

IMS
Version 12

Release Planning



IMS
Version 12

Release Planning



Note

Before using this information and the product that it supports, be sure to read the general information under “Notices” on page 233.

This edition applies to IMS Version 12 (program number 5635-A03), IMS Database Value Unit Edition, V12.1 (program number 5655-DSQ), and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this information

These topics provide general information to help you evaluate and plan for IMS™ Version 12. The topics describe the new features and enhancements for IMS Version 12, the hardware and software requirements for these new features and enhancements, considerations for migration and coexistence for IMS Version 12, and an overview of the IMS Tools that are enhanced to work with IMS Version 12.

This information is available as part of the Information Management Software for z/OS® Solutions Information Center at pic.dhe.ibm.com/infocenter/dzichelp. A PDF version of this information is available in the information center.

As a convenience for customers who have several versions of IMS, this book also provides a summary of the enhancements made for IMS Version 11. For complete information about these enhancements, see the *IMS Version 11: Release Planning Guide* (GC19-2442).

When you install IMS, you will also need information from the following information units:

- *IMS Version 12 Installation*
- *IMS Version 12 System Definition*
- *IMS Version 12: Program Directory for Information Management System Transaction and Database Servers*

How to use the Release Planning information

Use the IMS Version 12 Release Planning information to learn about the new enhancements in IMS Version 12 and to plan your migration.

The Release Planning information is organized into the following parts:

- Part 1, “General planning information for IMS Version 12,” on page 1, which contains general information about the new release, including the following information:
 - A summary of the enhancements and changes to IMS Version 12
 - An overview of the hardware and software requirements
 - Migration considerations for IMS Version 12
 - Coexistence considerations between the supported versions of IMS
 - A summary of changes to the IMS library for IMS Version 12
 - A listing of the changed, new, and deleted messages and abends for IMS Version 12
 - A listing of the new and changed log records for IMS Version 12
- Part 2, “Planning for IMS Version 12 enhancements,” on page 119, which contains contains more detailed descriptions of the larger new functions and enhancements in IMS Version 12.
- Part 3, “IBM DB2 and IMS Tools support for IMS Version 12,” on page 177, which describes IBM® IMS Tools and products that support IMS Version 12.
- Part 4, “Featured integration solutions for IMS Version 12,” on page 217, which contains overviews of some of the new ways that you can further integrate IMS Version 12 and the rest of your IT architecture.

Prerequisite knowledge

Before using this information, you should have knowledge of either the IMS Database Manager (DB) or the IMS Transaction Manager (TM). You should also understand basic z/OS and IMS concepts, your installation's IMS system, and have a general knowledge of the tasks involved in project planning.

You can learn more about z/OS by visiting the z/OS Basic Skills Information Center.

You can gain an understanding of basic IMS concepts by reading *An Introduction to IMS*, an IBM Press publication. An excerpt from this publication is available in the Information Management Software for z/OS Solutions Information Center.

IBM offers a wide variety of classroom and self-study courses to help you learn IMS. For a complete list of courses available, go to the IMS home page at www.ibm.com/ims and link to the Training and Certification page.

IMS function names used in this information

In this information, the term HALDB Online Reorganization refers to the integrated HALDB Online Reorganization function that is part of IMS Version 12, unless otherwise indicated.

How new and changed information is identified

New and changed information in most IMS library PDF publications is denoted by a character (revision marker) in the left margin. The first edition (-00) of *Release Planning*, as well as the *Program Directory* and *Licensed Program Specifications*, do not include revision markers.

Revision markers follow these general conventions:

- Only technical changes are marked; style and grammatical changes are not marked.
- If part of an element, such as a paragraph, syntax diagram, list item, task step, or figure is changed, the entire element is marked with revision markers, even though only part of the element might have changed.
- If a topic is changed by more than 50%, the entire topic is marked with revision markers (so it might seem to be a new topic, even though it is not).

Revision markers do not necessarily indicate all the changes made to the information because deleted text and graphics cannot be marked with revision markers.

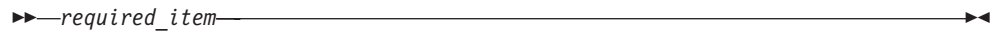
New and changed information in the information center is denoted by blue carets (<< and >>) at the beginning and end of the new or changed information.

How to read syntax diagrams

The following rules apply to the syntax diagrams that are used in this information:

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line. The following conventions are used:
 - The >>--- symbol indicates the beginning of a syntax diagram.

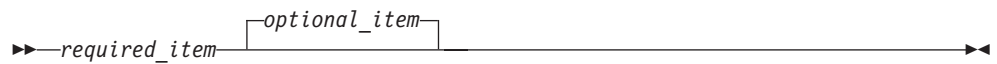
- The ---> symbol indicates that the syntax diagram is continued on the next line.
- The >--- symbol indicates that a syntax diagram is continued from the previous line.
- The --->< symbol indicates the end of a syntax diagram.
- Required items appear on the horizontal line (the main path).



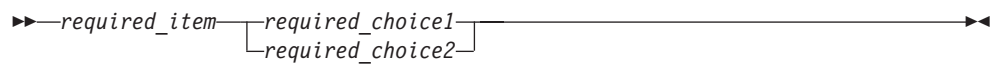
- Optional items appear below the main path.



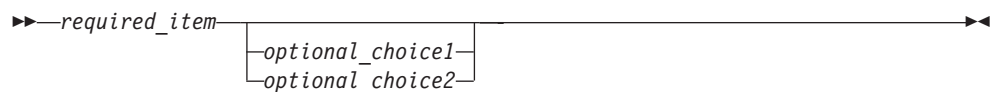
If an optional item appears above the main path, that item has no effect on the execution of the syntax element and is used only for readability.



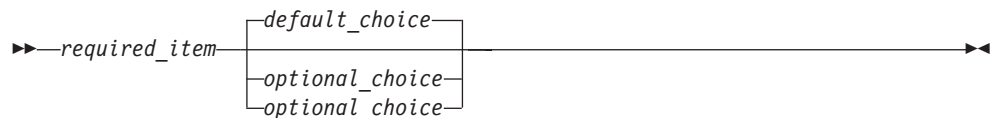
- If you can choose from two or more items, they appear vertically, in a stack. If you *must* choose one of the items, one item of the stack appears on the main path.



If choosing one of the items is optional, the entire stack appears below the main path.



If one of the items is the default, it appears above the main path, and the remaining choices are shown below.



- An arrow returning to the left, above the main line, indicates an item that can be repeated.



If the repeat arrow contains a comma, you must separate repeated items with a comma.

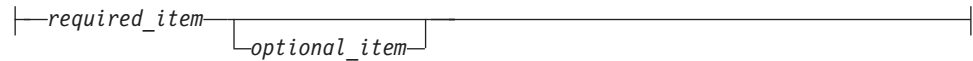


A repeat arrow above a stack indicates that you can repeat the items in the stack.

- Sometimes a diagram must be split into fragments. The syntax fragment is shown separately from the main syntax diagram, but the contents of the fragment should be read as if they are on the main path of the diagram.



fragment-name:



- In IMS, a b symbol indicates one blank position.
- Keywords, and their minimum abbreviations if applicable, appear in uppercase. They must be spelled exactly as shown. Variables appear in all lowercase italic letters (for example, *column-name*). They represent user-supplied names or values.
- Separate keywords and parameters by at least one space if no intervening punctuation is shown in the diagram.
- Enter punctuation marks, parentheses, arithmetic operators, and other symbols, exactly as shown in the diagram.
- Footnotes are shown by a number in parentheses, for example (1).

Accessibility features for IMS Version 12

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility features

The following list includes the major accessibility features in z/OS products, including IMS Version 12. These features support:

- Keyboard-only operation.
- Interfaces that are commonly used by screen readers and screen magnifiers.
- Customization of display attributes such as color, contrast, and font size.

Note: The Information Management Software for z/OS Solutions Information Center (which includes information for IMS Version 12) and its related publications are accessibility-enabled for the IBM Home Page Reader. You can operate all features by using the keyboard instead of the mouse.

Keyboard navigation

You can access IMS Version 12 ISPF panel functions by using a keyboard or keyboard shortcut keys.

For information about navigating the IMS Version 12 ISPF panels using TSO/E or ISPF, refer to the *z/OS TSO/E Primer*, the *z/OS TSO/E User's Guide*, and the *z/OS*

ISPF User's Guide Volume 1. These guides describe how to navigate each interface, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

Related accessibility information

Online documentation for IMS Version 12 is available in the Information Management Software for z/OS Solutions Information Center.

IBM and accessibility

See the *IBM Human Ability and Accessibility Center* at www.ibm.com/able for more information about the commitment that IBM has to accessibility.

How to send your comments

Your feedback is important in helping us provide the most accurate and highest quality information. If you have any comments about this or any other IMS information, you can take one of the following actions:

- From any topic in the information center at pic.dhe.ibm.com/infocenter/dzichelp, click the **Feedback** link at the bottom of the topic and complete the Feedback form.
- Send your comments by e-mail to imspubs@us.ibm.com. Be sure to include the title, the part number of the title, the version of IMS, and, if applicable, the specific location of the text on which you are commenting (for example, a page number in the PDF or a heading in the information center).

Part 1. General planning information for IMS Version 12

In addition to the new functions and enhancements that are available, IMS Version 12 has new hardware and software requirements, as well as new considerations for migration and coexistence between IMS systems.

These topics provide an overview of the new functions and enhancements in IMS Version 12 and describe how they might affect your installation. New, changed, and deleted messages and codes, and the IBM DB2® and IMS Tools that support IMS Version 12 are also described.

Chapter 1. Overview of IMS Version 12 enhancements

The enhancements to IMS Version 12 affect all areas of the product: IMS Database Manager, IMS Transaction Manager, and IMS system.

The larger enhancements are also described in more detail in Part 2, “Planning for IMS Version 12 enhancements,” on page 119.

IMS Database Manager enhancements

The IMS Version 12 Database Manager includes enhancements to: database buffer pools, DBRC, HALDB, usability and serviceability, and the IMS Universal drivers. IMS Version 12 adds support for Fast Path secondary indexes.

“IMS system enhancements” on page 21 describes additional enhancements for the IMS Database Manager.

Database pool storage enhancements overview

In IMS Version 12, the storage for certain database pools is now obtained in 31-bit virtual storage backed by 64-bit real storage. If you page fix any of these pools and have 64-bit real storage on your processor, you might see a reduction in the use of 31-bit fixed real frames.

The 31-bit virtual storage for the following database pools is now backed by 64-bit real storage:

DBWP

DB work pool

DLDP DMB pool

DLMP

PSB CSA pool

DPSB DLI PSB pool

PSBW PSB work pool

Large database pools that could not be page fixed before, due to 31-bit real storage constraints, might be able to be fixed because the fixed pages are backed by 64-bit real storage.

DBRC enhancements overview

The DBRC enhancements for IMS Version 12 improve the usability and consistency of DBRC and the RECON data sets through command enhancements, new user data fields, and other changes.

The DBRC enhancements for IMS Version 12 are:

- LIST command enhancements

When recovery-related information is not required, the output from LIST commands can be reduced by using the new NORCVINF parameter. Also, the output from /RMLIST commands that are issued through the OM API is no longer limited to 32 KB.

The output from LIST.HISTORY commands is enhanced to include:

- Full-precision time stamps
- Additional information about HALDBs and deallocation records
- The inclusion of concurrent events (such as log switch and deallocation)

The output from a LIST.RECON or LIST.RECON STATUS command includes the number of registered databases. The DBRC application programming interface (API) returns the number of registered databases in the RECON status block (DSPAPQRC).

- New user data fields are added in the CA, IMAGE, RECOV, and REORG records in the RECON data set. Also, many DBRC commands and API requests are enhanced to support the user data fields.
- Obsolete CA records can be deleted from the RECON data set.
- The number of user keys that can be defined for GENJCL functions is increased from 32 to 64.
- A new %DBTYPE keyword is added to the GENJCL %SELECT control keyword for gathering information about ALLOC records.
- The VOLLIST parameter is now optional for many commands if the RECON status record indicates that these data sets are to be treated as cataloged.
- A retention period for CA groups can be specified.
- A “BPE” indicator is added to the RECON data set if the instance of DBRC is BPE-based.
- The DELETE.LOG command is enhanced to tolerate the absence of a LOGALL record.

New output data has been added to the DBRC API. Therefore, the output block version number is increased to 4.0.

For more details about these enhancements, see Chapter 8, “DBRC enhancements,” on page 121.

Dynamic full-function database buffer pool enhancements overview

In IMS Version 12, you can dynamically reconfigure the OSAM subpools and VSAM shared resource pools for full-function databases while IMS is online. You can now add, delete, and update subpools and the database buffers associated with these subpools dynamically by using type-2 commands to tune the pools according to workload, without affecting system availability. In addition, the VSAM buffer pool ID limit is increased from 16 to 255.

The dynamic database buffer pool enhancements provide:

- The ability to quiesce all activities against a subpool so that subpool definition changes can be made dynamically. You can quiesce activities without taking the IMS system offline by using a new parameter on the type-2 UPDATE POOL TYPE(DBAS) command: SECTION(OSAMxxx), SECTION(VSAMxxx), or SECTION(OSAMxxx,VSAMxxx). The command initiates the buffer pool reconfiguration that is defined in the DFSDFxxx member of the IMS PROCLIB data set while IMS resources are still in use. This enhancement is available only for full-function databases.

Any time IMS is started, the definitions in the DFSVSMxx PROCLIB member are used for initialization. This behavior is unchanged from prior releases of IMS. The DFSDFxxx PROCLIB member is not a replacement to the DFSVSMxx PROCLIB member and is not read for subpool definitions during restart. The

DFSDFxxx PROCLIB member is read only for subpool definitions when the command is issued. IMS maintains the dynamic buffer pool function across an emergency restart by obtaining committed subpool change information from the IMS restart data set (RDS). When a dynamic subpool change completes successfully, the changed information is written to the RDS. If the command was unsuccessful or if IMS terminates before the change can be recorded in the RDS, that change is not maintained across an emergency restart.

Any time IMS shuts down normally, the subpool definitions in the DFSVSMxx PROCLIB member are used during restart. Any prior changes made by the dynamic buffer pool function are not maintained.

Keep in mind that the UPDATE POOL TYPE(DBAS) command does not have a timeout capability. After it is issued, there is no way to interrupt the command.

