



IBM Software Group

IMS30 IMS Fast Path Enhancements

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IMS Development



IMS Fast Path Enhancements

- IMS V8 Fast Path Enhancements
- IMS V9 Fast Path Enhancements
- IMS Fast Path Small Program Enhancements
- IMS Fast Path Tools Enhancements



IMS V8 Fast Path Enhancements



- Non-recoverable DEDBs
- Greater Than 240 Areas
- Shared VSO Coupling Facility Enhancements



Non-Recoverable DEDBs (NRDEDBs)

- Provide capability to use DEDBs as temporary or work or scratchpad databases
- Support VSO, non-VSO, shared or non-shared DEDBs
- Does not support DEDBs with SDEPs
 - ▶ DFS3711A issued during DBFUMIN0 or online authorization when SDEPs are defined
- Declare DEDB as non-recoverable in DBRC
 - ▶ INIT.DB or CHANGE.DB
(RECOVABL / NONRECOV)
 - ▶ Declared at the DB level (not by Area)
 - ▶ Must not be RSR recovered



Non-Recoverable DEDBs (Cont'd)

- Reduce log volume
 - ▶ No database change (5950) logging
 - No REDO capability
 - No I/O toleration (no EEQEs)
 - ▶ New 5951 record written once per Area per syncpoint
- Improve online performance
 - ▶ At checkpoint, no hardening of VSO data to an ADS
 - ▶ Hardening of VSO to an ADS is done at:
 - IMS shutdown
 - Area close (/DBR, /STO, or /VUN)



Non-Recoverable DEDBs (Cont'd)

- Read Errors
 - ▶ AO status to the application

- Write Errors
 - ▶ Single ADS or last good MADS
 - Tolerate 10 errors as EQEs, then mark Stopped/Recovery Needed
 - ▶ At least 1 more good MADS
 - Tolerate 10 errors as EQEs, then switch and continue



Non-Recoverable DEDBs (Cont'd)

- Image Copy
 - ▶ Concurrent Image Copy not supported

- Database Recovery
 - ▶ RESTORE keyword required for GENJCL.RECOV and Non-recoverable DEDBs
 - ▶ Update log records may be needed for RESTORE depending on the sequence of events



Non-Recoverable DEDBs (Cont'd)

- Migration
 - ▶ Existing DEDBs may be changed to non-recoverable after migration to IMS V8 or higher.
 - ▶ Operational procedures may need to be changed
 - Use automation to restore or re-initialize after errors for a non-recoverable DEDB.
- Fallback
 - ▶ Improperly closed
 - Restored/re-initialized, changed to recoverable and Image copied before fallback
 - ▶ Properly closed
 - Changed to recoverable and Image Copied



Greater Than 240 Areas (GT240 Areas)

- Remove the 240 Areas restriction for DEDBs
 - ▶ Increase from 240 Areas to 2048 Areas for DEDB

- No changes to current DEDB externals
 - ▶ DBDGEN / ACBGEN
 - ▶ DBRC registration (optional) of Areas
 - ▶ Online operation
 - ▶ DEDB utilities
 - ▶ Image Copy / Change Accumulation / DB Recovery



GT240 - Migration

- DEDBs with LE 240 Areas that are run through IMS V8 DBDGEN are backward compatible.
- ACBGEN with BUILD PSB=ALL prepares ACB blocks capable of supporting GT 240 Areas for all DEDBs
- When adding Areas GT 240 to an existing DEDB, the same rules apply as those used for adding Areas LE 240
 - ▶ Randomizer routine may need changes
- DEDBs with GT 240 Areas are not backward compatible



GT240 – Coexistence

- IMS V7 will go out of service in October 2005
- Migration/Coexistence is enforced by DBRC Migration SPE (IMS V7 - PQ63108; INFO APAR – II13265)
- DEDBs having GT 240 Areas can only be shared among IMS V8 or higher systems.
- DEDBs having LE 240 Areas may be shared among IMS systems of all supported releases.
- IMS V8 or higher utilities must be used for Change Accumulation and DB Recovery



GT240 – Fallback

- DEDBs with LE 240 Areas follow current fallback procedures. The DBDs are backward compatible. ACBGEN should be run on the prior releases
- DEDBs with GT 240 Areas must be converted back to DEDBs having LE 240 Areas before fallback.



