IMS System Topics

- IMS Connect Enhancements
- Concurrent Application Threads
- Reduced Total Cost of Ownership (TCO)
- IMS Command Enhancements
- IMS CQS Enhancement
- IMS DRD Enhancement
- IMS User Exit Enhancements
- IMS Security Enhancements
- /DIAG Command Enhancements

Migration
IMS Connect Enhancements

- XML Converter Enhancements
- Auto-restart of the Language Environment (LE)
- Expanded Recorder Trace Records
- Use of RACF Event Notification Facility (ENF)
  Support for cached RACF UserIDs (UID)
- Reporting of overall health to Workload Manager (WLM)
- Configurable TCP/IP backlog (queue) size
XML Converter Enhancements

- Support for extending the current limit of 100 up to 2000 for the maximum number of XML converters
  - New IMS Connect configuration parameter MAXCVRT ADAPTER(…, MAXCVRT = value)
  - IMS 12 (PM64487 / UK79728)
- Capability to view converters that are currently loaded
  - New Type-2 Command: QUERY IMSCON TYPE(CONVERTER)
    - Requests detailed information about XML converters in IMS Connect
- Benefits
  - Enhances the flexibility of converter usage
  - Directly impacts IMS Soap Gateway environments
Auto-restart of the Language Environment (LE)

- **Automated** mechanism to reinitialize the Language Environment when an XML converter ABENDs
  - Without restarting IMS Connect
  - Converters will be reloaded as they are needed
- **Automatic** refresh of the BPE User Exit for the XML Adapters (HWSXMLA0) after the ABEND limit ABLIM has been reached
- Benefit
  - Improved efficiencies during error conditions
  - Eliminates IMS Connect restart and user interactions
Expanded Recorder Trace Records

- The Recorder trace records have been expanded to:
  - Capture entire messages sent and received using:
    - All TCP/IP communications
      - Including DRDA sockets and ISC TCP/IP
    - SCI (OM, ODBM, MSC, and ISC communications)
    - Requires a Trace Level HIGH and use of the external trace data set
      
      UPDATE TRACETABLE NAME(RCTR) OWNER(HWS) LEVEL(HIGH) EXTERNAL(YES | NO)

- Benefits
  - Improved diagnostics and problem determination
RACF Event Notification Facility (ENF) Support

- **Background**
  - IMS Connect V12 provided the option to cache RACF UserIDs (UIDs) along with a command to refresh them
  - IMS Connect V13: RACF ENF Support for Cached UserIDs (UID)
    - *Automatically* refreshes cached UIDs by listening to RACF events (ENF signals) indicating that a change has been made to a UID
    - NOTE: This function applies only when RACF UID caching has been enabled in IMS Connect

- **Benefit**
  - Allows IMS Connect to listen for certain RACF events indicating that a change has been made to a specific UserID
  - Avoids manual intervention
Reporting of Overall Health to WLM

• WLM (Workload Manager) Health Report
  • New function to automatically report the overall health of IMS Connect
    • Allows Sysplex Distributor to use and take into account this information for workload balancing

• Benefit
  • Allows WLM to know when resources are constrained or available
  • Minimizes the possibility of Sysplex Distributor assigning work that IMS Connect is unable to handle
Configurable TCP/IP backlog (Queue) size

• New parameter TCPIPJQ
  • Allows users to configure the length of the queue in TCP/IP for connection requests that have not yet been assigned a socket.
    • Connection requests are held on this queue until IMS Connect can assign a socket
  • Overrides the default which is equal to the maxsoc value
    • Actual value used is the smaller of IMS Connect’s TCPIPJQ value and SOMAXCONN in TCP/IP

• Benefit
  • Provides a configurable option to increase the backlog queue size in TCP/IP
Summary of IMS Connect Enhancements

- XML Converter Enhancements
  - Enhances the flexibility of converter usage
    - Directly impacts IMS Soap Gateway environments
- Auto-restart of the Language Environment (LE)
  - Improved efficiencies during error conditions
    - Eliminates IMS Connect restart and user interactions
- Expanded Recorder Trace Records
  - Improved diagnostics and problem determination
    - Avoids manual intervention
Summary ...