- Constraint relief by increasing the VSAM pool ID limit from 16 to 255.

Requirement: To support defining more than 16 VSAM pool IDs, z/OS 1.11 APAR OA32318 must be installed.

To use the dynamic database buffer function:

1. Specify the buffer pool information that you want to bring online in new sections in the DFSDFxxx PROCLIB member: <SECTION=OSAMxxx> and <SECTION=VSAMxxx>. Multiple instances of these sections can be in the member, as long as the suffix of each section is unique. For example:

```
<SECTION=VSAMMON>
POOLID=(VSM1, VSRBF=(2048,5000,I))
POOLID=(VSM2, VSRBF=(4096,5000,I))
<SECTION=VSAMTUE>
POOLID=(VSM1, VSRBF=(2048,8000,I))
POOLID=(VSM2, VSRBF=(4096,8000,I))
<SECTION=VSAMFRI>
POOLID=(VSM1, VSRBF=(2048,1000,I))
POOLID=(VSM2, VSRBF=(4096,1000,I))
<SECTION=OSAMMON>
IOBF=(4096,1000,N,N,OSM1)
IOBF=(8192,2000,N,N)
```

When deleting an existing VSAM subpool, update the DFSDFxxx PROCLIB member with a POOLID, which identifies the VSAM shared resource pool that the subpool belongs to, followed by a VSRBF statement, with the number of buffers set to 0, to indicate that the subpool is to be removed. For example:

```
POOLID=(id,VSRBF=size,0)
```

2. Issue the UPDATE POOL TYPE(DBAS) SECTION(OSAMxxx) command, the UPDATE POOL TYPE(DBAS) SECTION(VSAMxxx) command, or the UPDATE POOL TYPE(DBAS) SECTION(OSAMxxx,VSAMxxx) command.

IMS completes the following steps:

- Quiesces the work that is associated with the affected buffer subpool
 - Stops access to the subpool
 - Changes the configuration of the subpool
 - Enables access to the subpool and starts processing the work again
3. If you are reassigning an OSAM DBD association (for example, changing a database data set association from one subpool to another subpool), you must stop and restart the database so that the subpool is assigned during data set open.

Recommendations:

- Put definitions that are persistent across cold starts in the DFSVSMxxx member of the IMS PROCLIB data set.
- Change database buffer configurations during non-peak times because access to these subpools is stopped during the reconfiguration.

The QUERY POOL command and the Syntax Checker are also enhanced to support the dynamic buffer function. The output of the QUERY POOL TYPE(DBAS)SUBTYPE(OSAM,VSAM) command displays information about dynamic pools, as well as the pools that are defined in the DFSVSMxx member of the IMS PROCLIB data set.

Even if new pools are added using type-2 commands, the new pools are displayed in the output of the type-1 /DISPLAY POOL command.

Fast Path enhancements overview

The Fast Path function in IMS Version 12 is enhanced with support for secondary indexes, as well as usability and performance improvements.

Fast Path secondary index enhancements overview

IMS Version 12 provides support for Fast Path secondary indexes for DEDB databases. A secondary index database provides an alternate path to access its corresponding primary DEDB database and can be processed as a separate database.

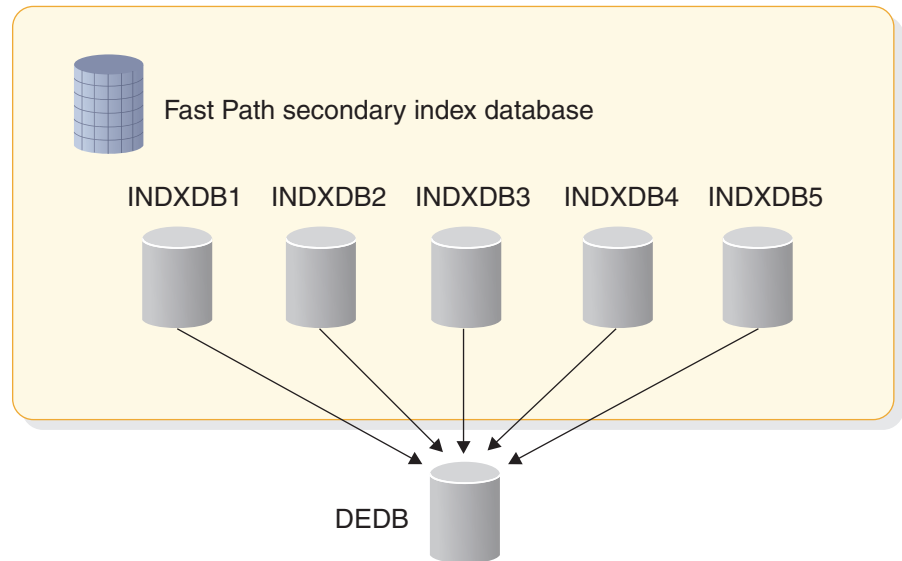
IMS supports only two database structures for Fast Path secondary indexes: hierarchical indexed sequential access method (HISAM) and simple hierarchical indexed sequential access method (SHISAM). Both secondary index databases offer sequential key secondary indexing support for primary DEDB databases.

Fast Path secondary indexes support sparse indexing (suppressing the automatic maintaining of the pointer segment in the index) for BMPs. To suppress index maintenance, specify the //DFSCTL DD statement (with the SETI keyword) in the JCL of the IMS BMP region.

Fast Path secondary index support has the following capabilities that are not available with full-function secondary indexes:

User data partitioning

You can spread a Fast Path secondary index across multiple physical databases. Each index database can contain a range of keys. Index keys are assigned to an index database by a user partition selection exit routine. The index databases can be accessed individually or as one logical separate database. The following figure illustrates the concept of partitioning Fast Path secondary indexes.



Multiple secondary index segments

You can create multiple index entries from different fields in the same source segment by defining two or more LCHILD/XDFLD statement pairs under the SEGM statement of a target segment. Search fields must be in the same source segment and the search fields must be the same size.

IMS does not provide a utility to build a Fast Path secondary index database for existing DEDBs. You can use a user-written application or a vendor tool to build a Fast Path secondary index database, such as the IBM Fast Path Solution Pack for z/OS.

To bring the secondary index database online to IMS, perform an online change or cold start IMS.

To create a Fast Path secondary for a new DEDB:

1. Create DBDs for both the new DEDB and the secondary index database.
2. Run the ACB Maintenance utility for both the new DEDB and the secondary index database.
3. Perform an online change to bring the DEDB and secondary index database online.
4. Load the DEDB by using an IMS application that runs as a BMP. The application causes the secondary index to be populated automatically as part of index maintenance.

Requirements:

- Secondary index pointer segments must be symbolic.
- Only IMS Version 12 and later systems can data share Fast Path secondary index databases.

Restrictions:

- Sequential dependent (SDEP) segments cannot be target or source segments for a DEDB secondary index.

- Fast Path secondary indexing does not support shared secondary index databases (more than one index is in a database). Only one secondary index can be in the same Fast Path secondary index database

The following IMS components are updated as part of this enhancement:

Commands

The /DISPLAY DB and QUERY DB commands are enhanced to provide information about Fast Path secondary indexes.

Exit routines

A new exit routine, the Data Entry Database Partition Selection exit routine (DBFPSE00), is added to support data partitioning for HISAM or SHISAM secondary index databases. The exit routine is defined in the DBD of the primary DEDB.

Generation utilities

The following utilities are updated to support Fast Path secondary indexes: Database Description (DBD) Generation utility, Program Specification Block (PSB) Generation utility, and Application Control Blocks Maintenance utility.

After applying APAR/PTF PM45141/UK76062, you can use a portion of a concatenated key as a value on a SRCH or SUBSEQ field in an XDFLD statement for Fast Path secondary indexes. Use the /CK operand to specify the value. For example, SRCH= (/CK, *start_byte*, *length*)).

Fast Path usability and serviceability enhancements overview

The Fast Path usability and serviceability enhancements address various customer requirements to improve the Fast Path function.

- When no response comes from a failing IMS data sharing partner during a type-3 notify, message DFS3770W is issued. This message does not supply the name of the failing partner IMS. IMS Version 12 provides new message DFS0066I, which supplies the IMS IDs of the IMS subsystems that successfully returned responses so that the failing IMS can be identified.
- In IMS Version 11 and earlier, only the updated portion of a DEDB segment is logged. IMS Version 12 provides a new option, FULLSEG, to specify that the full-segment image is logged. The FULLSEG option is available on the DBRC INIT.DB, INIT.DBDS, CHANGE.DB, and CHANGE.DBDS commands. The default is NOFULLSG, which provides the same information in the X'5950' log record as in IMS Version 11 and earlier. When full-segment images are logged, you can use the X'5950' log record as input to the Log Archive exit routine. In addition, as part of this enhancement:
 - The DB and DBDS records for DEDBs in the RECON data set contain full-segment logging indicators.
 - The DBRC API DEDB output block (DSPAPQFD) and the area output block (DSPAPQAR) include full-segment logging indicators.
 - The output of LIST.DB and LIST.DBDS commands includes full-segment logging indicators.
- The EXIT parameter on the DBD and SEGM statements for DEDBs is enhanced so that you can specify whether information about DLET calls or before-image data for REPL calls is logged in X'99' log records. The default is to log this information (EXIT=DLET,BEFORE), which is the same as in IMS Version 11 and earlier. To omit DLET call and before-image data from the X'99' log records, specify EXIT=NODLET,NOBEFORE.

As part of this enhancement, DBDGEN messages DBD700, DBD770, and SEGM700 are changed to have new parameters and to indicate that the database organization is not correct.

- The Fast Path 64-bit buffer manager is enhanced to improve usability and performance. For more information, see “Fast Path 64-bit buffer manager enhancements overview” on page 30.
- Message DFS0004I, which relates to the use of z/OS V1R9 with the Fast Path 64-bit buffer manager, is no longer relevant and is therefore deleted from IMS Version 12.

Full-function usability enhancements overview

The full-function usability enhancements in IMS Version 12 include displaying the status of randomizer and exit routines when a full-function database is started or stopped, better diagnostic information about abends 0080, 3303, and 3310, logging the user RACF® user ID in data capture log type X'99' for both online transactions and batch jobs, and sending message DFS993I to the system console.

Randomizer status enhancement

Messages DFS2842I and DFS2838I are enhanced to include the status of the randomizer routines for HDAM and PHDAM databases. New message DFS2406I is issued to indicate the status of the partition selection routine for the HALDB partition databases. If the randomizer is not in storage and IMS successfully loads it, the status LOADED is displayed. If an existing copy of the randomizer is found in storage, the status SHARED is displayed.

Messages DFS2406I, DFS2842I, and DFS2838I are issued as the result of commands to start or stop full-function databases.

Enhancements for abends 0080, 3303, and 3310

Abend U0080 for open, close, and end-of-volume errors for OSAM database data sets is no longer issued. Instead, messages are issued. Message DFS0730I is issued for open and close errors. Message DFS0842I is issued for end-of-volume errors. Abend U0080 can still be issued for entry or termination errors.

When a z/OS cross-system coupling facility (CF) failure (such as a CF switch) occurs while an IMS batch job is running, IMS suspends the batch job, issues message DFS2404A, and resumes the job when the CF becomes available. In this situation, IMS no longer cancels the job with abend U3303.

When IRLM times out a lock request and this action results in abend U3310, new message DFS2291I can be issued to provide information about the application programs that are waiting for the lock. You can control whether or how the message is issued by using the new keyword MSG2291I= in the DIAGNOSTICS_STATISTICS section of DFSDFxxx PROCLIB member. The valid options are:

MSG2291I=SUPPRESS

All DFS2291I messages are suppressed. MSG2291I=SUPPRESS is the default.

MSG2291I=SHORT

A single message DFS2291I is issued.

MSG2291I=ISSUE

All instances of message DFS2291I are issued.

Example of message DFS2291I:

```
DFS2291I LOCKNAME=0900004288800201D7
DFS2291I DBNAME=DLVNTZ02 LOCKFUNC=GET LCL AND GBL ROOT LOCKS
DFS2291I BLOCKER PST=0001 TRAN=NQF1 PSB=PMVAPZ12 TYPE=MPP
DFS2291I BLOCKER TRANELAPSED TIME=00:01:11 IMSID=IMS1
DFS2291I BLOCKER RECOVERY TOKEN=IMS1 0000000200000000
DFS2291I VICTIM PST=0002 TRAN=SHF1 PSB=PMVAPZ12 TYPE=MPP
DFS2291I VICTIM TRANELAPSED TIME=00:00:49 IMSID=IMS1
DFS2291I VICTIM RECOVERY TOKEN=IMS1 0000003000000000
```

Data capture log enhancement

The Data Capture exit routine (DB2CDCEX) is enhanced to save the user RACF user ID in X'99' logs for both online transactions and batch jobs. Before IMS Version 12, the RACF user ID was logged only for online transactions.

Message DFS993I enhancement

As of IMS Version 12, message DFS993I CSA PSB|DLS PSB|PSBW POOL TOO SMALL is sent to the system console in addition to the master terminal. Before IMS Version 12, some systems that did not have a master terminal (for example, DBCTL) did not receive message DFS993I.

HALDB enhancements overview

In IMS Version 12, High Availability Large Database (HALDB) partition names can be reused as non-HALDB database names; a new option releases the ownership of an online reorganization (OLR) process when IMS terminates; the reorganization number in a HALDB partition is never regressed after a time-stamp recovery; and new options can suppress message DFS2500I.

New OLR-RUNNING status for /DISPLAY ACTIVE command

To process HALDB online reorganizations for a partition, IMS creates a special region that is similar to a BMP region. These regions are not true BMP regions and they go away when OLR is complete.

In the output of the /DISPLAY ACTIVE and /DISPLAY ACTIVE REGION commands, these regions are identified only as BMP regions, but several clues indicate that the process running in the region is OLR:

- The job name is DBD name.
- The transaction name is the partition name.
- The program name is the partition name with a prefix of 0. Because PSB names for application programs start with an alphabetical character, the regions started by IMS for OLR can be identified by the 0 that at the beginning of the program name.

However, during IMS shutdown it is still not easy to determine if a BMP region is active for OLR or for a BMP application program.

To make it easy to identify when it is OLR that is running in regions that are displayed as BMP regions, a new OLR-RUNNING status is displayed in the command output of /DISPLAY ACTIVE and /DISPLAY ACTIVE REGION in IMS Version 12.