Shared VSO CF Enhancements

- Provide coupling facility enhancements for Shared VSO
 - ▶ System-Managed Rebuild
 - Rebuild a VSO structure from one CF to another for planned reconfiguration without taking it offline.
 - Does not support rebuild for loss of connectivity, structure or coupling facility failure cases.
 - ▶ Auto Alter
 - Dynamically expand or contract a VSO structure size at a system event, if needed
 - ▶ System-Managed Duplexing
 - Allow dual VSO structure support without explicitly defining both primary and secondary structures in DBRC and in a CFRM policy.



Shared VSO CF Enhancements (Cont'd)

- Software and Hardware Requirements:
 - ▶ System-Managed Rebuild
 - OS/390 V2R8
 - CF Level 9
 - ▶ Auto Alter
 - OS/390 V2R10
 - CF Level 9
 - ▶ System-Managed Duplexing
 - z OS/1.2 with OW41617
 - CF Level 11 (9672 CF) or CF Level 12 (zSeries CF)
 - CF-to-CF links



SVSO Enhancements: System-Managed Rebuild

- System Managed Rebuild Benefits
 - ▶ Provide a means to rebuild a VSO structure for planned reconfiguration while the structure remains online.
 - ▶ All structures in a coupling facility can be migrated using a single command.



SVSO Enhancements: System-Managed Rebuild

- CFRM Policy Change
 - ▶ Define two or more coupling facilities of CF level 9 or higher in the preference list, PREFERREDLIST() for a VSO structure.

- Initiating a Rebuild for a VSO Structure
 - ▶ Via "SETXCF START,REBUILD,STRNAME=strname" command for copying a VSO structure from one coupling facility to another.
 - ▶ Via "SETXCF START,REBUILD,CFNAME=cfname" command for copying all structures from a coupling facility to another.



SVSO Enhancements: Auto Alter

- Auto Alter Benefits
 - ▶ Dynamically expand or contract a structure based on its actual coupling facility storage usage.
 - ▶ Over-configured coupling facility storage can be reclaimed when zOS needs coupling facility storage.
 - ▶ Users have exclusive control over the structures that are to be included as potential Auto Alter candidates.



SVSO Enhancements: Auto Alter

- Enabling Auto Alter for a VSO Structure
 - ▶ Via IXCMIAPU Policy Utility CFRM parameters under STRUCTURE
 - MINSIZE(minsize)
 - ALLOWAUTOALT(YES)
 - FULLTHRESHOLD(value)

- Data sharers of a VSO structure cannot have any IMS connector that does not support Auto Alter function.



SVSO Enhancements: Sys-Managed Duplexing

- System Managed Duplexing Benefits
 - ▶ Provide dual VSO structure support without having to define secondary structures in DBRC and in a CFRM policy.
 - ▶ Automatically switch to Simplex mode from Duplex mode when a loss of connectivity, a structure failure or a coupling facility failure occurs in one of the VSO structure instances.



SVSO Enhancements: Sys-Managed Duplexing

- Enabling System Managed Duplexing
 - ▶ A System Managed Duplexing capable CFRM CDS is required:
 - ITEM NAME(SMDUPLEX) in CFRM CDS Format Utility (IXCL1DSU) control card defines a CFRM CDS to be system managed duplexing capable.



SVSO Enhancements: Sys-Managed Duplexing

- Enabling System Managed Duplexing (Cont'd)
 - ▶ The DUPLEX keyword in a CFRM policy is enhanced to control whether system-managed duplexing is allowed for a structure:
 - DUPLEX(ENABLED)
 - DUPLEX(ALLOWED)
 - DUPLEX(DISABLED)
 - ▶ Data sharers of a VSO structure cannot have any IMS connector that does not support Duplexing.



SVSO Enhancements: Sys-Managed Duplexing

- Initiating System Managed Duplexing
 - ▶ DUPLEX(ENABLED)
 - Triggers at a system event (e.g., connect, disconnect, etc.)
 - ▶ DUPLEX(ALLOWED)
 - Via an operator command to start or stop duplexing
 - "SETXCF START,REBUILD,DUPLEX,STRNAME=strname"
 - "SETXCF STOP,REBUILD,DUPLEX,STRNAME=strname,KEEP=OLD|NEW"



SVSO Enhancements: Sys-Managed Duplexing

- Migration and Coexistence Considerations
 - ▶ Once system-managed duplexing is enabled for a VSO structure, IMS systems that do not support system managed duplexing function are prevented from connecting to the structure to data share