- RACF Event Notification Facility (ENF) Support for cached RACF UserIDs (UID)
  - Allows IMS Connect to listen for certain RACF events indicating that a change has been made to a specific UserID
- Reporting of overall health to Workload Manager (WLM)
  - Allows WLM to know when resources are constrained or available
  - Minimizes the possibility of Sysplex Distributor assigning work that IMS Connect is unable to handle
Summary ...

- Configurable TCP/IP backlog (queue) size
  - Provides a configurable option to increase the backlog queue size in TCP/IP to be greater than 50
Overall Value of IMS Connect Enhancements

• Enhanced usability while providing better performance and diagnostics

• Increased resiliency to Abnormal Ends (ABENDs)

• Improved usability and manageability
Concurrent Application Threads Enhancement

- Partition Specification Table (PST) used for
  - Active dependent regions (MSG/BMP/IFP/JMP/JBP)
  - CICS/DBCTL threads
  - Open Database Access threads
- Customers continue to require more PSTs!
  - 31 dependent regions - 1980 (IMS 1.1.6)
  - 999 dependent regions - 1995 (IMS 5.1)
  - 4095 dependent regions - 2013 (IMS 13)
- Related parameters
  - MAXPST=
  - PST=
  - MAXTHRDS= for ODBM
  - MAXTHRDS=, MINTHRDS= for DBCTL
**MAXPST= parameter**

- Used in DBC, DCC, and IMS procedures
  - Specifies the maximum number of PSTs for an online IMS control region
    - Default is 255 (no change)
    - Maximum value is 4095 in IMS 13 (quadrupled)
- Controls maximum number of
  - Active dependent regions (MSG/BMP/IFP/JMP/JBP)
  - CICS/DBCTL threads
  - Open Database Access threads
- Reducing MAXPST= requires a cold start
Command Considerations – type-2 and type-1

- The following DRD commands for transactions support a MAXRGN parameter of up to the MAXPST= value
  - CREATE TRAN
  - CREATE TRANDESC
  - UPDATE TRAN
  - UPDATE TRANDESC
- Output of the /DISPLAY TRAN command supports a 4 digit decimal number for BAL() instead of a 3 digit number
- The TRANSACT IMSGEN macro only supports MAXRGN=255
Benefits of the Concurrent Thread Enhancement (Increasing MAXPST)

- Customers can now have increased capacity/scalability for their IMS systems
  - Larger capacity for mergers/acquisitions
    - Without having to add more IMS images
  - Increased workloads with latest zEnterprise hardware
    - Room for vertical growth
  - More regions for IMS 13 synchronous program switch function, also synchronous callout, distributed syncpoint/etc.
    - Longer region occupancies
- MAXPST should no longer be a limiting factor in IMS growth
Reduced Total Cost of Ownership

- Cross-platform focus on reducing mainframe software costs
- Major focus on reducing CPU usage
- Changes throughout IMS to improve performance, reduce storage usage and reduce CPU used to run IMS
  - Using more efficient storage services
  - Improved algorithms
  - Reducing pathlength
  - Optimizing frequently used processes
  - Latch / lock improvements
  - Storage reductions
  - Use of zEnterprise hardware functions

- Benefits
  - Improved performance, lower cost per transaction, reduced cost of ownership.
Reduced Total Cost of Ownership

- IMS 13 includes the following reduced TCO focus areas
  - Specific Reduced TCO enhancements
  - Other Reduced TCO enhancements
  - External Subsystem Access Facility (ESAF) for Java Dependent Regions
Specific Reduced TCO Enhancements

- IMS logger LOG latch contention reduction
  - Improves usage of log latch and log buffer management for increased logging bandwidth and more efficient processing