This enhancement is added to IMS Version 12 by APAR PM 74287.

Database name enhancement

In IMS Version 11 and earlier, when a HALDB partition was removed from the HALDB master and information about the partition was removed from the RECON data set, IMS retained information about the deleted partition name and prevented the name from being reused for a non-HALDB database. IMS now discards the residual information about the partition name so that it can be reused for a non-HALDB database. When a HALDB master is deleted, all of its partition names become available for reuse.

OLR ownership enhancement

In IMS Version 11 and earlier, when an OLR process is running on a particular IMS and that IMS terminates (normally or abnormally), the ownership of the OLR process remains with that IMS. This situation prevents the OLR process from continuing in another IMS. In IMS Version 12, the ownership of an OLR process can be released from the terminated IMS so that the OLR process can be resumed on another IMS with an INIT OLREORG command.

To cause IMS to release the ownership of the OLR process if IMS terminates, perform one of the following tasks:

- Specify the new option RELOLROWNER=Y in the database section of the DFSDFxxx PROCLIB member.
- Specify the new OPTION(REL) parameter on the INIT OLREORG command.
- Specify the new OPTION(REL) parameter on the UPDATE OLREORG command.

The output of the /DISPLAY DB OLR and QUERY OLREORG commands is enhanced to show whether the REL option was specified on the commands, or if the option RELOLROWNER=Y was specified in the database section of the DFSDFxxx PROCLIB member.

Requirements:

- When OLR ownership is released using this enhancement, the OLR process is not automatically resumed when IMS restarts. Therefore, the OLR process must be manually resumed by issuing an INIT OLREORG command.
- When an IMS Version 12 coexists with IMS Version 10 or IMS Version 11 systems, the following coexistence APARs must be installed:
 - PM31789/UK67484 for IMS Version 10
 - PM31791/UK67485 for IMS Version 11

Reorganization number change

Users can avoid running the HALDB Index/ILDS Rebuild utility (DFSPREC0) to rebuild the ILDS after recovering a database that has a secondary index when reorganization verification is enabled. Some customers use an index builder to rebuild their secondary index instead of recovering their secondary index and then running the DFSPREC0 utility to rebuild their ILDS. This alternate path was not supported by IMS when the reorganization number verification function was implemented.

In IMS Version 12, you do not have to run the DFSPREC0 utility to rebuild an ILDS.

The flow of events for time-stamp recoveries of HALDB partitions is changed as follows:

1. The Database Recovery utility (DFSURDB0) reads the reorganization number from the RECON data set.
2. If the recovery is successful, the DFSURDB0 utility increases the reorganization number in the partition and passes this new number back to DBRC.
3. DBRC verifies that the new reorganization number is greater than the current reorganization number (in the RECON data set) and also verifies that the recovery results in a new version of the data set.
4. DBRC adds a recovery record to the RECON data set that includes the old and new reorganization numbers.
5. DBRC issues a new message (DSP1119I) indicating that the reorganization number was changed because the database was recovered.

The following items are also updated to support the reorganization number change:

- The REORG(*value*) parameter is added to the NOTIFY.RECOV command, which adds a recovery record to the RECON data set.
- New output fields are added to the DSECT of DSPAPQRV.
- The following new messages are added:

DSP1118I

A reorganization number was included on a NOTIFY.RECOV command (or passed to DBRC by the recovery utility) and reorganization number verification is not active for this RECON data set.

DSP1119I

An execution of the recovery utility was done either before or after a reorganization of the data set was run.

DSP1223E

Either a database recovery utility is running or a NOTIFY.RECOV REORG() command is being processed. The reorganization number is invalid.

Suppressing message DFS2500I enhancement

A new parameter, MSG2500 = ISSUE | SUPPRESS, is added in the DFSDFxxx PROCLIB member in the <DIAGNOSTICS_STATISTICS> section to indicate if DFS2500I message should be issued (all or just one) or suppressed for HALDB partitions during an UPD DB command. The default is to suppress (not issue) the message.

ISSUE

Enables IMS to issue DFS2500I messages for HALDB partitions during a UPD DB command.

SUPPRESS

Tells IMS to suppress issuing DFS2500I messages for HALDB partitions during a UPD DB command.

IMS catalog enhancements overview

The IMS catalog is an optional system database that stores metadata about your databases and applications. You can use the metadata for both business and technical purposes.

The IMS catalog is a comprehensive view of IMS database metadata that is fully managed by IMS. By externalizing this metadata, IMS can participate in solutions that require the exchange of metadata, such as business impact analysis.

The IMS catalog:

- Contains information about IMS program resources, database resources, and relevant application metadata that IMS controls. For example, it contains all program and database-related information defined to the IMS database system, including databases, fields, segments, data types, and more. When these resources are created, altered, or deleted, the catalog can be updated automatically to reflect those changes.
- Is a High Availability Large Database (HALDB). Use DL/I calls or SQL statements to look at data in the catalog in the same way that you retrieve data from any other HALDB.
- Can be a trusted source of metadata. When documented utilities and processes are used, IMS can ensure that the catalog contains accurate information.

The IMS Universal JDBC driver, the IMS Universal DL/I driver, and the IMS Universal Database resource adapter are enhanced in several areas to support and take advantage of the IMS catalog.

Applications that use the IMS Universal drivers along with the IMS catalog no longer need to maintain the Java™ metadata class because the metadata is maintained in the IMS catalog.

For more details about these enhancements, see Chapter 9, “IMS catalog enhancements,” on page 127.

IMS DRA enhancement overview

The IMS Version 12 DRA thread enhancement provides the option for DRA clients to direct the DRA not to attach dedicated DRA thread task control blocks (TCBs). By not doing so, the overhead of TCB switching is avoided and parallel processing can be improved.

IBM CICS® Transaction Server for z/OS Version 4.2 takes advantage of the IMS Version 12 DRA thread enhancement to support the CICS open transaction environment (threadsafe). IMS DL/I calls can run on a CICS thread, eliminating the need for IMS to create additional TCBs for each thread and the need to switch between tasks during call processing.

IMS Universal drivers enhancements overview

Many enhancements are made to the IMS Universal drivers in IMS Version 12.

The IMS Universal drivers are enhanced as follows:

- The IMS Universal drivers support two new data types: arrays and structs. This support increases the range of data types that the drivers can manage.
- The IMS Universal drivers add richer support for field redefines.
- The IMS Universal drivers add support for segments maps. A segment map consists of different cases (sets of fields) within a segment where each case is valid only for a unique value of the map control field.
- The IMS Universal JDBC driver is enhanced to support applications that store XML data in IMS databases or retrieve XML data from IMS databases. Both the type-4 and type-2 drivers offer this support

- The IMS Universal drivers add support for variable-length database segments, which includes the following enhancements:
 - A new `wasNull()` method in the `com.ibm.ims.dli.Path` interface checks whether a field retrieved is null (that is, if the field was beyond the length of a segment instance).
 - New support for the `wasNull()` method in the `java.sql.ResultSet` interface checks whether a field retrieved is null (that is, if the field was beyond the length of a segment instance).
 - A new connection property determines whether the length field of variable-length segments is exposed to JDBC and SQL application programs.

Variable-length database support includes the following operations:

Read The IMS Universal drivers now support individual variable-length segment requests and path requests that include variable-length segments. The drivers now indicate whether a field is null in variable length segments to indicate when the segment instance does not include the field. By default, variable-length segment information is handled automatically by the drivers and is application-transparent, unless the application program sets the property `llField=true`.

Update and insert

The IMS Universal drivers now support both individual variable-length segment updates and inserts, path updates, and inserts that include variable-length segments. By default, the drivers automatically expand or contract the variable-length segment to contain the largest field (offset + length) that is specified by the update or insert operation.

There are no changes to the behavior of the delete operation.

- The IMS Universal drivers add type-2 connectivity support for CICS applications that want to access IMS databases. This support is provided in APAR/PTF PM38667/UK73380.
- The IMS Universal drivers support the following SQL keywords when APAR/PTF PM69378/UK81917 is installed:
 - ABS
 - ACOS
 - ASIN
 - ATAN
 - ATAN2
 - BETWEEN
 - CEIL
 - CEILING
 - COS
 - COSH
 - COT
 - DEGREES
 - EXP
 - FETCH
 - FIRST
 - FLOOR
 - INNER
 - JOIN
 - LN
 - LOG
 - LOG10
 - MOD
 - NULL

- ON
- ONLY
- POWER
- RADIANS
- ROW
- ROWS
- SIGN
- SIN
- SINH
- SQRT
- TAN
- TANH

IMS Transaction Manager enhancements

The IMS Version 12 Transaction Manager includes support for IBM System z[®] Integrated Information Processor and enhancements to the LU 6.2 Edit exit routine, MSC, OTMA, and shared queues.

“IMS system enhancements” on page 21 describes additional enhancements for the IMS Transaction Manager.

IMS support for IBM System z Integrated Information Processor

Request response processing for authorized Common Queue Server (CQS) clients in IMS Version 12 is executed under enclave service request blocks (SRBs). In IMS Version 12 and later, IMS will request z/OS to process such work on an available System z Integrated Information Processor (zIIP).

Request response processing is the processing of the return of data from the CQS address space to an authorized CQS client address space in response to a request that the client directed to the CQS. Authorized CQS clients are clients that register to IMS IMS Version 12 CQS while executing in supervisor state and with a system program status word (PSW) key (keys 0 through 7).

Examples of IMS IMS Version 12 operations that involve such authorized CQS clients include:

- When the IMS control region is running with IMS shared message queues or shared IMS Fast Path message queues enabled
- When the IMS Resource Manager (RM) address space is using a resource structure

LU 6.2 Edit exit routine (DFSLUEE0) enhancement overview

The LU 6.2 Edit exit routine (DFSLUEE0) can discard an asynchronous output message when the message is not deliverable.

Return code 2 is added to the LU 6.2 Edit exit routine (DFSLUEE0), which informs IMS to discard an undeliverable asynchronous output message. The new return code is valid only for asynchronous conversations.

MSC enhancements overview

IMS Version 12 users can define a new type of MSC physical link that uses TCP/IP to connect two IMS systems in an IMS MSC network. Also, DFSCMC10 is now linked directly into RESLIB and is loaded during IMS initialization.

Multiple Systems Coupling (MSC) includes two major enhancements in IMS Version 12:

- IMS no longer requires a linkedit step to link DFSCMC10 into LPALIB as IGG019xx for MSC channel-to-channel links.

DFSCMC10 is now linked directly into RESLIB and IMS loads it in during IMS initialization. The stage1 IMSCTF APNDG= parameter is no longer needed to specify the xx suffix name added to IGG019.

This enhancement is provided in APAR/PTF PM42918/UK71482. After this service is installed, IMS ignores the APNDG= parameter on the IMSCTF macro.

- MSC links can now use TCP/IP.

In IMS Version 11 and earlier, MSC physical links were primarily defined to use VTAM®, although physical links could also use either channel-to-channel (CTC) or memory-to-memory (MTM) connections. MSC uses IMS Connect to manage the TCP/IP connection.

TCP/IP connections can be used as backup connections to existing VTAM connections, or can be used as the primary connection method for MSC physical links. Throughput is potentially greater through TCP/IP than through VTAM.

For more details about this enhancement, see Chapter 12, “MSC TCP/IP enhancement,” on page 171.

Non-Discardable Messages exit routine (DFSNDMX0) enhancements overview

The Non-Discardable Messages exit routine (DFSNDMX0) interface accept four new transaction status flag options.

The Non-Discardable Messages exit routine (DFSNDMX0) interface is enhanced for IMS Version 11 and IMS Version 12 to accept four new transaction status flag options that enable an exit routine to perform one of the following actions:

1. Stop the scheduling of messages containing a specific transaction code
2. Stop input messages for a particular transaction code
3. Stop a particular transaction
4. Start a particular transaction

This enhancement is added to:

- IMS Version 11 with APAR/PTF PM67950/UK81040.
- IMS Version 12 with APAR/PTF PM45943/UK71989.

OTMA enhancements overview

The OTMA enhancements reduce system storage, improve security, reduce timeouts for commit mode 0 (commit-then-send) transactions, enable message routing to remote instances of IMS, can send clients an acknowledgement for synchronous callout calls, and improves usability by adding support for a generic character or wildcard at the end of the tpipe name in the /DISPLAY TMEMBER TPIPE command.

OTMA ACEE reduction enhancement overview

In IMS Version 12, OTMA ensures that only one accessor environment element (ACEE) per user ID is created and cached for OTMA messages, even when the messages come from multiple OTMA clients. The ACEE for each user is independent of OTMA client instances.

In IMS Version 11 and earlier, multiple copies of OTMA ACEEs for the same user ID could exist in the IMS control region if transactions with the same user ID were submitted from multiple OTMA clients. These multiple copies created a storage issue when thousands of user IDs connected with IMS from multiple OTMA clients. Also, a security issue was created when only some of the OTMA member ACEEs were refreshed while others were not.

This enhancement also includes the following changes:

- The output of the /DISPLAY OTMA command includes a new field, ACEEAGE, which shows the ACEE aging value for each OTMA client.
- The maximum OTMA ACEE aging value is changed from 68 years (in IMS Version 11 and earlier) to 999999 seconds (11.6 days). Each cached OTMA ACEE has its own aging value based on the OTMA client with the lowest aging value that accesses it.
- The effect of the /SECURE OTMA REFRESH TMEMBER *membername* command is the same as the effect of the /SECURE OTMA REFRESH command. Both commands affect the one OTMA ACEE table that is used for all users.

OTMA commit mode 0 (commit-then-send) transaction enhancement overview

When an OTMA IMS application does not reply to the IOPCB and does not switch the message to another transaction, IMS issues message DFS2082 for both RESPONSE and NONRESPONSE modes of OTMA send-then-commit (CM1) transactions. In IMS Version 11 and earlier, IMS never issued message DFS2082 for OTMA commit-then-send (CM0) transaction timeouts, regardless of transaction response mode.

In IMS Version 12, IMS can issue a DFS2082 message for CM0 transaction timeouts. To enable this function, set the new optional TMAMHRSP flag in the OTMA state data prefix.

Restriction: DFS2082 messages are issued only for CM0 original input transaction timeouts and are not issued for program-to-program switches. IMS does not issue a DFS2082 message for a switched-to transaction, even when both the switched-to transaction and the original transaction fail to reply.

