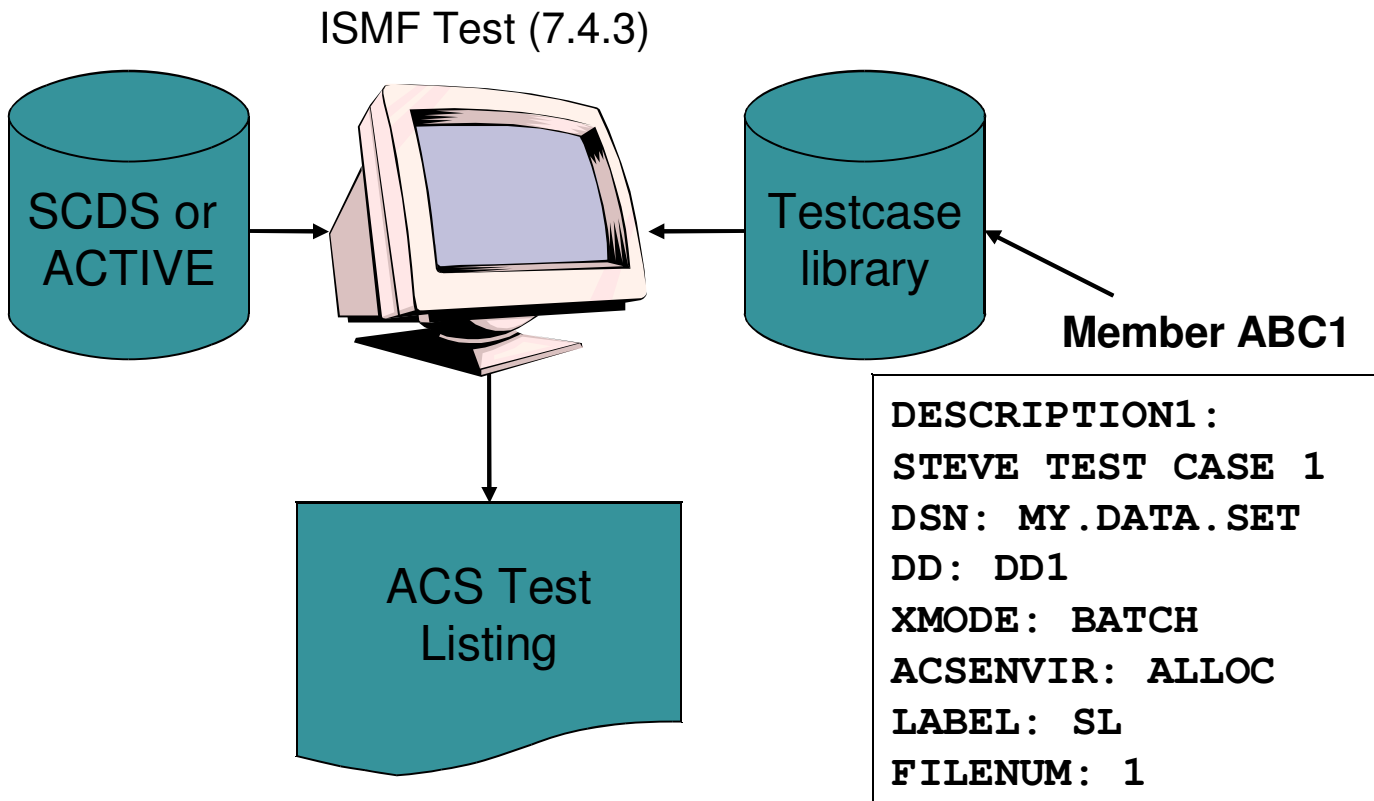


- **&SIZE / &MAXSIZE**

- ACS test case must specify KB, ACS routine can compare KB or MB
- z/OS 1.11 introduces &SPACE\_TYPE and &SECOND\_QTY
- **&SIZE / &MAXSIZE** *recalculated* after DATACLAS routine runs
  - But this is not accounted for in ISMF test
- For non-VSAM
  - &SIZE = Primary + directory
  - &MAXSIZE = Primary + directory + 15 secondaries
- For VSAM (based on cluster, then data, then index)
  - &SIZE = Primary
  - &MAXSIZE = Primary + 122 secondaries \* volcount
    - *May be different if ECR and/or Add'l Volume Amount = 'S'*