- Shared queues local first optimization now applies to program-to-program switch messages as well as ordinary input messages
  - Avoids false scheduling on another IMS when the local IMS can process the program-to-program switch message

- Exploitation of pageable 1M pages
  - Based on usage of new zEC12 processors with Flash Express storage and z/OS 1.13 (Dec. 2012)
  - Provides improvements in dynamic address translation and usage of translation lookaside buffer (TLB)
Specific Reduced TCO Enhancements

- DB Space Management Block Serialization Latch Improvements
  - Split from single to multiple latches to improve heavy BMP workloads

- MEMDSENQMGMT Exploitation
  - More efficient memory-based data set ENQ management improves allocation of large number of data sets
Other Reduced TCO Enhancements

- OTMA YTIB chain changed from a single linked list to a hash table, to improve FINDDEST performance.
- Convert OTMA and IMS Connect STORAGE calls to CPOOL
- Remove unnecessary clearing of OTMA buffers
- DFSCPY00 improved SVC directory entry search algorithm and removal of IVSK instructions.
- CQS mainline modules changed to use branch-relative branching
- Cache efficiency improvements (DPST blocks packed into a single IPAGE to keep cache references localized)
- IMS page load service algorithm optimization
- IMS dispatcher optimizations
- OSAM CML Lock Reduction
- General instruction optimization (replacing STCK with STCKF, long displacement facility exploitation)
- IMS cache manager spin loop elimination
ESAF support in Java Dependent Regions (JDR)

- Prior to IMS 13, the only external subsystem (ESS) that JDR applications could access is DB2 using the DB2 RRS Attach Facility (RRSAF)
  - No access to other external subsystems such as WebSphere MQ
  - DB2 RRSAF usage unique to JDR vs. other region types
    - More complex external subsystem definitions

- Need for consistent External Subsystem Attach Facility (ESAF) interface across all region types for DB2
- Need for less complex external subsystem definitions
- Need support for other external subsystems
ESAF support in Java Dependent Regions (JDR)

- With IMS 13, there are two methods for accessing DB2 from JDRs
  - Access via the previously existing DB2 RRSAF interface
  - Access via the standard ESAF interface
- With IMS 13, the ESAF interface can be used in JMP/JBP regions to access any ESAF defined to the IMS control region
  - WebSphere MQ, DB2, WOLA (WebSphere Optimized Local Adapter)
- Support for the SSM= parameter on the JMP/JBP dependent region startup JCL
- Only one ESS connection method allowed per JMP/JBP
  - Default ESS connection method is DB2 RRSAF
    - No impact to existing users
Benefits of ESAF Support in Java Dependent Regions

- JMP/JBP regions can now use the standard ESAF (External Subsystem Attach Facility) for accessing external subsystems such as DB2 for z/OS, WebSphere MQ, and WOLA
  - Provides consistent External Subsystem Attach Facility (ESAF) interface for DB2 across all region types
  - Uses simplified external subsystem definitions
    - Provides easier implementation than DB2 RRS Attach Facility (RRSAF)
  - More efficient interface compared to using the DB2 RRS Attach Facility (RRSAF) for DB2 access
IMS Command Enhancements Overview

- DBRC command enhancements
- DEDB Alter command enhancements
- /DIAGNOSE SNAP command enhancement
- HALDB command enhancements
- IMS Connect type-2 command enhancements
  - Dynamically create data store definitions (CREATE IMSCON TYPE(DATASTORE))
  - Dynamically create port definitions (CREATE IMSCON TYPE(PORT))
  - Query XML converters loaded in IMS Connect (QUERY IMSCON TYPE(CONVERTER))
IMS Command Enhancements

• Enhancements are focused on type-2 commands for the Operations Manager (OM) environment

• Benefits
  • Support of new IMS 13 functions
  • Improved manageability
IMS CQS Enhancement