OTMA early termination notification enhancement

After this APAR is applied, OTMA notifies OTMA clients of IMS termination by issuing existing protocol commands much earlier in the shutdown process than in previous releases. OTMA early termination notification reduces the number of new requests that OTMA clients send to IMS after the IMS termination process begins.

During a planned IMS shutdown, OTMA sends the protocol commands TMAMMNTR (X'3C' Resource Monitor) and TMAMCSPA (X'14' Suspend TPIPE) to all OTMA clients.

During an unplanned IMS shutdown, OTMA leaves the XCF group earlier in the abend processing and XCF exit routines notify the OTMA clients earlier.

This enhancement is provided by the APAR/PTF PM73869/UK90361.

OTMA message routing to remote IMS enhancement overview

OTMA is enhanced to support sending ALT-IOPCB output messages to a remote IMS by using a local IMS Connect and a remote IMS Connect. The OTMA destination descriptor or the OTMA destination routing exits (DFSYPX0 and DFSYDRU0) can be used to define the remote IMS and IMS Connect destinations. The IMS super member can also be defined to route the messages to the remote IMS Connect and IMS.

For more information about IMS Connect setup and configuration, see “IMS Connect to IMS Connect enhancement” on page 150.

OTMA shared queues enhancement

In a shared queues environment, when OTMA input transactions are received by a front-end IMS and processed by a back-end IMS, OTMA can now be configured to return ALTPCB output from the back-end IMS to the OTMA client through the front-end IMS by specifying OTMABE=YES in the DFSYDTx PROCLIB member of the front-end IMS.

This enhancement is provided in the same APAR/PTF as the OTMA transaction expiration enhancements (PM46829/UK75415).

OTMA synchronous callout response enhancement

OTMA clients can now use SendOnly with acknowledgement (ACK) for synchronous callout responses so that the client receives an indication of whether the response was successfully delivered to the IMS ICAL application. The client must issue an additional receive call to retrieve this indication.

The required OTMA flags in the OTMA headers to activate the SendOnly with ACK for the callout response messages are TMAMSYRP, TMAMCRRQ, and TMAMHSOM.

This OTMA enhancement is provided in APAR/PTF PM39562/UK74653.

IMS Connect is enhanced to support the SendOnly with ACK for callout response through APAR/PTF PM39569/UK74666.

OTMA TPIPE enhancements

- OTMA is enhanced to validate TPIPE names more efficiently, which might reduce the processor cycles used for input transactions.
- The following TPIPE enhancements help you avoid certain storage abends:
 - You can now specify the maximum number of TPIPES that IMS creates for an OTMA by using the new MAXTP parameter on the DFSYDTx member of IMS PROCLIB data set.

When the MAXTPs parameter is defined for an OTMA member, IMS monitors requests for TPIPE creation for the OTMA member. When the total number of the TPIPES reaches 80 percent of the maximum, IMS issues a warning message DFS4382W to the system console and MTO. When the maximum TPIPE limit is reached, an error message DFS4383E is sent to the system console and MTO, and any input transaction requesting a new TPIPE is rejected with a new NACK code X'29'. After the total number of the TPIPES for the member decreases to 50 percent of the maximum, a relief message DFS4384I is issued.

If there are multiple OTMA members defining their maximum number of TPIPEs, the highest number defined among the members is considered as the global TPIPE limit for the members. When the total number of TPIPEs in an IMS system reaches the global limit, a warning message DFS4385W is issued to the system console and MTO. After the total number of the total TPIPEs in an IMS drops down to 80 percent of the global limit, a relief message DFS4386I is issued.

- The OTMA resource monitor function also sends out the protocol command X'3C' to the OTMA members for the various TPIPE warning and relieve status so that the client applications can reroute the subsequent transactions to a different IMS system if needed.
- The output of the /DISPLAY OTMA and /DISPLAY TMEMBER commands are enhanced to show the current number of TPIPEs for members that are using the function. After the limit has been reached, MAX TPIPE is displayed as the USER_STATUS for the member. The global TPIPE limit for multiple members setting the TPIPE limit is displayed under the new output field TPCNT for the IMS server. This status is cleared when the global TPIPE count falls below 50 percent.

These OTMA enhancements are provided in APAR/PTF PM33681/UK79518.

OTMA transaction expiration enhancements

OTMA transaction expiration at GU time has been updated to provide two enhancements:

- The symptom dump of abend U0243 abend and its DFS554A message are not generated when a transaction time has expired to save the CPU cycles. This behavior is the default action. However, OTMA can be configured to generate the symptom dump and DFS554A message by specifying TODUMP=YES in the DFSYDTx PROCLIB member.
- A DFS3688I message instead of the DFS555I/DFS2224 messages is sent to the OTMA client when a transaction time has expired. This behavior is the default action. However, if the TMAMINPT flag is set in the OTMA input, the input transaction data is sent back to the OTMA client (instead of the DFS3688I message) for the transaction expiration.

WebSphere® MQ Version 7.0.1 with APAR PM47795 has been enhanced to support the IMS transaction expiration function.

These enhancements are provided in APAR/PTF PM46829/UK75415.

OTMA wildcard support for the /DISPLAY TMEMBER command

When issuing the /DISPLAY TMEMBER command, the tpipe name can now end with a wildcard character (an asterisk). By using the wildcard character, you can display a series of tpipe queues that are named similarly.

The wildcard support is delivered through the IMS service process in APAR/PTF PM46829/UK75415.

Shared queue enhancements overview

IMS Version 12 adds support for using z/OS cross-system coupling facility (XCF) for communicating between a front-end IMS and a back-end IMS in a shared-queue group for APPC synchronous conversations or OTMA

send-then-commit (CM1) transactions with a synchronization level of NONE or CONFIRM. In these situations, IMS is the synchronization point manager instead of z/OS Resource Recovery Services (RRS).

Requirement: A MINVERS value of 12.1 must be set in the RECON data set before this enhancement can be enabled.

The following IMS components are enhanced to support this new function:

- DFSDCxxx PROCLIB member

New values of B, S, and X are added to the AOS keyword:

AOS=B

Specifies that XCF is used for APPC or OTMA synchronous transactions with a synchronization level of either NONE or CONFIRM. If RRS=Y is specified and the synchronization level is SYNCPT, the transaction can be processed using RRS.

AOS=S

Specifies that XCF is used for APPC and OTMA synchronous transactions to communicate between the front-end and back-end systems with a synchronization level of NONE or CONFIRM and RRS MultiSystem Cascaded Transaction is used for communications for synchronous transactions with a synchronization level of SYNCPT. AOS=S is functionally equivalent to AOS=F. If a system without RRS tries to process one of these transactions, the application terminates abnormally.

AOS=X

Specifies that XCF is used for communications for APPC synchronous conversations or OTMA send-then-commit (CM1) transactions with synchronization level of NONE or CONFIRM. AOS=X applies only to a front-end system. Transactions with a synchronization level of SYNCPT will not use RRS. In this scenario, AOS=X is functionally equivalent to AOS=N.

The following keyword is added:

AOSLOG=N | Y

Specifies whether the front-end IMS system writes a X'6701' log record for certain events. To not write the log (AOSLOG=N) is the default specification.

- Commands

The SET AOSLOG() parameter is added to the /DIAGNOSE command, which enables users to change the AOSLOG= specification in the DFSDCxxx PROCLIB member.

The output of the /DISPLAY ACT command is changed to support this enhancement. For example:

```
XX,/DIS A DC
DFS000I VTAM STATUS AND ACTIVE DC COUNTS
DFS000I VTAM ACB OPEN -LOGONS DISABLED
DFS000I IMSLU=N/A.N/A APPC STATUS=DISABLED TIMEOUT= 0
DFS000I OTMA GROUP=N/A STATUS=NOTACTIVE IMS1
DFS000I APPC/OTMA SHARED QUEUE STATUS - LOCAL=ACTIVE-XCF GLOBAL=ACTIVE-XCF
DFS000I APPC/OTMA SHARED QUEUES LOGGING=Y
DFS000I APPC/OTMA RRS MAX TCBS - 40 ATTACHED TCBS - 1 QUEUED
RRSWKS- 0
```

```
DFS000I APPLID=APPL8 GRSNAME= STATUS=DISABLED
DFS000I LINE ACTIVE-IN - 1 ACTIV-OUT - 0
DFS000I NODE ACTIVE-IN - 0 ACTIV-OUT - 0
DFS000I LINK ACTIVE-IN - 0 ACTIV-OUT - 0
```

- Exit routines

The TM and MSC Message Routing and Control User exit routine (DFSMSCE0) is changed to include an XCF routing indicator. If an exit routine does not specify a routing indicator, XCF is the default.

- Messages and codes

The following messages are changed to support this enhancement:

- DFS2088I
- DFS2089I
- DFS554A
- DFS555I

A new abend code (U0109) is added.

The IMS Syntax Checker is enhanced to support the new and changed keywords in the DFSDCxxx PROCLIB member.

This enhancement does not change how IMS processes synchronous transactions with a synchronization level of SYNCPT. RRS is still required for SYNCLVL=SYNCPT.

IMS system enhancements

IMS Version 12 includes enhancements to the overall IMS system, including both the IMS Database Manager and the IMS Transaction Manager.

Callout enhancement overview

The DL/I ICAL call for synchronous callout is enhanced to be able to use the first 8 bytes of the AIBUTKN parameter to specify the map name in the application interface block (AIB) for message formatting or service identification purposes.

This enhancement is delivered through the IMS Version 12 service process with APAR/PTF PM73135/UK82636.

IMS cancel program enhancement overview

In a mixed Java/COBOL environment, APAR/PTF PM50971/UK78269 provides the ability to cancel COBOL programs after they have run while maintaining the Persistent JVM in the MPP region.

The CANCEL_PGM=Y|N parameter is now supported in the PROCLIB member that is specified on the ENVIRON= parameter. CANCEL_PGM=Y ensures that the next time the referenced (sub)program is called it will be entered in its initial state. In addition, all programs contained within the program being canceled are also canceled.

When CANCEL_PGM=Y:

- You can use an exclude list to specify (sub)program names that IMS should exclude from the cancel process. All other (sub)programs not specified in the list will be canceled. The exclude list is a PROCLIB member specified as follows:
CANCEL_PGM=Y,EXCLUDE=proclib_member_name

- You can specify a user exit in the following form:
CANCEL_PGM=Y,APPTERMEXIT=*exit_name*. This user exit is invoked after the program has terminated and returned to IMS, but before the 'clean up' process is initiated as described by the CANCEL_PGM=Y option. This user exit must be written in an LE conforming language such as COBOL or Assembler. This user exit is given control by IMS in the LE enclave created for the Persistent JVM environment. The value specified for *exit_name* must be between one (1) and eight (8) bytes in length. As a usage example, this exit can be used to clean up any LE HEAP storage used by the program environment.

Command enhancements overview

IMS Version 12 includes enhancements to existing commands, as well as new commands. Most of the enhancements are provided in type-2 commands, to support the IMS strategy of enhancing the capability of single point of control (SPOC) applications that issue type-2 commands through the Operations Manager (OM) API or the REXX SPOC API.

CQS trace command enhancements

The following BPE commands are changed to support the CQS trace enhancements:

- DISPLAY TRACETABLE
- UPDATE TRACETABLE

DBRC command enhancements

The following DBRC commands are enhanced for the IMS Version 12 DBRC enhancements:

- | | |
|-----------------|---------------------|
| • CLEANUP.RECON | • LIST.DB |
| • CHANGE.IC | • LIST.DBDS |
| • CHANGE.CA | • LIST.HISTORY |
| • CHANGE.CAGRP | • LIST.RECON |
| • CHANGE.RECOV | • LIST.RECON STATUS |
| • CHANGE.REORG | • NOTIFY.CA |
| • DELETE.LOG | • NOTIFY.IC |
| • GENJCL | • NOTIFY.REORG |
| • INIT.CA | • NOTIFY.RECOV |
| • INIT.CAGRP | • /RMLIST |

/DIAGNOSE SNAP command enhancements

The /DIAGNOSE SNAP command is enhanced in IMS Version 12 to improve the reliability of diagnostic information and to streamline the problem determination process. For more details about the enhancements, see “/DIAGNOSE SNAP command enhancement overview” on page 27.

/DISPLAY POOL QBUF command enhancements

APAR/PTF PM73755/UK93601 enhances the /DISPLAY POOL command to return addition information when QBUF is specified in a shared queues environment.

The command output now displays:

- The number of buffers that are currently in use, as well as highest.

- The highest number of buffers that have been in use at one time.

Dynamic database buffer pool command enhancements

The following new IMS commands are added:

- QUERY POOL TYPE(DBAS)
SUBTYPE(OSAM,VSAM)
- UPDATE POOL TYPE(DBAS)
SECTION(OSAMxxx)
- UPDATE POOL TYPE(DBAS)
SECTION(VSAMxxx)

For more information about these command enhancements, see “Dynamic full-function database buffer pool enhancements overview” on page 4.

Dynamic resource definition (DRD) command enhancements

New options are added to the following DRD commands to support the IMS repository function and enhancements to DRD:

- | | |
|----------------|------------------|
| • EXPORT DEFN | • QUERY PGMDESC |
| • IMPORT DEFN | • QUERY RTC |
| • QUERY DB | • QUERY RTCDESC |
| • QUERY DBDESC | • QUERY TRAN |
| • QUERY PGM | • QUERY TRANDESC |

Fast Path secondary index command enhancements

The following IMS commands are enhanced to support Fast Path secondary indexes:

- /DISPLAY DB
- QUERY DB

Fast Path usability and serviceability command enhancements

The following DBRC commands are enhanced to support the Fast Path usability and serviceability enhancements:

- | | |
|---------------|-------------|
| • CHANGE.DB | • INIT.DBDS |
| • CHANGE.DBDS | • LIST.DB |
| • INIT.DB | • LIST.DBDS |

Fast Path 64-bit buffer command enhancements

The output of the QUERY POOL TYPE(FBPB64) command is enhanced to support the new SHOW(STATISTICS) keyword.

HALDB command enhancements

The following IMS commands are enhanced to support the HALDB Online Reorganization (OLR) ownership enhancement and other HALDB functions:

- /DISPLAY ACTIVE and /DISPLAY ACTIVE REGION, updated by APAR PM74287
- /DISPLAY DB OLR
- INIT OLREORG
- QUERY OLREORG
- UPDATE OLREORG

The /DISPLAY ACTIVE and /DISPLAY ACTIVE REGION commands are enhanced by APAR PM74287 to return a status of OLR-RUNNING for any system-created BMP regions in which the HALDB OLR function is currently running.