IMS V9 Fast Path Enhancements



- Multi-Area Structure
- Fast Path Area Open Enhancement
- Optional EMHQ for Shared Queues



SVSO Multi-Area Structure (MAS)

- Provide capability to have a structure populated by one or more Areas.
- All Areas in a MAS must have the same CI size
- No restriction on how many Areas can populate a structure
- No IMS duplexing for MAS
 - ▶ Duplexing is available thru System-Managed Duplexing



SVSO MAS – Defining a MAS

- Define MAS in DBRC via keyword “MAS”
 - ▶ Indicates that the Area is to reside in a Multi-Area Structure

- New buffer pool definition
 - ▶ DEDBMAS=(name , csize, pri, sec, max, lkasid, strname)



SVSO MAS – Defining a MAS : Example

- INIT.DBDS DBD(DEDDB1)
AREA(AREA1)
VSO
MAS
CFSTR1(MASSTR)
- INIT.DBDS DBD(DEDDB1)
AREA(AREA2)
VSO
MAS
CFSTR1(MASSTR)
- DEDBMAS=(MASPOOL,4K,1000,100,5000,
LKASID,MASSTR)

SVSO MAS – Connection

- First Area to connect to the structure creates the structure
- There is only 1 XES connection to the structure per IMS
- First Area that created the structure gets DFS2822I
 - ▶ DFS2822I AREA area CONNECT TO STR
strname SUCCESSFUL



SVSO MAS – Association

- First and Nth Area to connect to the structure associate to the structure
(Association is a logical connection to a CF structure)
- There is only 1 XES connection to the structure per IMS
(XES connection is a physical connection to a CF str)
- First and Nth Area that connected the structure get DFS2851I
 - ▶ DFS2851I AREA area ASSOCIATE TO STR
strname SUCCESSFUL



SVSO MAS – Disassociate

- First and Nth Area to disconnect from the structure disassociate from the structure
(Disassociate is a logical disconnection from a CF structure)
- First and Nth Area that disconnected from the structure get DFS2851I
 - ▶ DFS2851I AREA area DISASSOCIATE FROM STR strname SUCCESSFUL