- When IMS Common Queue Server (CQS) rejects a z/OS STOP cqsjobname command because CQS clients are still connected (CQS0300I), CQS issues a new message, CQS0301I, for each connected client
  - Enables the operator to shut down or quiesce the connected CQS clients so that the CQS address space can be stopped

- Benefits
  - Improved manageability for CQS
IMS DRD Enhancement

- Support for the IMS repository (a single centralized store for resource definitions in an IMSplex) enhanced to validate resource attributes between associated resources when a resource definition is added to, updated in, or deleted from the IMSRSC Repository
  - Validates transaction, routing code, and program attributes
- Also provided through the IMS 12 service process
  - APAR PM32805 / PTF UX75915
- Benefits
  - Simplifies management of the DRD resources
User Exit Dynamic Refresh Capability – IMS 12 SPE

- Delivered via IMS 12 SPE PM56010 (PTF UK79071)
- Command:
  - `REFRESH USEREXIT TYPE(exittype)`
  - Refreshes the user exit types specified without bringing IMS down
  - Eligible exit types are:
    - ICQSEVNT
    - ICQSSTEV
    - INITTERM
    - PPUE
    - RESTART
  - `USER_EXITS` section in DFSDFxxx (where xxx is the value of the DFSDF initialization parameter) read to pick up the EXITDEF statements for the user exit type(s) specified on the command
    - An optional MEMBER( ) parameter can be used to point to a different DFSDFxxx member
IMS 13 User Exit Enhancements

- Enhanced user exit services extended to additional IMS control region user exits
- Users can now dynamically refresh more IMS user exit routines to bring in an updated version of the exit (or add/delete)
  - Significantly reduces downtime since IMS control region no longer requires restart
- Users can now display information about more user exits that are defined in the USER_EXITS section of DFSDFxxx
  - Provides useful exit information to the user
- Users can now code an exit to leverage IMS’s ability to call multiple routines of the same type from a single point within the exit
Enhanced User Exit Services Added to More Exit Types

- AOIE (DFSAOE00, Type-2 Automated Operator Exit)
- BSEX (DFSBSEX0, Build Security Environment Exit)
- NDMX (DFSNDMX0, Non-Discardable Message Exit)
- RASE (DFSRAS00, Resource Access Security Exit)
- OTMAYPRX (DFSYPRX0, OTMA Destination Resolution Exit)
- OTMAYDRU (DFSYDRU0, OTMA User Data Formatting Exit)
- OTMARTUX (DFSYRTUX, OTMA Resume TPIPE Security Exit)
- OTMAIOED (DFSYIOE0, OTMA Input/Output Edit Exit)
- LOGWRT (DFSFLGX0, Logger Exit)
- LOGEDIT (DFSFLGE0, Log Edit Exit)
Enhanced User Exit Services Added to More Exit Types

- The exits listed can now leverage enhanced user exit services to:
  - Use REFRESH USEREXIT to bring in new copy of an exit based on type
    - Either all exits of a certain type as listed in DFSDFxxx will be refreshed or none
    - Can also add/delete as long as DFSDFxxx updated first
  - Use QUERY USEREXIT to display useful exit information
  - Code multiple exits of the same exit type to be called from a single entry point

- Benefits
  - Expanded flexibility
  - IMS availability is increased
  - Management of user exits eased
IMS Security Enhancements

• All IMS security settings can now be defined as IMS startup parameters
  • Updates to SECURITY macro in system definition (SYSGEN) no longer required due to its removal
  • Previously, certain settings could only be defined in SECURITY macro

• Move security user exits out of the IMS nucleus into 31-bit storage
  • DFSCSGN0
  • DFSCTRNN0
  • DFSCTSE0
New IMS Startup Security Parameters