The DBRC NOTIFY.RECOV command is changed to support the HALDB enhancements.

For more information about these command changes, see “HALDB enhancements overview” on page 10.

IMS catalog command enhancements

The INITIATE OLC command is enhanced with new completion codes for the IMS catalog.

IMS Connect command enhancements

The following IMS Connect WTOR commands have new output fields: VIEWHWS and VIEWPORT.

The following IMS Connect z/OS MODIFY commands have new output fields: QUERY MEMBER and QUERY PORT.

The following new IMS Connect WTOR commands are added:

- | | |
|---------------------|------------|
| • REFRESH CONVERTER | • STOPMSC |
| • REFRESH RACFUID | • STOPRMT |
| • SET UIDCACHE | • STOPSCLN |
| • STARTMSC | • VIEWMSC |
| • STARTRMT | • VIEWRMT |
| • STOPLINK | |

The following new IMS Connect z/OS MODIFY commands are added:

- | | |
|-----------------------------|--------------------|
| • DELETE LINK | • UPDATE CONVERTER |
| • DELETE RMTIMSCON SENDCLNT | • UPDATE MSC |
| • QUERY MSC | • UPDATE RACFUID |
| • QUERY RMTIMSCON | • UPDATE RMTIMSCON |

The following new type-2 commands are added to support IMS Connect:

- QUERY IMSCON TYPE(ALIAS)
- QUERY IMSCON TYPE(CLIENT)
- QUERY IMSCON TYPE(CONFIG)
- QUERY IMSCON TYPE(DATASTORE)
- QUERY IMSCON TYPE(IMSPLEX)
- QUERY IMSCON TYPE(LINK)
- QUERY IMSCON TYPE(MSC)
- QUERY IMSCON TYPE(ODBM)
- QUERY IMSCON TYPE(PORT)
- QUERY IMSCON TYPE(RMTIMSCON)
- QUERY IMSCON TYPE(SENDCLNT)
- QUERY IMSCON TYPE(UOR)
- UPDATE IMSCON TYPE(ALIAS)
- UPDATE IMSCON TYPE(CLIENT)
- UPDATE IMSCON TYPE(CONFIG)
- UPDATE IMSCON TYPE(CONVERTER)
- UPDATE IMSCON TYPE(DATASTORE)
- UPDATE IMSCON TYPE(IMSPLEX)
- UPDATE IMSCON TYPE(LINK)
- UPDATE IMSCON TYPE(MSC)
- UPDATE IMSCON TYPE(ODBM)
- UPDATE IMSCON TYPE(PORT)
- UPDATE IMSCON TYPE(RACFUID)
- UPDATE IMSCON TYPE(RMTIMSCON)
- UPDATE IMSCON TYPE(SENDCLNT)

For more information about these command changes, see “IMS Connect command enhancements” on page 141.

MSC command enhancements

The following IMS commands are enhanced to support MSC TCP/IP enhancements:

- | | |
|--------------------|--------------------|
| • /CHANGE LINK | • QUERY MSPLINK |
| • CREATE TRAN | • /RSTART |
| • /DISPLAY ACTIVE | • /TRACE UNITYTYPE |
| • /DISPLAY AFFIN | • UPDATE MSLINK |
| • /DISPLAY ASMT | • UPDATE MSPLINK |
| • /DISPLAY LINK | • UPDATE TRAN |
| • /DISPLAY MSPLINK | • UPDATE TRANDESC |
| • /PSTOP LINK | |
| • QUERY IMS | |

IMS repository function command enhancements

The new type-2 DELETE DEFN, QUERY RM, and UPDATE RM commands are added.

The following commands are enhanced to support the repository:

- | | |
|---|-------------------|
| • /CHECKPOINT FREEZE DUMPQ
PURGE LEAVEPLEX | • QUERY PGM |
| • EXPORT DEFN | • QUERY PGMDESC |
| • IMPORT DEFN | • QUERY RTC |
| • QUERY DB | • QUERY RTCDESC |
| • QUERY DBDESC | • QUERY STRUCTURE |
| • QUERY IMS | • QUERY TRAN |
| • QUERY IMSPLEX | • QUERY TRANDESC |
| | • UPDATE IMS |

The following z/OS MODIFY (F), SHUTDOWN, or STOP (P) commands are added for the Repository Server (RS) address space:

- | | |
|---|------------------------------------|
| • F <i>repositoryname</i> ADMIN <i>action</i> | • F <i>repositoryname</i> SHUTDOWN |
| • F <i>repositoryname</i> AUDIT <i>action</i> | • P <i>reposerver_name</i> |
| • F <i>repositoryname</i> SECURITY REFRESH | |

The BPE DISPLAY TRACETABLE and UPDATE TRACETABLE commands are enhanced to display information about the trace tables for the Repository Server address space and the new Repository Server DIAG trace table.

For more information about these command changes, see Chapter 11, “IMS repository function enhancements,” on page 159.

OTMA command enhancements

The output of the /DISPLAY OTMA command includes a new field, ACEEAGE, which shows the ACEE aging value for each OTMA client.

The following IMS commands are enhanced to support IMS-to-IMS TCP/IP communications:

- CREATE OTMADESC
- /DISPLAY TMEMBER
- QUERY OTMADESC
- UPDATE OTMADESC

ACB member online change enhancement overview

The ACB member online change function is enhanced to process only the DBDs and PSBs that are specified in NAME() keyword of the INIT.OLC TYPE(ACBMBR) command.

In an IMSplex environment, you can use the ACB member online change (OLC) function to add or change individual members of the ACB library, or the entire ACB library, and bring these new or changed members online without quiescing the IMSplex or refreshing the active ACB library. With OPTION(NAMEONLY) specified on the INIT.OLC TYPE(ACBMBR) command, IMS processes only the DBDs and PSBs that are specified in the NAME keyword.

If a PSB is specified in the NAME keyword, the following rules apply:

- Regardless of whether a PSB is new to the active ACB library, if the DBDs in the intent list have not been modified, this PSB is copied to the active ACB library.
- If a PSB is not new to the active ACB library and the DBDs in the intent list have been modified, this PSB is not copied to the active ACB library and a completion code 12B is returned.

If a DBD is specified in the NAME keyword, the following rules apply:

- If a DBD is new to the active ACB library and the DBDs in the reference list have not been modified, this DBD is copied to the active ACB library.
- If a DBD is new to the active ACB library and the DBDs in the reference list have been modified, this DBD is not copied to the active ACB library and a completion code 12C is returned.
- If a DBD is not new to the active ACB library and has been modified, this DBD is not copied to the active ACB library and a completion code 12A is returned.

Control area reclaim enhancement overview

When IMS Version 12 is run on z/OS Version 1 Release 12, as empty control areas (groups of VSAM control intervals) become available, they are automatically reused without needing to be reorganized.

In z/OS Version 1 Release 12, when all VSAM control areas (CIs) in a control area become free (data is no longer in them), the control area can automatically be reused for new inserted records without the need to reorganize the data sets. IMS Version 12 exploits this functionality.

CQS trace enhancements overview

Two new trace event tables are automatically generated by IMS to contain structure event trace entries and structure overflow trace entries. These new tables retain critical trace entries for a longer period of time, which improves CQS serviceability.

Prior to IMS Version 12, all CQS structure events were contained in a single trace table. The following two new trace tables are added:

- The structure event trace table (SEVT), which contains all structure event trace entries except entries that are related to overflow events.
- The structure overflow event trace table (OFLW), which contains only trace entries that are related to overflow events.

All existing trace entries that are not related to client activity are moved to one of the new trace tables and are expanded to take advantage of the larger 64-byte trace entry length. The existing CQS structure trace table (STR) now contains only client activity trace entries.

The following IMS components are updated to support the new trace event tables:

- The BPE configuration PROCLIB member
- The CQS BPE EXTERNAL TRACE FORMATTING MENU panel of the IMS Dump Formatter
- The BPE DISPLAY TRACETABLE and UPDATE TRACETABLE commands

/DIAGNOSE SNAP command enhancement overview

The /DIAGNOSE SNAP command is enhanced in IMS Version 12 to improve the reliability of diagnostic information and to streamline the problem determination process.

The following new resource types are added to the /DIAGNOSE SNAP command. Multiple parameters (in the parentheses) can be specified, with each one separated by a comma or a blank.

AREA(*areaname*)

Captures control block information for the Fast Path area specified in the *areaname* parameter.

DB(*dbname*)

Captures control block information for the database specified in the *dbname* parameter.

LINE(*linenumber*)

Captures control block information for the communication line specified in the *linenumber* parameter. The *linenumber* parameter identifies a currently defined communication line.

LINK(*linknumber*)

Captures control block information for the logical link specified in the *linknumber* parameter. The *linknumber* parameter identifies a currently defined logical link.

PGM(*pgmname*)

Captures control block information for the program specified in the *pgmname* parameter. The *pgmname* parameter identifies a currently defined program.

REGION(*regionnumber*)

Captures control block information for the dependent region specified in the *regionnumber* parameter. The *regionnumber* parameter identifies a currently active dependent region.

Two other enhancements are added to the /DIAGNOSE SNAP command:

OPTION(DISPLAY LIMIT(1999 | *number_of_lines*)

Specifies the destination for the resource information captured by the SNAP function. In IMS Version 12, DISPLAY is the default destination. In IMS Version 11, the default destination is the OLDS.

SHOW(ALL | *keyword* | *blockname*)

Specifies the control blocks that are to be captured by the SNAP function.

DRD enhancements overview

Dynamic resource definition (DRD) is enhanced for IMS Version 12 in the following areas: the IMPORT command has a new UPDATE option, the Manage Resources ISPF panels are enhanced, and DRD can use the IMS resource definition (IMSRSC) repository.

IMPORT command UPDATE option

The new UPDATE option for the type-2 IMPORT command enables users to change runtime resources and descriptors with the attributes from an imported definition.

If no runtime resource or descriptor exists when the IMPORT OPTION(UPDATE) command is issued, IMS creates the resource or descriptor with the attributes from the imported definition.

For the update of an existing runtime resource or descriptor to succeed, the resource or descriptor must not be in use. Otherwise, the IMPORT OPTION(UPDATE) command fails.

Manage Resources ISPF panel enhancements

The following Manage Resources ISPF panels are enhanced to support the IMS repository function and the UPDATE option of the IMPORT DEFN command.

- DELETE DEFN
- EXPORT DEFN
- IMPORT DEFN
- QUERY DB
- QUERY DBDESC
- QUERY PGM
- QUERY PGMDDESC
- QUERY RTC
- QUERY RTCDESC
- QUERY TRAN
- QUERY TRANDESC

DRD usage of the IMS repository function

Before IMS Version 12, DRD stored resource and descriptor definitions in a resource definition data set (RDDS). IMS Version 12 introduces an alternative to the RDDS: the IMS resource definition (IMSRSC) repository.

For more information, see Chapter 11, “IMS repository function enhancements,” on page 159.

Extended Address Volume (EAV) enhancement overview

z/OS Version 1 Release 12 supports non-VSAM data sets residing in the extended addressing space (EAS). IMS Version 12 takes advantage of that enhancement and provides support for OSAM data sets to be allocated in the EAS of an EAV.

As of IMS Version 12, the following types of data sets can be allocated in the EAS of an EAV:

- BPE external trace data sets
- OSAM database data sets
- VSAM database data sets
- GSAM data sets, after APAR/PTF PM86782/UK94966 is applied.
- Online log data sets (OLDSs), including large OLDS (for example, greater than 64 KB tracks)
- Write ahead data sets (WADSs)
- Restart data sets (RDSs)
- Message queue blocks data sets
- Long and short message data sets
- Terminal devices with UNITYPE = SPOOL or DISK
- RESLIB data sets (IMS.SDFSRESL)
- MODBLKS data sets for online change (IMS.MODBLKSA and IMS.MODBLKSB)
- Application control block library (ACBLIB) data sets
- DBRC RECON data sets (non-PRA)
- Database Image Copy utility (DFSUDMP0) data sets
- Database Image Copy 2 utility (DFSUDMT0) data sets
- Database Change Accumulation utility (DFSUCUM0) data sets
- Local online change data sets (IMS.MODSTAT)
- Global online change data sets (IMS.OLCSTAT)
- Partitioned data set extended (PDSE) data sets (IMS.SDFSJLIB, PGMLIB, SMPLTS, and External Subsystem Attach Facility (ESAF) load libraries)
- Time-controlled operations (TCO) data sets
- System log data sets (SLDSs)
- Recovery log data sets (RLDSs)
- HALDB Indirect List data sets (ILDSs)
- IMS Repository data sets
- MFS map library data sets produced by the MFS Language and Service utilities (IMS.FORMAT)
- IMS Trace facility external trace data sets
- IMS Monitor output data sets

Requirements: Non-VSAM EAV support requires:

- z/OS Version 1 Release 12 or later
- IBM System Storage® DS8000® devices or DS8700 devices configured as 3390 Model A devices

Fast Path 64-bit buffer manager enhancements overview

Enhancements to the Fast Path 64-bit buffer manager improve usability and performance in IMS Version 12.

The Fast Path 64-bit buffer manager is enhanced to:

- Provide information in the output of the QUERY POOL TYPE(FPBP64) SHOW(ALL) command that indicates which subpools or extents are being quiesced in preparation to delete the subpool or extent, and also displays EPVT storage usage
- Provide a subset of the output of the QUERY POOL TYPE(FPBP64) SHOW(ALL) command by using the new SHOW(STATISTICS) keyword
- Perform compression, expansion, and resizing of buffer subpools
- Improve performance by removing internal code paths that supported earlier operating systems

The following parameters are added to the Fast Path section of the DFSDFxxx PROCLIB member to enable (or not) some of the new functions:

FPBP64C=Y | N

Specifies whether subpool compression is enabled for the 64-bit buffer manager.

After applying IMS Version 12 APAR/PTF PM84873/UK92995, the default value is FPBP64C=N.

FPBP64D=Y | N

Specifies whether IMS uses the values on the DBBF parameter to calculate the initial startup sizes for the 64-bit subpools. FPBP64D=N is the default.

FPBP64E=Y | N

Specifies whether subpool pre-expansion is enabled for the 64-bit buffer manager subpools.