# Native ISMF Test

- Test cases are flatfile PDS members



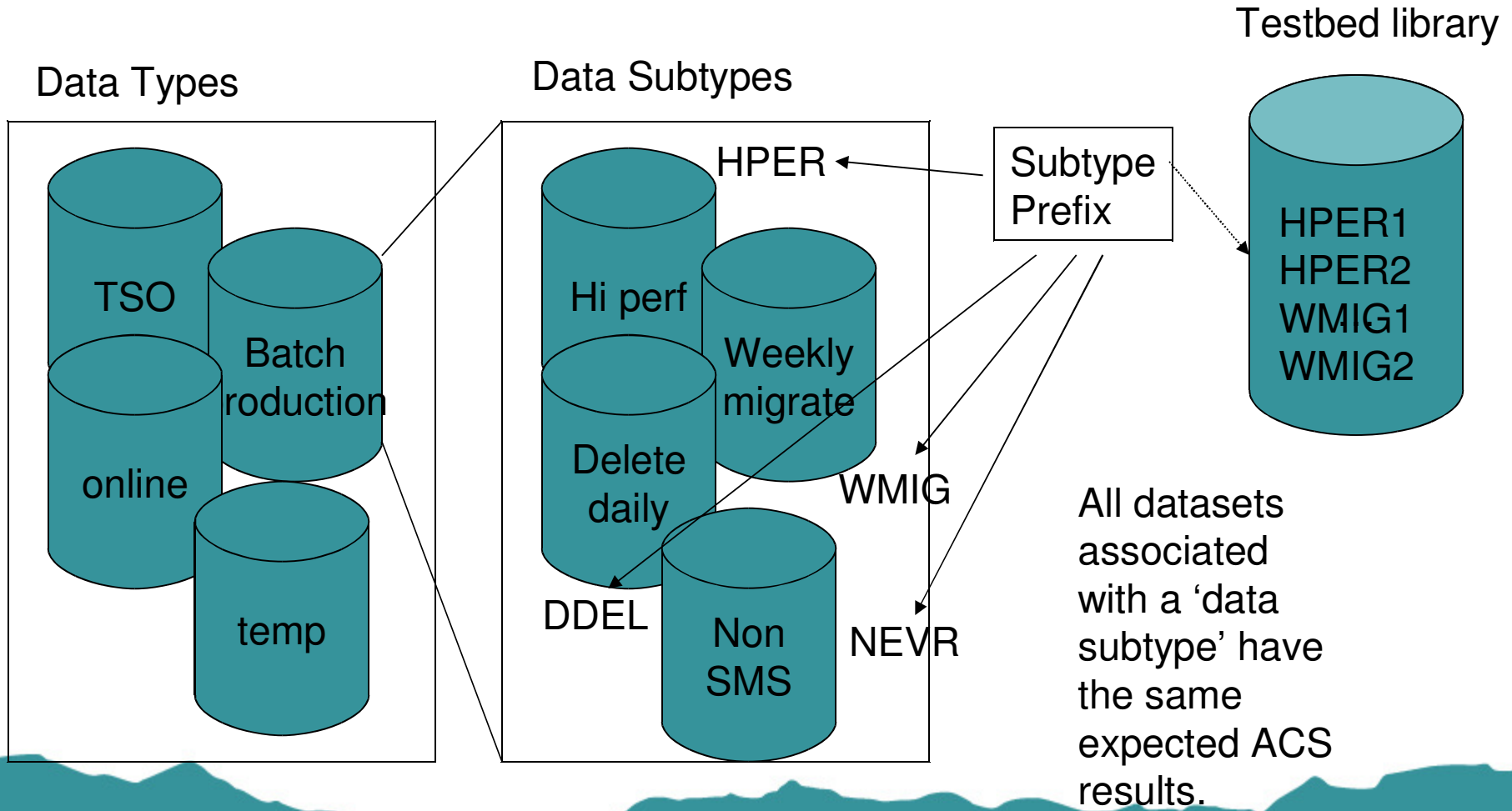
# Create an ISMF Test Case

- Manually Define or Alter or Execute
  - via ISMF Test (7.4.1, 7.4.2, 7.4.3)
- Naviquest
  - Saved ISMF list
  - SMF data created by ACS routine exit SYS1.SACBCNTL(IGDACSSC)
  - DCOLLECT, VMA extract
- Data source may need to be cleaned up before testcase generation
  - SYS1.VTOC, SYS1.VVDS eliminated
  - duplicates eliminated



# Naviquest Terminology

## Data Classification



# ISMF Testcase Listings

- ACS routines executed and EXIT codes
- SMS classes and SG assignments
- Messages

## ACS TESTING RESULTS

CDS NAME : STEVE.SCDS

ACS ROUTINE TYPES: DC SC MC SG

ACS TEST LIBRARY : STEVE.TESTCASE.PDS

ACS TEST	MEMBER	EXIT CODE	RESULTS
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-----  
DESCRIPTION: TEST CASE CREATED 2010/07/30 AT 08:06 BY STEVE

EXPECTED RESULT:

SJPA1	0	DC = NULL VALUE ASSIGNED
-------	---	--------------------------

	0	SC = STC1
--	---	-----------

MSG : SIZE GT 30M=000014C0

	0	MC = STANDEF
--	---	--------------

ACS TESTING RC: 00

# Saved ISMF List



- Create list via ISMF Dataset application (option 1)
  - Easy to create
- Build Test Cases via Naviquest (option 11.1)
- Easy to create
  - But does not always create valid test cases
    - Any invalid data in the testcase results unable-to-ALTER, unable-to-execute testcase, or worse
      - *Saved list uses SPACETYPE instead of SPACE\_TYPE*
      - *Saved list uses 'K' or 'M' in SIZE variable (unable to ALTER but testcase executes, incorrectly)*