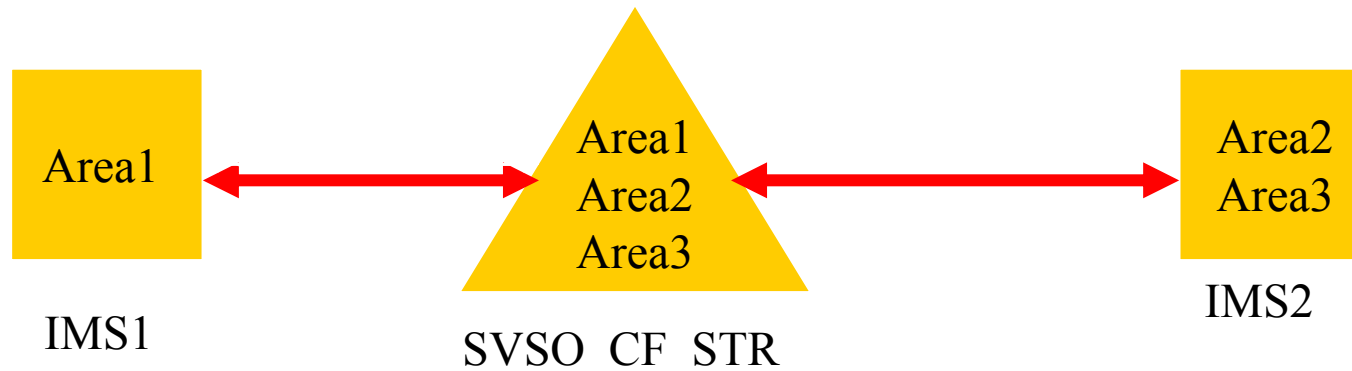


SVSO MAS – Disconnect

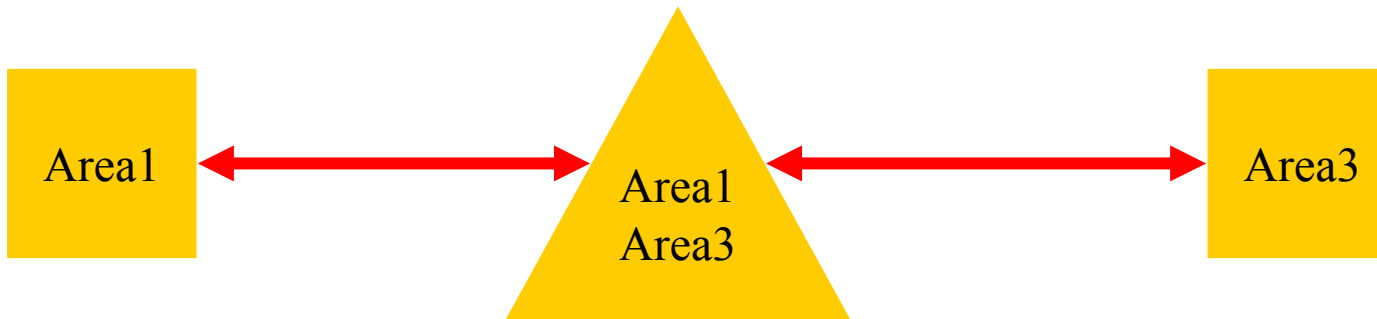
- Last Area to disconnect from the structure disconnect from the structure
(Disconnect is a physical disconnection from a CF structure)
- Removes the connection between XES and IMS
- Last Area that disconnected from the structure gets DFS2853I
 - ▶ DFS2853I AREA area DISCONNECT FROM STR strname SUCCESSFUL



SVSO MAS - /STO AREA Processing



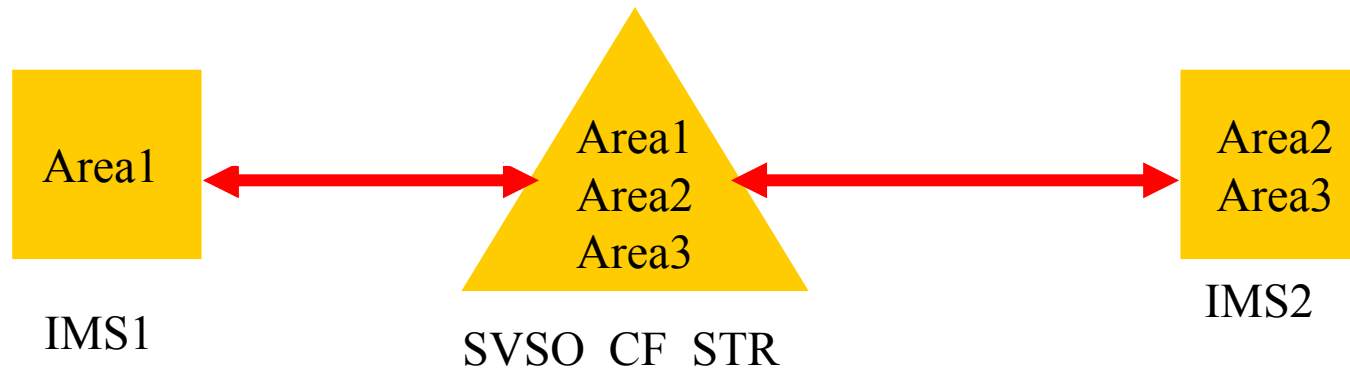
IMS2: /STO AREA AREA2 command entered



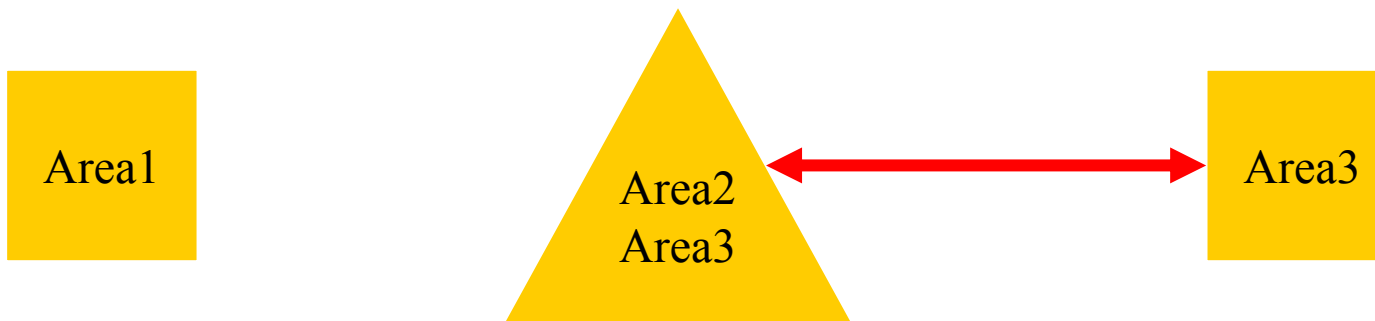
All the entries for Area2 are deleted from the structure