After applying IMS Version 12 APAR/PTF PM84873/UK92995, the default value is FPBP64E=N.

FPBP64SR=Y | N

Specifies whether IMS moves the SDEP buffers into 64-bit storage during emergency restart processing (Y), or uses ECSA for SDEP insert buffers processing during emergency restart processing (N). FPBP64SR=Y is the default.

For information about other Fast Path enhancements, see “Fast Path usability and serviceability enhancements overview” on page 8.

IMS Connect enhancements overview

IMS Connect is enhanced in IMS Version 12 with new type-2 commands, IMS-to-IMS connections, and other usability, performance, and diagnostic functions.

In IMS Version 12, IMS Connect is enhanced as follows:

- IMS Connect can be controlled by using type-2 commands instead of WTOR commands or IMS Connect z/OS MODIFY commands.
- IMS-to-IMS TCP/IP communications is available for Multiple Systems Coupling (MSC) and Open Transaction Manager Access (OTMA), without needing a third-party application to relay the TCP/IP messages between two instances of IMS.
- Load up to 2000 XML converters into IMS Connect (the previous capacity was 100). This enhancement is delivered through the IMS service process in APAR/PTF PM64487/UK79728.
- Several small enhancements improve usability, performance, and diagnostics.

For more details about these enhancements, see Chapter 10, “IMS Connect enhancements,” on page 137.

IMS Dump Formatter enhancements overview

The IMS Dump Formatter ISPF panels are enhanced to support any Repository Server address space, any Repository Server client, and any OTMA Callable Interface client. These enhancements are delivered through the IMS service process in APAR/PTF PM30542/UK69382.

IMS Log Archive utility (DFSUARC0) enhancement overview

In IMS Version 12, the Log Archive utility (DFSUARC0) is enhanced with a new parameter (CMPRSNR) to the SLDS control statement and the default behavior of the utility is changed.

Before this enhancement, DFSUARC0 replaces DB update log records for full function non-recoverable databases with placeholder records. After the APAR is installed, the utility copies these records unless instructed to do otherwise by use of the CMPRSNR parameter.

This enhancement is added to:

- IMS Version 12 with APAR/PTF PM54945/UK77566.
- IMS Version 11 with APAR/PTF PM19363/UK77565.

IMS log record enhancement overview

In IMS Version 12, CPU usage statistics for workloads operating on System z Application Assist Processors (zAAP) and System z Integrated Information Processor (zIIP) are captured in the IMS X'56FA' and X'07' log records.

By capturing these statistics, the time the workload operates on a zAAP or zIIP is separated from the time spent on standard central processors (CP). This enhancement enables more precise statistics regarding workloads that have been offloaded to a zAAP or zIIP.

IMS logger enhancements overview

Several enhancements improve the overall performance of IMS logging and free ECSA for other uses.

IMS Version 12 improves the functionality of IMS logging in the following ways:

- The IMS support for log data sets is enhanced to:

- Use DFSMS striping to increase logging bandwidth. The OLDS and SLDS can use extended-format data sets that can optionally be striped. Use parameters on the DD statements for the data sets to specify the DFSMS options.
- Better tolerate DFSMS compression. This enhancement might reduce backout failures.
- The IMS log buffers can be moved in to 64-bit virtual storage to free ECSA storage space for other uses. Log buffers are obtained in 64-bit storage when all the following are true:
 - The new BUFSTOR parameter of the DFSVSMxx PROCLIB member specifies BUFSTOR=64.
 - The OLDS block size is a multiple of 4096.
 - The OLDSSs are on extended format data sets.

Recommendation: Use large pages to back your log buffers. When running with 64-bit log buffers, IMS allocates the 64-bit storage backed by large (1 MB) pages, if they are available. Having your log buffers backed by large pages can improve performance due to more efficient dynamic address translation. Large pages are available on z10™ and larger processors with more than 4 GB of storage.

To set up your system to have large pages available, specify the LFAREA= parameter in the z/OS IEASYSxx PARMLIB member. Ensure that you request enough storage on LFAREA= to contain all of your log buffers, plus any other large page usage in your system. To determine the amount required for your IMS log buffers, multiply the number of buffers you requested on the OLDSDEF BUFNO= statement by the OLDS block size, and round up to the next megabyte (1 megabyte = 1 048 576 bytes).

To support this enhancement, message DFS3254I is added, which states that BUFSTOR=64 is specified, but the BLKSZ parameter of OLDSDEF is not a multiple of 4096.

For information about the IEASYSxx LFAREA= parameter, see *z/OS MVS Initialization and Tuning Reference*.

- The Log Filter exit routine (DFSFTFX0) is enhanced for IMS Version 12 to include a new function code that indicates a log buffer send where the data resides above the 2 GB boundary, and three new fields on the exit routine parameter list. If the IMS log buffers reside in 64-bit storage, and if DFSFTFX0 is part of the IMS system, the exit routine must be able to use the updated parameter list. The sample exit routine shipped with IMS is modified to use the updated parameter list.
- The Logger exit routine (DFSFLGX0) is changed for IMS Version 12 to include:
 - A new version of the parameter list and a new field that indicates the version number. The version number for IMS Version 12 is 2.
 - A new field in the parameter list that contains the 64-bit address of the log buffer storage, if 64-bit addressing is being used.
- The write-ahead data set (WADS) channel program is rewritten and replaced for IMS Version 12.
- IMS logger dump formatting is unchanged. However, this function is moved to the SYS section of the IMS Enhanced Dump Analysis panels within the IMS Dump Formatter.

Requirement: You must preallocate and format the WADS on a DASD device that supports Extended Count-Key-Data (ECKD™) architecture.

IMS repository function enhancements overview

The IMS repository function enables multiple IMS systems in an IMSplex to manage, store, share, and retrieve resource definitions in a centralized manner. This function helps simplify the dynamic resource definition (DRD) function by eliminating the need to manually coordinate individual resource definition data sets (RDDSs) across the IMSplex.

The IMS repository function is an alternative to DRD RDDSs. IMS Version 12 continues to support RDDSs.

The initial type of repository supported is the IMS resource definition (IMSRSC) repository. Use the CSLRIxxx and DFSDFxxx members of the IMS PROCLIB data set to define the specifications of the IMSRSC repository.

The IMSRSC repository is managed by the IMS Repository Server (RS), a new address space for IMS Version 12. RS is managed by the Common Service Layer (CSL) Resource Manager (RM). Resource and descriptor definitions can be added, queried, modified, or deleted from the IMSRSC repository by making requests to RM using type-2 commands.

For more details about these enhancements, see Chapter 11, “IMS repository function enhancements,” on page 159.

Installation Verification Program (IVP) enhancements overview

The IVP is enhanced to demonstrate the setup and configuration of the IMS repository function, an IMS resource definition (IMSRSC) repository, and the IMS catalog function.

Large data set support for DISK and SPOOL devices enhancements overview

With IMS Version 12, terminals with UNITYPE = DISK or SPOOL support large format data sets that are larger than 65535 track size and are allocated as DSNTYPE=LARGE.

In addition, the Spool SYSOUT Print utility (DFSUPRT0), and the spool and disk terminal support, supports data sets in the cylinder managed area on extended address volumes (EAVs).

This support is added with APAR/PTF PM30501/UK70003.

PARDLI parameter support extended to all IMS dependent regions

In IMS Version 12, support for the PARDLI parameter is extended to all IMS dependent region types.

The PARDLI parameter controls whether DL/I processing is performed in the dependent region or in the IMS control region.

After applying IMS Version 12 APAR/PTF PM73608/UK91881, you can specify the PARDLI parameter for JMP, MPP, and IFP regions. Prior to this enhancement, the PARDLI parameter was supported by BMP and JBP regions only.

Important: Using PARDLI=1 with MPP, JMP, or IFP regions can seriously degrade performance. Use PARDLI=1 for MPP, JMP, or IFP regions only when needed for the purposes of debugging application programs.

Persistent JVM performance enhancement: Reusable DB2 JCC connections

In a mixed Java and COBOL environment, IMS Version 12 introduces the ability to re-use DB2 JCC connections for application programs that invoke a Java application that accesses DB2 from an MPP, BMP, or IFP dependent region.

A DB2 JCC connection can be re-used only if the user ID of the next transaction is the same as the user ID of the previous transaction.

The DB2JCC_CONN_REUSE=Y | N parameter in the PROCLIB member that is specified on the ENVIRON= parameter enables the reuse of DB2 JCC connections. The default is DB2JCC_CONN_REUSE=N.

This support is added with APAR/PTF PM80880/UK91884.

IMS security enhancements

IMS Version 12 includes enhancements to security initialization parameters and RACF support.

Security initialization parameters enhancement

IMS Version 12 includes two new initialization parameters: RCLASS and SECCNT.

Use initialization parameters instead of specifying the RCLASS and SECCNT keywords in the SECURITY macro.

IMS Version 12 is the last IMS version to support the SECURITY macro.

In IMS Version 12, the initialization parameters for the RCLASS and SECCNT keywords are delivered by APAR/PTF PM48204/UK74051.

For information about using initialization parameters for security, see Controlling security during system startup for DB/DC and DCCTL (System Administration).

Resource access security enhancement overview

The Resource Access Security exit routine (DFSRSAS00) is enhanced in IMS Version 12 to accept additional return codes that can indicate the user is trusted, thus allowing IMS to bypass unnecessary RACF security checks.

Syntax Checker enhancements overview

The IMS Version 12 Syntax Checker supports the new and changed IMS PROCLIB members, and delivers other enhancements and changes.

The Syntax Checker is updated for IMS Version 12 in the following ways:

- Support is added for the new PROCLIB member for the Repository Server address space.
- Support is added for the CATALOG section of the DFSDFxxx PROCLIB member.
- The ability to display and save keywords in custom order-of-input is added. This function is delivered through the IMS Service process.

- The IMS PROCLIB members parameters that were supported in IMS Version 11 are updated to reflect the changes in IMS Version 12.
- IMS Version 9 PROCLIB members cannot be used as input to the IMS Version 12 Syntax Checker. IMS Version 10, IMS Version 11, and IMS Version 12 PROCLIB members are supported.

TSO SPOC enhancements overview

The TSO single point of control (SPOC) application is enhanced in IMS Version 12 to support the use of the IMS repository function and the UPDATE option of the IMPORT DEFN command.

The following Manage Resources ISPF panels have been changed to support the IMS repository function and the UPDATE option of the IMPORT DEFN command.

DELETE DEFN
EXPORT DEFN
IMPORT DEFN
QUERY DB
QUERY DBDESC
QUERY PGM
QUERY PGMDDESC
QUERY RTC
QUERY RTCDESC
QUERY TRAN
QUERY TRANDESC

The changes support the use of the IMS repository function and the UPDATE option of the IMPORT DEFN command.

Chapter 2. Hardware and software requirements

IMS Version 12 has base hardware and software requirements. Some individual functions have additional requirements.

These topics describe the requirements for installing and activating IMS Version 12.

Hardware requirements

IMS Version 12 has base hardware requirements. Some individual functions have additional hardware requirements.

Processor requirements

The processor that IMS Version 12 runs on must meet certain requirements.

The processor that IMS Version 12 runs on must meet the following requirements:

- An IBM zSeries machine running in z/Architecture[®] mode (ESA mode is not supported by IMS Version 12)
- Capable of running z/OS Version 1 Release 11 or later
- A 64-bit processor, such as those described in the following table
- A processor that supports the Long Displacement Facility of the z/Architecture

Table 1. IBM 64-bit processors

Machine name	Machine type
IBM eServer [™] zSeries 900 (z900) ¹	2064
IBM eServer zSeries 800 (z800)	2066
IBM eServer zSeries 990 (z990)	2084
IBM eServer zSeries 890 (z890)	2086
IBM System z9 [®] Enterprise Class (formerly z9 [®] 109)	2094
IBM System z9 Business Class (z9 BC)	2096
IBM System z10 [®] Enterprise Class (z10 EC)	2097
IBM System z10 Business Class (z10 BC)	2098
IBM zEnterprise [®] 196 (z196)	2817
IBM zEnterprise 114 (z114)	2818
IBM zEnterprise EC12 (zEC12)	2827

1. z900 systems must be at the GA2 level (microcode level 3G or later) to enable the Long Displacement Facility. For all other machine types, the Long Displacement Facility is always present.

For more information about IBM 64-bit processors, see System z Hardware at www.ibm.com/systems/z/hardware/.

System console requirements

The console requirements of z/OS Version 1 Release 11 or later apply.

Tape unit requirements

IMS supports IBM 3590 and later tape units (or equivalent products) for installation and maintenance. IMS supports tape block sizes greater than 32760 bytes for the output of the Database Image Copy utility (DFSUDMP0) and the Online Database Image Copy utility (DFSUICP0).

Coupling facility requirements

Sysplex data sharing (including data caching and VSO data sharing) with Internal Resource Lock Manager (IRLM) V2.2 or V2.3 requires a coupling facility level 9 or later. Shared queues, shared-EMH support, and the OM Audit trail also require a coupling facility level 9 or later. System-Managed Duplexing requires a coupling facility level 12 or later, and bidirectional CF-to-CF links (such as HiperLink, ICB link, or IC link).

For more information about System-Managed CF Structure Duplexing, see http://www-01.ibm.com/common/ssi/rep_ca/1/897/ENUS102-181/ENUS102-181.PDF.

DASD requirements

IMS Version 12 hardware requirements include several requirements for DASD.

During the binding of the IMS control blocks load modules (specifically during the bind of the IMS VTAM control blocks load monitoring module), both the binder work data set SYSUT1 and IMS.SDFSRESL library must reside on a device that supports a record size of 18 KB or greater. For all other system libraries and working storage space, any device that is supported by the operating system is allowed.

For IMS database storage, any device that is supported by the operating system is allowed within the capabilities and restrictions of Basic Sequential Access Method (BSAM), Queued Sequential Access Method (QSAM), Overflow Sequential Access Method (OSAM), and Virtual Storage Access Method (VSAM).

Restriction: IMS does not support VSAM Extended Addressability (EA).

Data sets that reside in the extended addressing space (EAS) of extended address volumes (EAVs) require IBM System Storage DS8000 devices at microcode level R4.0 via bundle 64.0.175.0 or higher.

You must preallocate and format the write-ahead data set (WADS) on a DASD device that supports Extended Count-Key-Data (ECKD) architecture.