  - Non-dataset variables must be manually entered
    - JOB, XMODE, ACCT, DD, etc.
    - can be entered at Naviquest testcase generation time, or under ISMF 7.4
  - Doesn't work for VSAM
    - Data/Index cases created but not CLUSTER – ok for RENAME but not ALLOC

# DCOLLECT Data



- Run DCOLLECT for dataset info
  - ISMF option C or batch job
- Generate test cases
  - Navquest (ISMF 11.2)
- Easy to create lots of test cases
  - Navquest testcase generation filters out SYS1.VVDS, etc.
  - Non-dataset variables must be manually entered after testcase generation
    - JOB, XMODE, ACCT, DD, etc.

# SMF Records from IGDACSSC

- **STORCLAS** exit supplied in **SYS1.SACBCNTL**
  - source code accesses ACERO, ACERW, ACSPM
    - must be reassembled for each new DFSMS release
  - writes 'exit entered message'
  - write ACS R/O variables to SMF type 127
  - optionally write ACS R/O variables to job log if ACCT=DEBUG
- **Program ACBTST**
  - creates testcases from SMF type 127 records - one PDS member each
- **Can create many test cases**
  - includes all variables - JOB, STEP, DD, PGM, USER, etc.
  - Customize exit to select only desired jobs/applications
  - PDS member names Tnnnnnnn may need to be made meaningful

# Naviquest



- Enhanced ACS Management – ISMF Option 11
  - Test Case Generation
  - Test Case Listings Comparison
  - Test Case Update
- Batch or ISPF
  - batch jobs invoke ISMF / ISPF via REXX
  - most ISPF functions can be performed in batch