- **RCLASS parameter** added to **DFSPBxxx PROCLIB member**
  - RCLASS support in **DFSDCxxx PROCLIB member** will remain
  - DFSPBxxx RCLASS parameter value will **override** DFSDCxxx if specified in both
- **SECCNT parameter** added to **DFSDCxxx PROCLIB member**
- Retrofit SPE APARs/PTFs available for IMS startup security parameter enhancement activation in IMS 11 and IMS 12
  - **PM48203/UK74050** (IMS 11)
  - **PM48204/UK74051** (IMS 12)
- If specifying RCLASS in **DFSPBxxx/DFSDCxxx**, can also have the following APARs/PTFs applied to avoid an error message being issued when it shouldn’t be
  - **PM72199/UK82616** (IMS 11)
  - **PM73558/UK82617** (IMS 12)
Security User Exits removed from Nucleus

- User exits DFSCSGN0, DFSCTRN0 and DFSCTSE0 now linked separately, loaded from STEPLIB (if present) into 31-bit storage
- New DFS1937I message indicates which user exits have been loaded
- Storage can now be shared among the DFSCSGN0, DFSCTRN0 and DFSCTSE0 user exits using a new parameter that contains the storage address
  - DFSCSGN0 can now be called if loaded at IMS initialization to obtain storage via STORAGE OBTAIN (GETMAIN)
    - Address of storage passed to IMS, then IMS passes address to DFSCSGN0, DFSCTRN0 and DFSCTSE0
  - Enables easier sharing of storage between these user exits
  - Updates required in each of the exits in order to use the new parameter to share storage
IMS Security Enhancements Benefits

• Removal of SECURITY macro
  • Significant reduction in system programmers’ time/effort required in maintaining IMS systems
  • Management of security definitions eased
  • System definition (SYSGEN) process made more simple
• Removal of selected user exits from IMS nucleus
  • Exits are easier to maintain
  • Linking to IMS nucleus no longer necessary when one of the exits has been changed
  • Usage of 24-bit storage reduced
/DIAGNOSE Command Enhancements

- Process for capturing diagnostic data used in troubleshooting IMS issues has been simplified
  - SYSOUT option now available for /DIAGNOSE SNAP output
    - Documentation can be gathered/stored in a readable format that is easy to retrieve and send to IBM support
    - Time-consuming SYSLOG searches and manual data formatting prior to transmission no longer required
  - /DIAGNOSE SNAP command extended to include more resources + more coverage of existing resources
    - SHOW() support added for LTERM, NODE and USER
    - BLOCK – can now specify multiple single instance blocks and more blocks can be snapped
    - More blocks can be snapped for DB, LINE, LINK
    - MSNAME support added
/DIAGNOSE Command Enhancements

• Benefits
  • Cost effective, non-disruptive alternative to console dumps
  • /DIAGNOSE command is now more interactive
    • Can be used more as a tool for easing the real-time diagnosis process
  • Decreased time and effort required in capturing diagnostic information
  • Improved turn-around time in problem resolution
IMS System Topics

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- IMS Command Enhancements
- IMS CQS Enhancement
- IMS DRD Enhancement
- IMS User Exit Enhancements
- IMS Security Enhancements
- /DIAG Command Enhancements
IMS 13 Migration
Packaging

- IMS 13 program number: 5635-A04

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Software Prerequisites...

• Minimum software level prerequisites
  • z/OS Version 1 Release 13 (5694-A01) or later
    • When running IMS Version 13 on z/OS Version 1 Release 13, APAR OA39392 / PTF UA66823 must be installed.
    • IBM High-Level Assembler Toolkit Release 5 (5696-234)
    • z/OS V1R13.0 Security Server RACF V1R13.0 or later, or an equivalent product, if security is used.
  • IRLM Version 2.3 if IRLM is used
Software Prerequisites ...

- Minimum software levels for optional functions...
  - Java Dependent Regions requires JDK 6.0.1
  - ISC TCP/IP requires CICS 5.1
  - Depending on the environment, the IMS Universal Drivers require:
    - IBM JDK 6.0.1 or later
    - DB2 V9.1 or later
    - WAS V7 or later
    - CICS V4.1 or later
  - DB Versioning requires implementation of the IMS Catalog
- Check Release Planning documentation at GA for additional prerequisites/coexistence/migration items
Software Prerequisites

- Minimum software levels for other middleware
  - IMS 13 supports interactions with
    - DB2 9 or later
    - CICS 3.2 or later
      - *CICS 5.1 is required for ISC TCP/IP support*
    - MQ for z/OS: Versions V7.0.1 or later
Hardware Prerequisites...