The fast replication function of the Database Image Copy 2 utility (DFSUDMT0) requires DASD controllers that support one of the following features:

- The concurrent-copy feature of DFSMS
- The FlashCopy[®] feature of the IBM Enterprise Storage Server[®] (ESS)
- The SnapShot feature of the IBM RAMAC Virtual Array (RVA) storage system

FlashCopy and SnapShot might require microcode from IBM to activate their functionality. Also, the source and target data sets (databases and image copies) must reside on the same ESS or RVA hardware.

The DASD storage requirements for the following items are described in the *Program Directory for Information Management System Transaction and Database Servers V12.0*:

- SMP/E system entries
- SMP/E data sets
- Target libraries
- Distribution libraries
- Install process
- Optional machine-readable material

The following types of data sets can be allocated in the extended addressing space (EAS) of an extended address volume (EAV):

- BPE external trace data sets
- OSAM database data sets
- VSAM database data sets
- Online log data sets (OLDSs), including large OLDS (for example, greater than 64 KB tracks)
- Write ahead data sets (WADSs)
- Restart data sets (RDSs)
- Message queue blocks data sets
- Long and short message data sets
- Terminal devices with UNITYPE = SPOOL or DISK
- RESLIB data sets (IMS.SDFSRESL)
- MODBLKS data sets for online change (IMS.MODBLKSA and IMS.MODBLKSB)
- Application control block library (ACBLIB) data sets
- DBRC RECON data sets (non-PRA)
- Database Image Copy utility (DFSUDMP0) data sets
- Database Image Copy 2 utility (DFSUDMT0) data sets
- Database Change Accumulation utility (DFSUCUM0) data sets
- Local online change data sets (IMS.MODSTAT)
- Global online change data sets (IMS.OLCSTAT)
- Partitioned data set extended (PDSE) data sets (IMS.SDFSJLIB, PGMLIB, SMPLTS, and External Subsystem Attach Facility (ESAF) load libraries)
- Time-controlled operations (TCO) data sets
- System log data sets (SLDSs)
- Recovery log data sets (RLDSs)
- HALDB Indirect List data sets (ILDSs)
- IMS Repository data sets
- MFS map library data sets produced by the MFS Language and Service utilities (IMS.FORMAT)
- IMS Trace facility external trace data sets
- IMS Monitor output data sets

Large sequential data set support hardware requirements

To take advantage of this support, hardware that has more than 65,535 tracks must be used.

Multiple Systems Coupling hardware requirements

When the physical link is channel-to-channel (CTC) and is dedicated to IMS, Multiple Systems Coupling (MSC) requires the System/370 CTC adapter or a logical channel on the IBM 3088, ESCON[®], or Fiber Channel connection (FICON[®]). MSC FICON CTC support requires that at least one IMS system be installed on an IBM zSeries machine with the FICON channel and FICON CTC microcode. The other side (IMS) can be any processor with a FICON channel.

Parallel RECON access hardware requirements

The parallel RECON access function requires a Parallel Sysplex[®] environment and DFSMS Transactional VSAM Services (DFSMSStvs). Therefore, parallel RECON access requires Coupling Facility (CF) hardware in the System z sysplex.

Terminals and equipment supported by IMS Version 12

IMS Version 12 supports SLU, LU, NTO, 3270, and Finance (3600) terminals, as well as other equipment such as printers and DASD devices.

The following tables list the terminals and other equipment supported by IMS Version 12.

In the table, the following abbreviations are used:

DSC Data Stream Compatibility

ISC Intersystem Communication

LU Logical Unit

NTO Network Terminal Option

PC Personal Computer

PP Program Product

SLU Secondary Logical Unit

TTY Teletypewriter equipment

VTAM

Virtual Telecommunications Access Method

Table 2. Terminals that are supported by IMS Version 12

Compatible product	SNA	Notes
SLU 1 (for example, 3230, 3232, 3262, 3287, 3767, 3268, 3770, 3770P, 3790 (type 2 batch and bulk print), 4700, 5280, 5550, S/32, S/34, S/38, 8100)	VTAM	1, 2
SLU 2 (for example, 3179, 3180, 3276, 3278, 3279, 3290, 3790 (3270 DSC feature), 3600 Admin PP, 4700, 5280, 5520, 5550, 8100, 8775, S/34, Display writer)	VTAM	1, 2
SLU P (for example, 3600, 3630, 3650, 3680, 3770PC, 3790, 4700, 4730, 4736, 5520, 8100, S/34, Series/1)	VTAM	1, 2, 3, 4
LU 6.1 (ISC)	VTAM	1, 2
LU 6.2 (APPC)	VTAM	2
NTO (for example, 33/35, TTY, 2740, 2741, 3101, 3232, 3767, S/23)	VTAM	1, 2

Notes:

1. The IMS Message Format Service (MFS) is available for this device. MFS editing can be bypassed on a message-by-message basis.
2. IMS Fast Path supports the use of compatible terminals.
3. Although IMS provides sample code for this terminal, additional user coding is required.
4. IMS provides no device-resident code for this device. Additional user coding is required to attach it to IMS.

Table 3. Terminals that are supported by IMS Version 12, but withdrawn from IBM Marketing

IMS-supported product	Compatible product	Switched mode	Polled mode	Local mode	SNA	Notes
3270		VTAM	VTAM	VTAM	VTAM	1, 2
Finance (3600)	4700				VTAM	1, 2, 3

Notes:

1. The IMS Message Format Service (MFS) is available for this device. MFS editing can be bypassed on a message-by-message basis.
2. IMS Fast Path supports the use of compatible terminals.
3. Although IMS provides sample code for this terminal, additional user coding is required.

For the following table, refer to operating system descriptions for specific device types.

Table 4. Other equipment that is supported by IMS Version 12

IMS-supported product	Access
System console	MVS™ write-to-operator/write-to-operator-with-reply (WTO/WTOR)
Spool device	Basic Sequential Access Method (BSAM)
Card reader	BSAM
Printer	BSAM
Magnetic tape	BSAM
DASD devices	BSAM

Restriction: IMS Version 12 does not support BTAM devices (2740-1, 2740-2, 2741, 2780, System/3, and System/7).

Remote Site Recovery hardware requirements

For basic Remote Site Recovery (RSR) functions, you need a Sysplex Timer, a high bandwidth control unit, and at least one tape unit.

RSR requires:

- A Sysplex Timer (if either data sharing or workload is spread across multiple CPCs)
- A high bandwidth control unit (such as a 3172)
- At least one tape unit at the tracking site

Coordinated Disaster Recovery support for IMS and DB2 requires that the DB2 logs reside on devices that support Extended Remote Copy (XRC).

Software requirements

IMS Version 12 has base software requirements. Some individual functions have additional software requirements.

Operating software requirements

IMS Version 12 and its various functions have specific operating software requirements.

Before you install IMS Version 12, check with your IBM Support Center or check either Information/Access or Service Link for additional preventive service planning (PSP) information that you need to be aware of. The PSP upgrade name for IMS Version 12 is IMS1200.

The z/OS service levels that are required for installation and execution are described in the *Program Directory for Information Management System Transaction and Database Servers V12.0*.

IMS Version 12 base software requirements

The base IMS Version 12 system runs on z/OS Version 1 Release 11 or later. Certain features and functions have additional software requirements.

IMS Version 12 requires the following minimum version, release, or modification levels (as long as those versions remain available and supported by IBM):

- z/OS Version 1 Release 11 (5694-A01) or later, as long as those versions remain available and supported by IBM.
 - IBM High-Level Assembler Toolkit (5696-234) Version 1 Release 5, a separately orderable feature of z/OS.
 - z/OS V1R11.0 Security Server RACF V1R11.0 or later, or an equivalent product, if security is used. RACF is available with the IBM SecureWay Security Server for z/OS (a separately orderable feature of z/OS).
 - The following APARs/PTFs are required to run IMS Version 12 on z/OS V1R11:
 - DFSMS APAR/PTF OA33409/UA55338
 - VSAM APAR/PTF OA32318/UA57797
- IRLM Version 2.2 or later (5635-A03), if data sharing is used. IRLM Version 2.2 and IRLM Version 2.3 are delivered with IMS Version 12.

When using multiple IMS systems:

- On the same z/OS system, you need only one IRLM.
- Of different release levels on the same z/OS system, you can have one IRLM or you can use two or more IRLM address spaces. If two or more IMS systems share data and are running on the same z/OS system, they should use the same IRLM.
- On different z/OS systems for inter-processor block-level data sharing, you must have one IRLM on each z/OS system.

IMS Version 12 also operates in a virtual machine (VM) under control of z/OS. This environment is intended for use in a program development, testing, and non-XRF production environment.

Restrictions: The VM environment has the following restrictions:

- The Log Analysis utilities might yield inaccurate time-stamp results.
- If you operate the IMS Version 12 Transaction Manager under VM for production purposes and have specific throughput or terminal response-time requirements, plan to benchmark under VM to ensure that the proposed configuration meets your performance needs.

System-Managed CF Structure Duplexing is recommended, though not required, for the Resource Manager resource structure.

Coordinated Disaster Recovery support for IMS and DB2 requires the IMS Version 12 Remote Site Recovery (RSR) Recovery Level Tracking (RLT) feature.

ACB library member online change software requirements

In general, the software and hardware requirements for the ACB library member online change function are the same as for IMS Version 12. However, IMS must be configured as an IMSplex.

Because this function is available only in an IMSplex environment and is a variation of the global online change function:

- When a single IMS is involved, that IMS must use the OLCSTAT data set and a Common Service Layer (CSL) with at least a minimum configuration consisting of an Operations Manager (OM) and a Structured Call Interface (SCI). If a Resource Manager (RM) is not used in this configuration, the value of the RMENV= parameter in either the DFSCGxxx or DFSDFxxx member of the IMS.PROCLIB data set must be specified as no (N).
- When multiple IMS systems are involved, they must:
 - Either all use a shared OLCSTAT data set, or each use a local OLCSTAT data set.
Each IMS system that shares the OLCSTAT data set must specify the same value for ACBSHR= in the DFSCGxxx PROCLIB member or the <COMMON_SERVICE_LAYER> section of the DFSDFxxx PROCLIB member.
 - Include a CSL with an OM, an SCI, and an RM. A resource structure is recommended, but is not required.

Coexistence APARs

Certain functions of IMS Version 12 can coexist with IMS Version 10 and IMS Version 11 with the appropriate coexistence APARs applied.

See “Overview of coexistence APARs” on page 95 for an overview of the APARs that are needed for coexistence purposes.

Database quiesce software requirements

In general, the software and hardware requirements for the database quiesce function are the same as for the IMS Version 12 base product. In addition, IMS must be configured as an IMSplex (with at least a minimal Common Service Layer), the MINVERS field in the RECON data sets must be set to '11.1' or higher, and image copy JCL must specify DISP=SHR if the image copy job runs while the database is quiesced.

The database quiesce function requires an IMSplex environment that includes a Common Service Layer, with at least one Operations Manager (OM) and one Structured Call Interface (SCI).

A Resource Manager (RM) is required when using the database quiesce function in an IMSplex that contains multiple IMS systems. An RM resource structure is recommended, but not required.

An RM is not required (RMENV=N) when using the database quiesce function in an IMSplex that contains one IMS system (also known as the enhanced command environment).

Before attempting a database quiesce operation, the minimum value of the MINVERS field in the RECON data sets must be '11.1' or higher.

The JCL that is generated for image copy or hardcoded by the user must specify DISP=SHR because the online IMS subsystems can have the database data sets allocated during a quiesce operation.

Database Resource Adapter (DRA) software requirements

The version of the IMS DRA modules that are used by a DRA client must be the same version as the IMS with which the DRA client is communicating.

Recommendations:

- Concatenate the IMS.SDFSRESL library to the DRA client step library so the correct version of the DRA Startup/Router routine (DFSPRRC0) is loaded into the DRA client load library.
- Ensure that the DRA Startup Table (DFSPZPxx) points to the correct version of IMS.SDFSRESL.

Data sharing software requirements

For block-level data sharing, IRLM Version 2.2 or later is required. The IRLM is an independent component that is shipped with IMS Version 12. The IRLM must be defined as a z/OS subsystem. Block-level data sharing of databases is supported between all in-service levels of IMS.

Dynamic resource definition software requirements

Although dynamic resource definition (DRD) has the same hardware and software requirements as IMS Version 12, certain configuration and system definition requirements exist.

The following configuration and system definition requirements apply to DRD:

- IMS must be defined with a Common Service Layer (CSL) in order to enable DRD. The CSL must contain a Structured Call Interface (SCI), an Operations Manager (OM) and, if the IMSRSC repository is used, a Resource Manager (RM).
- You must enable DRD by specifying the appropriate parameters in either of the following IMS PROCLIB members:
 - DFSDFxxx
 - DFSCGxxx (CSL parameters. These can be replaced by the <COMMON_SERVICE_LAYER> section of DFSDFxxx.)
- You must have a set of at least two resource definition data sets (RDDSs) or a set of IMSRSC repository data sets where the resource definitions that support DRD are stored. These RDDSs or IMSRSC repository data sets must exist before you store resource definitions that are created, updated, or deleted with DRD.

- You must have an entry point for DRD commands, such as the TSO SPOC application, the Manage Resources application, or another application that interacts with the OM API.
- The INITMOD procedure requires that either MODBLKSA or MODBLKSB is defined to initialize the MODSTAT data set, even for an IMS that does not define the MODBLKS data set.
- The Global Online Change utility (DFSUOLC0) requires that either MDBS=A or MDBS=B is defined to initialize the OLCSTAT data set, even for an IMS that does not define the MODBLKS data set.

Extended address volume (EAV) enhancement software requirements

For IMS non-VSAM data sets to reside in the extended addressing space (EAS) of an extended address volume (EAV), z/OS Version 1 Release 12 is required.

Fast Path software requirements

The Fast Path 64-bit buffer manager requires a minimum of 2.1 gigabytes of 64-bit common storage. Also, if the Fast Path 64-bit buffer manager will be used on systems that are being tracked by a Fast Database Recovery (FDBR) address space, the DFSDF= keyword must be specified on the FDR procedure.

HALDB Index/ILDS Rebuild utility free space function software requirements

The HALDB Index/ILDS Rebuild utility (DFSPREC0) requires four 2 GB data spaces to store and sort the rebuilt indirect list entries (ILEs) before reloading them into the ILDS.