# Naviquest Regression Testing

- Test Case Execution
  - Execute Test Cases vs. SCDS 1 – save listing
  - Execute Test Cases vs. SCDS 2 – save listing
- Test Case Listing Comparison
  - Compare listing 1 vs. listing 2
  - Outputs:
    - Summary of exceptions listing
    - Exception Test Case PDS – test case library for test cases with different results
- Test Case Update
  - Update Test Case Library from Exception Library + Exception Listing
    - Replace DESCRIPTION2
    - DC=, SC=, MC=, SG= (limited to 80 chars)

# WRITE Statements

- Use to display values of variables
  - Up to 110 characters
- Problems
  - TSO – displays only if allocation fails
  - Only first SG name displayed
  - Only first volume displayed for &ALLVOL / &ANYVOL
  - Maximum of 5 messages per ACS routine



# Using 'Trigger' Values

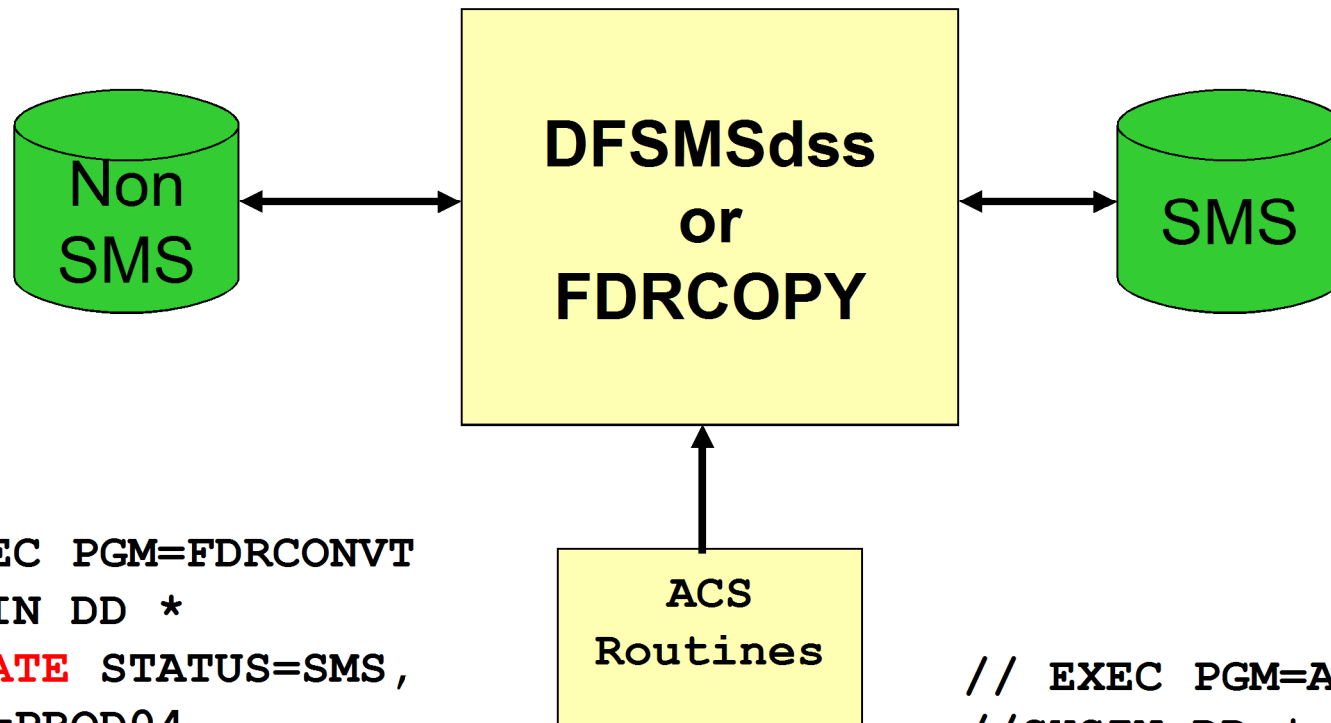
- Testing vs. ACTIVE
  - Run test jobs, e.g., PGM=IEFBR14
  - Examine JESMSGs
- Testing vs. SCDS
  - Use ISMF Test
  - Examine Testcase Listing
- Select on special values
  - Special JOBNAME, DD, etc.  

```
IF &DD = 'PI314159' THEN WRITE 'SIZE='&SIZE  
IF &JOBNAME = TESTX* THEN DO  
  WRITE 'SIZE='&SIZE  
  IF &XMODE = TSO THEN EXIT CODE(99)  
END
```
  - Nonexistent SMS class, e.g.,  

```
IF &STORCLAS = 'NULL' THEN SET &STORCLAS = "  
IF &ACSENVIR = 'ALLOCTST' (vendor use)
```

