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IMS 13 System Enhancements and Migration

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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 TCPIPQ
  - 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 TCPIPQ 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
  - DFSCTRN0
  - 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

- 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

IMS 13 Migration

Packaging

- IMS 13 program number: 5635-A04

FMID	Feature Description
HMK1300	IMS System Services
JMK1301	IMS Database Manager
JMK1302	IMS Transaction Manager
JMK1303	IMS ETO
JMK1304	IMS Recovery Level Tracker
JMK1305	IMS Database Level Tracker
JMK1306	IMS Java on Demand
HIR2230	IRLM 2.3

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/Architecture mode
  - Processors must also support the Long-Displacement Facility of the z/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

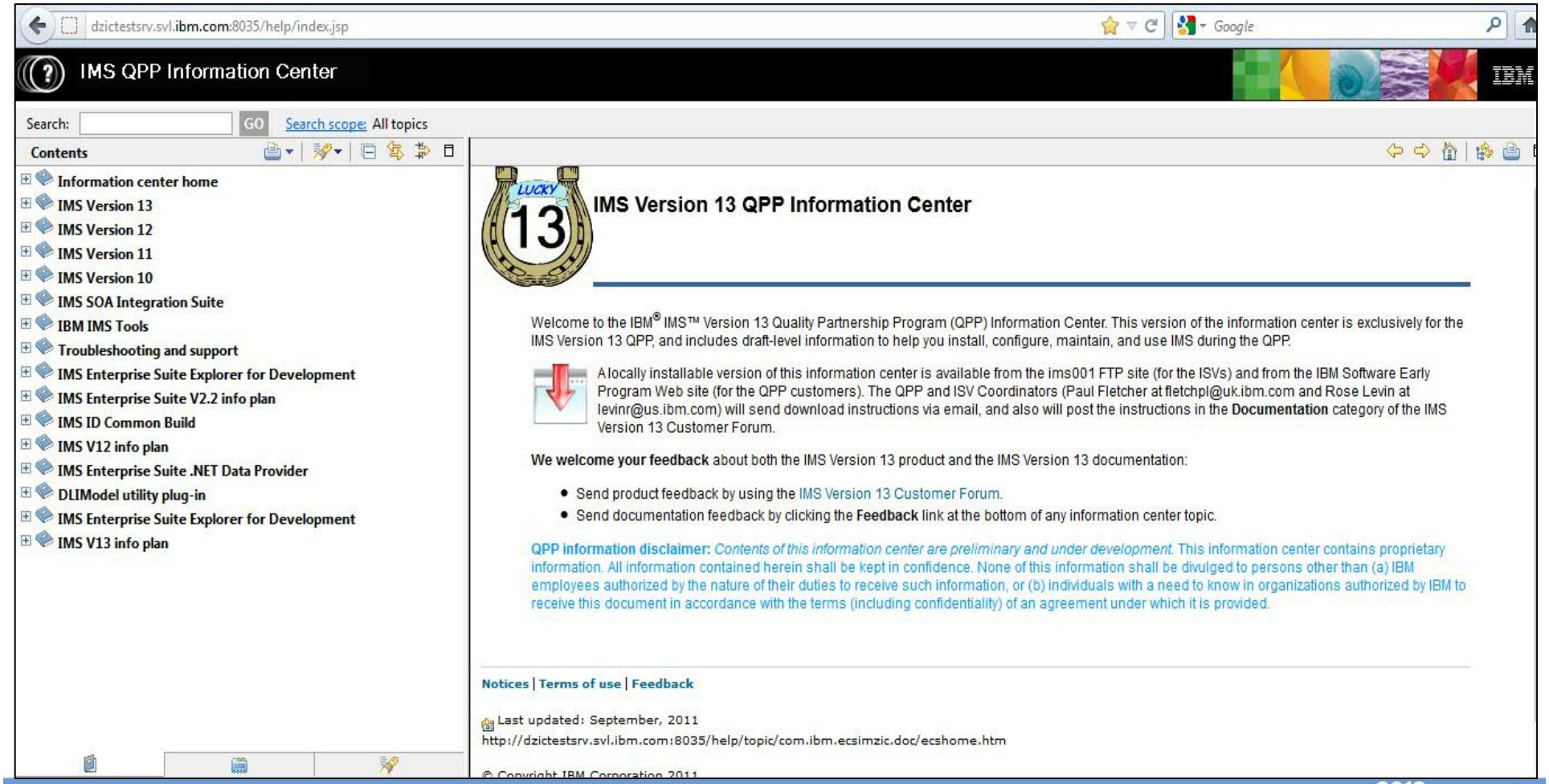
- IMS 10
  - Generally available on October 26, 2007
  - End of service was November 12, 2012
- IMS 11
  - Generally available on October 30, 2009
  - End of service has not been announced
- IMS 12
  - Generally availability on October 28, 2011
  - End of service has not been announced
- IMS 13
  - GA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

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