SVSO MAS - /VUN AREA Processing



IMS1: /VUN AREA AREA1 command entered



All the entries for Area1 are deleted from the structure



Fast Path Area Open Enhancement

- Enhance Fast Path Area Open/Close/Preopen/Restart Processing
- 10 Parallel TCBs for Area Open/Close processing
- Restart all DEDBs which were started at the time of an IRLM failure
- Reopen all DEDBs which were opened at the time of an IMS failure



Fast Path Area Open Enhancement

- Activate via New IMS Startup Parameters
 - ▶ FPOPN = N|P|R|A
 - Specify whether to re-open DEDB Areas automatically during IMS restart
 - ▶ FPRLM = N|P|S|R
 - Specify whether to re-start DEDB Areas automatically during IRLM reconnect



Optional EMHQ for Shared Queues

- Provide capability to make EMHQ structure optional in a Shared Queues environment with Fast Path installed
- Eliminate EMHQ and its related resources if not using Shared EMH



Optional EMHQ for Shared Queues

- Disable Shared EMH Processing in IMS:
 - ▶ Delete **the EMHQ statement** in DFSSQxxx proclib member



Optional EMHQ for Shared Queues

Sample DFSSQxxx Proclib Member

```
*****  
* IMS Shared Queue Definition Proclib Member *  
*****
```

```
CQS=CQSACA,  
CQSSSN=CQSA,  
MSGQ=QMSGIMS01,  
EMHQ=QEMHIMS01,  
SQGROUP=GRUP1
```

Delete EMHQ=
Statement



Optional EMHQ for Shared Queues

- Not to Allocate EMHQ Resources in CQS:
 - ▶ Delete **the STRUCTURE statements** for EMHQ:
 - In CQSSLxxx proclib member for an EMHQ structure and its associated CQS checkpoint dataset.
 - In CQSSGxxx proclib member for an EMHQ structure, its associated overflow structure, structure recovery datasets and CQS log.



Optional EMHQ for Shared Queues

Sample CQSSLxxx Proclib Member

*** CQS Local Structure Definition Proclib Member ***

*** Definition for IMS Message Queue Structure ***

```
STRUCTURE (STRNAME=QMSGIMS01,  
           CHKPTDSN=CQSA.QMSG.IMS01.CHKPT,SYSCHKPT=50000)
```

*** Definition for IMS EMH Queue Structure ***

```
STRUCTURE (STRNAME=QEMHIMS01,  
           CHKPTDSN=CQSA.QEMH.IMS01.CHKPT,SYSCHKPT=50000)
```

Delete
STRUCTURE=
Statement for
EMHQ



Optional EMHQ for Shared Queues

Sample CQSSGxxx Proclib Member

*** CQS Global Structure Definition Proclib Member ***

*** Definition for IMS Message Queue Structure ***

```
STRUCTURE (STRNAME=QMSGIMS01, SRDSDSN1=CQSA.QMSG.IMS01.SRDS1,
SRDSDSN2=CQSA.QMSG.IMS01.SRDS2, LOGNAME=SYSLOG.QMSG01.LOG,
OBJAVGSZ=1024)
```

*** Definition for IMS EMH Queue Structure ***

```
STRUCTURE (STRNAME=QEMHIMS01, SRDSDSN1=CQSA.QEMH.IMS01.SRDS1,
SRDSDSN2=CQSA.QEMH.IMS01.SRDS2, LOGNAME=SYSLOG.QEMH01.LOG,
OBJAVGSZ=1024)
```

Delete
STRUCTURE=
Statement for
EMHQ



Optional EMHQ for Shared Queues

- Not define EMHQ Structure and its CQS Log Stream
 - ▶ Delete **the STRUCTURE statements** for an EMHQ structure and its CQS log in CFRM policy.
 - ▶ Delete **the LOGSTREAM statement** for CQS log for an EMHQ structure in LOGR policy.