# CONVERTVOL

- Use SMS Conversion-in-Place (SIM) to execute ACS routines



```
// EXEC PGM=FDRCONVT  
//SYSIN DD *  
SIMULATE STATUS=SMS,  
VOL=PROD04,  
REDETERMINE=YES
```

```
// EXEC PGM=ADDRDSSU  
//SYSIN DD *  
CONVERTV SMS TEST -  
DYNAM (PROD04) -  
RETDETERMINE
```

## What ACS Testing Can't Do

- Expose ACS routine logic errors directly
- Use of LIKE= parameter in JCL
  - No &DSNTYPE, &DSORG, &SIZE/&MAXSIZE, RECORG
- Find Dataset Separation Profile errors
- Determine which volume will be selected for allocation
  - Use VOLSELMSG option in IGDSMSxx

# IGDSMSxx Values

- Values affecting ACS Routines
  - ACSDEFAULTS(YES | NO)
  - BREAKPOINTVALUE(nnnnn)
  - DSNTYPE(LIBRARY | PDS | HFS)
  - REVERIFY(YES | NO)
  - USE\_RESOWNER(YES | NO)
  
- Values affecting Allocation and Volume Selection
  - FAST\_VOLSEL(ON | OFF)
  - GDS\_RECLAIM(YES | NO)
  - OVRD\_EXPDT(YES | NO)
  - USEEAV(YES | NO)
  - VOLSELMSG

# ACS Testing and Debugging

- Keys to Success
  - **Limit the size and complexity of the ACS routines**
    - and the number of SMS classes
  - Log all updates to ACS and prepare a fallback
    - Use SETSMS with SAVEACDS
  - Use WRITE statements to show ACS variable values
  - Include easily-accessible 'testing' code in ACS routines
    - Perhaps duplicate the production ACS routines as 'test' segments in the test LPARs
  - Create and Maintain a Testcase Library and regression testing regimen

# ACS Testing and Debugging

- Keys to Success
  - Use 'durable' variables
    - DSN(n), DSORG, RECORG, DSNTYPE, etc
  - Code EXIT after SET
    - Use SELECT rather than IF
  - Always VALIDATE configuration before changing

# Documentation



## *R12 DFSMS Bookshelf*

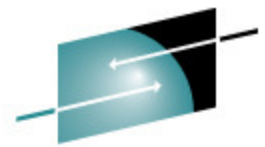
- [http://publibz.boulder.ibm.com/cgi-bin/bookmgr\\_OS390/Shelves/dgt2bka0](http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/Shelves/dgt2bka0)

## *DFSMSdfp Storage Administration SC26-7402-14*

- Defining SMS Constructs
- ACS Routine Language and Syntax
- Navquest
- *DFSMS Using ISMF SC26-7411-07*
  - *Dataset list generation*
- *DFSMS Implementing System-Managed Storage SC26-7407-06*
  - Implementing SMS management
- *DFSMS Using the New Functions SC26-7473-07*
  - What's new in DFSMS (incl HSM, DFDSS, IDCAMS, et. al.)



# Questions???



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