- IMS 13 runs only on 64-bit processors running in z/Appliance Architecture mode
  - Processors must also support the Long-Displacement Facility of the z/Appliance Architecture
  - ESA mode is not supported
  - For a list of z/Series machines see: www.ibm.com/systems/z/hardware

  ➔ z900 machines must be at GA2 level (microcode level 3G or later)
Hardware Prerequisites

• Sysplex Data Sharing (including Data Caching and VSO Data Sharing)
  • Coupling Facility (CF) level 9, or later

• Shared Queues and Shared EMH support
  • Coupling Facility level 9 or later
  • System-managed CF Duplexing
    • CF level 12 or later and bidirectional CF to CF links

• EAV support for non-VSAM data sets
  • EAVs are supported on DS8000 at microcode level R4.0 via bundle 64.0.175.0 (Sept 2008) or higher
Support Status of IMS Versions

- IMS 10
  - Generally available on October 26, 2007
  - End of service was November 12, 2012
- IMS 11
  - Generally available on October 30, 2009
  - End of service has not been announced
- IMS 12
  - Generally availability on October 28, 2011
  - End of service has not been announced
- IMS 13
  - GA date not yet announced
IMS 13 Supported Connections

- ISC is supported with
  - IMS 13, IMS 12, and IMS 11
  - CICS Transaction Server V 4.2, V4.1, V3.2 and V3.1
  - CICS Transaction Server V 5.1 for ISC TCP/IP connectivity
  - User-written software

- MSC is supported with
  - IMS 13
  - IMS 12
  - IMS 11

- Shared Queues is supported with
  - IMS 13
  - IMS 12
  - IMS 11
IMS Library Updates

- Books remain the same as IMS 12
- Information Center contains information on IMS 13
Withdrawn Support …

- IMS 11 is the last release to support the SMU-to-RACF utilities
  - IMS 9 was the last version of IMS to support SMU
  - Migration from SMU to RACF or an equivalent product should have been done on IMS 9 or earlier
- IMS 12 is the last release to support the SECURITY macro in system definition
  - Use the initialization parameters in IMS 13
  - RCLASS and SECCNT for V12 and V11
    - PM48204/UK74051 V12 SPE, PM48203/UK74050 V11 SPE
Withdrawn Support …

- IMS Enterprise Suite V2.1 is the last release to include DLIModel utility plug-in
- JCA 1.0 resource adapter is no longer enhanced, use the IMS Universal DB resource adapter instead
- IMS 13 is the last release to support IMS Connect SSL function
  - Instead, use IBM z/OS Communications Server Application Transparent Transport Layer Security (AT-TLS) to set up Secure Socket Layer (SSL) on TCP/IP connections to IMS Connect
Withdrawn Support

- IMS 11 is the last release to support the Knowledge Based Log Analysis (KBLA) facility
  - Customers using this function should migrate to use other IMS-provided analysis utilities and reports, such as
    - Fast Path Log Analysis utility (DBFULTA0)
    - File Select and Formatting Print utility (DFSERA10)
    - IMS Monitor Report Print utility (DFSUTR20)
    - Log Transaction Analysis utility (DFSILTA0)
    - Offline Dump Formatter utility (DFSOFMD0)
    - Statistical Analysis utility (DFSISTS0),
    - Other complementary products, such as IMS Problem Investigator, IMS Performance Analyzer, or similar products
IMS 13 System Enhancements and Migration

Diane Goff / Angie Greenhaw
IBM Advanced Technical Skills

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#12550

http://www.linkedin.com/in/angiegreenhaw