IMS Fast Path Small Program Enhancements



- High Speed REORG Enhancement
- New DLI RLSE Call
- VSO/SVSO Enhancements
- FDBR Enhancements
- /ERE Command Enhancement



SPE: High Speed REORG Enhancement

- Provide capability to reorganize specified segments directly into DOVF or IOVF
 - ▶ Bypass copying specified segments into RAP CIs to retain space in RAP CIs for new inserts
- Only support direct dependent segments for DOVF or IOVF direct copy
 - ▶ No DOVF or IOVF direct copy support for root and SDEP segments



SPE: High Speed REORG Enhancement

- Users specify segments via new input dataset, INDD
 - ▶ INDD dataset consists 3 input card types
 - ERRACTN= CONT | EXIT
 - AREA=areaname
 - segmentn
 - Segment name to be copied to DOVF or IOVF.
 - One segment name per line



SPE: High Speed REORG Enhancement

- IMS Versions Supported
 - ▶ IMS V7 (PQ86631)
 - ▶ IMS V8 (PQ90550)
 - ▶ IMS V9 (PQ90551)



SPE: New DLI RLSE Call

- Provide capability to release all locks that are held for unmodified data
- Support both Full Function and Fast Path
 - ▶ Full Function: Release locks for unmodified data under the DB PCB referenced in the call
 - ▶ Fast Path: Release all locks for unmodified data owned by the application



SPE: New DLI RLSE Call

- IMS Versions Supported
 - ▶ IMS V7 (in plan)
 - ▶ IMS V8 (PQ92045)
 - ▶ IMS V9 (in plan)



SPE: VSO/SVSO Enhancements

- **Fast Path Area Open Enhancement**
 - ▶ Provide capability to disable DEDB Area Preopen during IMS initialization
 - ▶ Activate via new IMS startup parameter
 - FPOPN=D
 - ▶ VSO/SVSO Areas that are defined to DBRC as PREOPEN are not opened at IMS initialization
 - Areas opened on first access or /STA AREA



SPE: VSO/SVSO Enhancements

- **Fast Path Area Open Enhancement**
 - ▶ IMS Versions Supported
 - IMS V8 (PQ74606)
 - IMS V9 (Base)



SPE: VSO/SVSO Enhancements

- **SVSO Enhancement at Disaster Recovery Site**
 - ▶ At ERE, IMS creates new SVSO structures at connect instead of connecting to existing SVSO structures at the local site because these structures at the local site do not exist at the disaster recovery site
 - ▶ Updates on SVSO structures at the local site made after the last checkpoint are lost
 - ERE does not apply updates with a 5612 log record because updates are hardened either to CF or DASD



SPE: VSO/SVSO Enhancements

- **SVSO Enhancement at Disaster Recovery Site**
 - ▶ Provide new startup parameter to specify SVSO options at disaster recovery site
 - SVSODR = NONE|AUTO|DRRS|WTOR
 - None: Processing unchanged
 - Auto: At ERE, if connect creates a new SVSO structure, mark Area as Recov Needed
 - DRRS: If ERE at disaster recovery site, it marks SVSO Area as Recov Needed at Area Open
 - WTOR: At ERE, if connect creates a new SVSO structure, issue a WTOR



SPE: VSO/SVSO Enhancements

- **SVSO Enhancement at Disaster Recovery Site**
 - ▶ IMS Versions Supported
 - IMS V7 (PQ67428)
 - IMS V8 (PQ69790)
 - IMS V9 (Base)



SPE: FDBR Enhancements

- **Serial Redo for SVSO Structures in FDBR**
 - ▶ Provide capability to redo Areas serially in a FDBR system
 - ▶ Activate via new option in DFSFDRxx Proclib member
 - SVSOOPEN=SERIAL
 - Option ignored at ERE or XRF TKO processing
 - ▶ Reduce the number of coupling facility structures being allocated by FDBR for redo processing



SPE: FDBR Enhancements

- **Serial Redo for SVSO Structures in FDBR**
 - ▶ IMS Versions Supported
 - IMS V7 (PQ70096)
 - IMS V8 (PQ70097)
 - IMS V9 (Base)



SPE: FDBR Enhancements

- **Local DEDB Buffer Pools Support for FDBR**
 - ▶ Provide capability to get DEDB buffer pools from Extended Private rather than from ECSA in a FDBR system
 - ▶ Activate via new option in DFSFDRxx Proclib member
 - FPBUFF=LOCAL



SPE: FDBR Enhancements

- **Local DEDB Buffer Pools Support for FDBR**
 - ▶ IMS Versions Supported
 - IMS V7 (PQ93253)
 - IMS V8 (PQ80264)
 - IMS V9 (Base)



SPE: /ERE Command Enhancement

- After multi-IMS failures, excessive DFS047 or DFS3709 messages attempting to authorize databases or Areas when new work begins before restarting all failed IMS systems
- Provide capability to synchronize the restart of failed IMS systems in an IMSplex via new parameter for keyword OPTION for /ERE command
 - ▶ /ERE **OPTION SYNCPLEX**
 - SYNCPLEX – Synchronize the startup of IMS systems after a multi-IMS failure

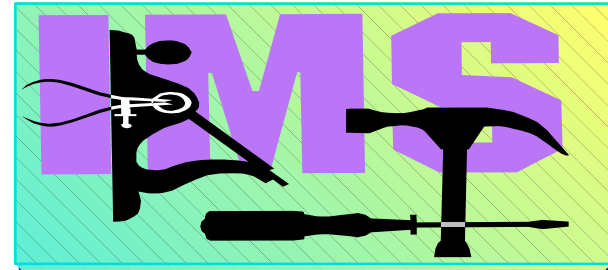


SPE: /ERE Command Enhancement

- IMS Versions Supported
 - ▶ IMS V8 (PQ95859)
 - ▶ IMS V9 (PQ89508)



IMS Fast Path Tools Enhancements



- Fast Path Tools

- ▶ IMS High Performance Fast Path Utilities, V2.1
5655-K94
- ▶ IMS DEDB Fast Recovery, V2.2 5655-E32



IMS HP Fast Path Utilities, V2.1 5655-K94

- Combines features and functions of IMS FP Basic Tools, V1.2 and IMS FP Online Tools, V2.1 and adds new HP Fast Path Reorganization Tool

- FP Basic Tools Functions:
 - ▶ DEDB Unload/Reload - provides unloading and reloading or reorganizing DEDBs and an API for reading/writing unload data set
 - ▶ DEDB Pointer Checker – for area data sets or ICs
 - ▶ DEDB Tuning Aid - predicts effects of a DB change



IMS HP Fast Path Utilities, V2.1 5655-K94 (Cont'd)

- FP Online Tools Functions:
 - ▶ DEDB Online Pointer Checker - Online interface to DEDB Pointer Checker and DEDB Tuning Aid
 - ▶ DEDB Online Data Extract - Easy-to-use, flexible tool for extracting data for data reporting and populating test data bases
 - ▶ DEDB Online Area Extender - Enables increasing size of SDEP part, IOVF part, or both while Area is online.

- New HP Fast Path Reorganization Tool component provides unloading and reloading or reorganizing DEDBs



IMS HP Fast Path Utilities, V2.1 5655-K94

- Values:
 - ▶ One tool to analyze, maintain, tune and migrate IMS FP DEDBs
 - ▶ Improved system availability by not taking FP databases offline
 - ▶ Increased DBA productivity with JCL ease-of-use when loading and unloading FP databases
 - ▶ Use of DEDB Online Area Extender increases database availability to 24x7 for IMS FP DEDBs



IMS DEDB Fast Recovery, V2.2 5655-E32

- Shortens recovery time after an emergency restart (ERE) failure
- Functions:
 - ▶ Avoids full DEDB AREA recoveries during forced cold start
 - ▶ Closes the IMS Online Log
 - ▶ Recovers all DEDBs (using the log)
 - ▶ Produces status listing of the necessary subsequent system recovery activities
 - ▶ Supports multiple IMS releases from a single Load Library
 - ▶ Updates and maintains DBRC RECON data sets



IMS DEDB Fast Recovery, V2.2 5655-E32

- Values:
 - ▶ Increased database availability
 - ▶ Increased IMS database data integrity



IMS Fast Path Tools – Service to be Discontinued

<u>IMS Tool Name</u>	<u>PID</u>	<u>Service Date</u>
IMS Fast Path Basic Tools V1.2	5655-E30	09/30/2006
IMS Fast Path Online Tools V2.1	5655-F78	09/30/2006

See Software Service Discontinuance:

- Letter 905-027 dated February 8, 2005