IMS callout function software requirements

To support the IMS callout function, OTMA must be enabled in IMS and IMS Connect configured for callout support.

Also, one of the following components is required: IMS Enterprise Suite SOAP Gateway, IMS TM Resource Adapter, or user-written IMS Connect clients (TCP/IP applications).

Related concepts:

 [IMS Enterprise Suite SOAP Gateway overview](#)

 [IMS TM Resource Adapter overview](#)

IMS catalog function software requirements

The IMS catalog function has software requirements.

The IMS catalog function is enabled in IMS Version 12 by a number of small programming enhancements (SPEs). These SPEs are delivered in a number of APARs/PTFs.

Before you can enable the IMS catalog in IMS Version 12, you must install the following APARs/PTFs:

- PM36434/UK78043, UK78044
- PM38214/UK78071
- PM38939/UK78042

- PM38942/UK78028
- PM42903/UK78067, UK78068
- PM42904/UK78066
- PM42905/UK78045
- PM42906/UK78070
- PM42908/UK77993, UK77994
- PM42909/UK78069
- PM45935/UK77995
- PM55836/UK77127

The SSA enhancements for the IMS catalog are delivered in separate APARs.

Distributed environments that use the IMS catalog function must use the IMS Universal drivers to access the catalog. The IMS catalog function supports the use of the IMS Universal drivers, traditional IMS database query techniques, or batch processing in the z/OS environment.

IMS Connect software requirements

IMS Connect has software requirements in addition to those of the base IMS product.

The software requirements for IMS Connect include:

- z/OS V1R11.0 Communications Server IP Version 6 or later (TCP/IP).
- To implement security, z/OS Security Server RACF or an equivalent product.
- To use the local option for client communications, there are additional software requirements. See IMS TM Resource Adapter.
- To use Secure Sockets Layer (SSL), z/OS System SSL, a sub-component of z/OS Cryptographic System Services, is required. For information about z/OS encryption support available with the z/OS Cryptographic System Services SSL module, see .

IMS Version 13 is the last version of IMS to support the IMS Connect SSL function. Customers using this function should migrate to using 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.

- To support the IMS Universal drivers or a user-written DRDA[®] source server, an IMS Common Service Layer is required, including the Open Database Manager, the Operations Manager, and the Structured Call Interface.
- IMS Connect must have z/OS UNIX System Services superuser privileges, to ensure that IMS Connect can open ports.

IMS Connect XML Adapter support

The IMS Connect XML Adapter support in IMS Version 12, used with the IMS Enterprise Suite SOAP Gateway, requires Rational[®] Developer for System z Version 8 or later. Certain functions of the IMS Enterprise Suite SOAP Gateway might have additional software requirements.

Two limited usage licenses of Rational Developer for System z are provided for each license of IMS Version 12.

Java application program support in IMS Version 12

Java applications that run in or access IMS Version 12 must meet specific software requirements.

Software requirements for Java applications that access IMS databases

IMS Version 12 requires software to support Java application programs that access IMS databases.

IMS Version 12 requires the following software:

- z/OS UNIX System Services available at run time.
- Hierarchic File System (HFS) or zFS. For information on preparing HFS, see *z/OS UNIX System Services File System Interface Reference*.

The support for XML documents in IMS Version 12 requires IBM 31-bit SDK for z/OS, Java Technology Edition, Version 6 (JDK 6.0).

IMS provides two generations of Java drivers and resource adapters:

- The IMS Universal drivers, which are the most recent generation (delivered with IMS Version 11 and later)
- The drivers and resource adapters provided by the classic Java APIs for IMS.

Recommendation: Because the IMS Universal drivers are built on industry standards and open specifications, and provide more flexibility and improved support for connectivity, data access methods, and transaction processing options, use these drivers for Java applications that access IMS. The IMS strategy is to provide new functionality through the IMS Universal drivers and the IMS Java dependent region resource adapter.

Software requirements for Java application programs that use the IMS Universal drivers:

The IMS Universal drivers that Java application programs can use to access IMS data have software requirements.

The IMS Universal drivers have the following runtime software requirements:

- Java Development Kit 6 (JDK 6.0) or later
- One or more of the following conditional requirements:
 - For CICS applications, IBM CICS Transaction Server for z/OS Version 4.1 (5655-S97) or later
 - For DB2 stored procedures:
 - DB2 10 for z/OS (5605-DB2) or later
 - DB2 for z/OS Version 9.1 (5635-DB2)
 - DB2 UDB for z/OS Version 8 (5625-DB2)To access DB2 UDB for z/OS Version 8 subsystems from JMP or JBP regions, you must install APAR/PTF PQ74629/UQ77540 into the DB2 subsystem.
 - For WebSphere applications, WebSphere Application Server for z/OS or WebSphere Application Server for distributed platforms, Version 7.0.1 (program number 5655-R36) or later. You must use the fix pack that contains WebSphere Application Server APAR PK89274 installed in the system.
- RACF or an equivalent product

- The software requirements for the JDR resource adapter are the same as for the IMS Universal drivers.

Java application programs that use the IMS Universal drivers also require a way to generate the IMS database metadata, such as using the IMS Enterprise Suite Explorer for Development. The default segment encoding of the database metadata class produced by the IMS Explorer for Development is cp1047. To change the segment encoding, use the `com.ibm.ims.base.DLIBaseSegment.setDefaultEncoding` method.

Note: Use binary-mode FTP to transfer the IMS Universal drivers JAR or RAR files to another system.

JAR and RAR files for type-4 connectivity

The following table describes the JAR and RAR files that provide type-4 connectivity for the IMS Universal drivers:

Table 5. Type-4 connectivity JAR and RAR files for Java applications that use the IMS Universal drivers

Driver	JAR or RAR file
IBM IMS Universal DL/I driver	<code>pathprefix/usr/lpp/ims/ims12/imsjava/imsudb.jar</code>
IBM IMS Universal JDBC driver	<code>pathprefix/usr/lpp/ims/ims12/imsjava/imsudb.jar</code>
IBM IMS Universal Database resource adapter	For use within WebSphere Application Server (both z/OS and distributed platforms): <code>pathprefix/usr/lpp/ims/ims12/imsjava/rar/imsudbJLocal.rar</code> for JCA/JDBC local transaction processing only <code>pathprefix/usr/lpp/ims/ims12/imsjava/rar/imsudbXA.rar</code> for JCA/JDBC two-phase (XA) commit processing or local transaction processing <code>pathprefix/usr/lpp/ims/ims12/imsjava/rar/imsudbLocal.rar</code> for CCI local transaction support <code>pathprefix/usr/lpp/ims/ims12/imsjava/rar/imsudbXA.rar</code> for CCI two-phase commit (XA) transaction support

JAR and RAR files for type-2 connectivity

The following table describes the JAR and RAR files that provide type-2 connectivity for the IMS Universal drivers:

Table 6. Type-2 connectivity JAR and RAR files for Java applications that use the IMS Universal drivers

Driver	JAR file
IMS Universal DL/I driver	<code>pathprefix/usr/lpp/ims/ims12/imsjava/imsudb.jar</code>
IMS Universal JDBC driver	<code>pathprefix/usr/lpp/ims/ims12/imsjava/imsudb.jar</code>

Table 6. Type-2 connectivity JAR and RAR files for Java applications that use the IMS Universal drivers (continued)

Driver	JAR file
IMS Universal Database resource adapter	<p>For use within WebSphere Application Server (both z/OS and distributed platforms):</p> <p><i>pathprefix</i>/usr/lpp/ims/ims12/imsjava/rar/imsudbLocal.rar for CCI programming interface to perform SQL or DL/I data operations</p> <p><i>pathprefix</i>/usr/lpp/ims/ims12/imsjava/rar/imsudbJLocal.rar for JDBC programming interface to perform SQL data operations</p>

When DriverType=2:

- The transaction scope is local (a unit of work is scoped to a particular connection). Multiple connections can have independent units of work associated with each connection.
- Application programs can issue local commit and rollback calls through either the JDBC Connection interface or the CCI LocalTransaction interface.
- ContainerManaged beans are supported, but require the following properties to be set in the EJB Deployment Descriptor:
 - In the Bean tab, specify the following properties under the LocalTransaction heading:
 - Boundary = BeanMethod
 - Resolver = ContainerAtBoundary
 - Unresolved action = Rollback
 - In the Assembly tab, set the transaction scope to NotSupported.

When DriverType=2_CTX:

- Specifies a global scope transaction model in which a unit of work can span multiple bean methods. RRS-managed transaction applications use this driver type. The container coordinates commit and rollback processing through RRS.
- Application programs can use the UserTransaction interface for explicit commit and rollback calls.

Software requirements for Java applications that use the classic Java APIs for IMS:

Java applications that access IMS databases by using the classic Java APIs for IMS have specific software requirements, depending on the environment in which the application runs.

JMP and JBP address spaces

Java application programs that run in JMP or JBP regions require the IBM 31-bit SDK for z/OS, Java 2 Technology Edition, Version 6 or later.

Support for interoperation between Java and COBOL or PL/I when running in a JMP or JBP region requires the object-oriented syntax for Java interoperability that is in IBM Enterprise COBOL for z/OS (program number 5655-G53) or later, or Enterprise PL/I for z/OS (program number 5655-H31) or later.

Java application programs that access DB2 for z/OS subsystems from JMP or JBP regions require that APAR/PTF PQ74629/UQ77540 be applied to the DB2 for z/OS subsystem.

The JAR files that are required to support this environment are:

Environment	JAR file
All	imsjavaBase.jar
Java message processing (JMP) region and Java batch processing (JBP) region	imsjavaTM.jar
JDBC only	<ul style="list-style-type: none">• imsJDBC.jar• imsXQuery.jar (for XQuery support)

WebSphere Application Server environment

Java application programs that provide JDBC access to IMS DB from WebSphere Application Server for z/OS require:

- WebSphere Application Server for z/OS Version 7.0.1 (program number 5655-R36) or later
- z/OS Resource Recovery Services (RRS)
- RACF or an equivalent security product
- The IMS Open Database Access (ODBA) component
- The IMS Database Resource Adapter (DRA) component

The JAR files that are required to support this environment are:

Environment	JAR file
All	imsjavaBase.jar
WebSphere Application Server for z/OS only	<ul style="list-style-type: none">• imsDBJCA.jar• imsDBJCA.rar
JDBC only	<ul style="list-style-type: none">• imsJDBC.jar• imsXQuery.jar (for XQuery support)

For information about configuring this environment, see *IMS Version 12 Communications and Connections*.

To access IMS databases from WebSphere Application Server from a non-z/OS environment, use the IMS Universal Database resource adapter.

CICS environment

Java application programs that provide JDBC access to IMS DB from a CICS environment require:

- One of the following versions of CICS Transaction Server for z/OS:
 - Version 3.1 (5655-M15) or later and JDK 1.4.2 or later
 - Version 3.2 (5655-M15) or later and JDK 1.4.2 or later
 - Version 3.2 (5655-M15) or later (with APAR PK59577 applied) and JDK 5.0 or later
- The IMS DRA component installed in the CICS environment

The version of the IMS DRA modules that are used by a DRA client must be the same version as the IMS with which the DRA client is communicating. For more information, see “Database Resource Adapter (DRA) software requirements” on page 44.

The JAR files that are required to support this environment are:

Environment	JAR file
All	imsjavaBase.jar
JDBC only	<ul style="list-style-type: none"> • imsJDBC.jar • imsXQuery.jar (for XQuery support)

DB2 for z/OS environment

Java application programs that provide JDBC access from IMS DB for DB2 for z/OS stored procedures require:

- One of the following versions of DB2 for z/OS:
 - DB2 for z/OS Version 10.1 (5605-DB2) or later with the DB2 SQLJ/JDBC driver
 - DB2 for z/OS Version 9.1 (5635-DB2) or later with the DB2 SQLJ/JDBC driver
 - DB2 UDB for z/OS Version 8 (5625-DB2) or later with the DB2 SQLJ/JDBC driver

To support Java application programs that access DB2 UDB for z/OS Version 8 subsystems from JMP or JBP regions, you must apply APAR/PTF PQ74629/UQ77540 to the DB2 subsystem.
- JDK 6.0 or later
- DB2 UDB for z/OS Version 8 (5625-DB2) requires APAR/PTF PK14609/UK10979 for this JDK support.
- The IMS Open Database Access (ODBA) component installed in the DB2 for z/OS environment
- The IMS DRA component installed in the DB2 for z/OS environment

The JAR files that are required to support this environment are:

Environment	JAR file
All	imsjavaBase.jar
JDBC only	<ul style="list-style-type: none"> • imsJDBC.jar • imsXQuery.jar (for XQuery support)

Software requirements for Java applications that access IMS transactions

Java applications that access IMS transactions must meet specific software requirements.

- Java programs that run in Java message processing (JMP) and Java batch processing (JBP) regions require Java Development Kit (JDK) 6.0 or later.
- For programs that access transactions using the IMS TM Resource Adapter, see the list of software requirements at <http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.etools.ims.tmra.doc/topics/rimsrequirements.htm>.

The JAR file `imsutm.jar` is needed to support JMP and JBP regions.

Open Database software requirements

To use the Open Database solution, IMS must be configured as an IMSplex and IMS Connect is required.

The Open Database solution requires IMS Connect, as well as the following Common Service Layer (CSL) components:

- Operations Manager (OM)
- Structured Call Interface (SCI)
- Open Database Manager (ODBM)

Parallel RECON access software requirements

To use the parallel RECON access function of Database Recovery Control (DBRC), you must configure IMS as an IMSplex and install DFSMS Transactional VSAM Services (DFSMSStvs), a separately orderable feature of z/OS.

Shared queues XCF enhancement software requirements

A MINVERS value of 12.1 is required in the RECON data set for a z/OS cross-system coupling facility (XCF) to manage in an IMS shared-queue group either APPC synchronous conversations or, if the appropriate synchronization level is specified, OTMA send-then-commit (CM1) transactions.

Sysplex serialized program management

The sysplex serialized program management function requires that a Resource Manager be active with a resource structure defined. This requirement in turn means that you need a Common Service Layer installed.

The sysplex serialized program management function has the following software requirements:

- The following Common Service Layer components: Operations Manager, Structured Call Interface, and Resource Manager
- A resource structure defined in a coupling facility
- Shared message queues

Sysplex data sharing

IMS sysplex data sharing (including data caching, shared SDEPs, and shared VSO DEDB areas) requires IRLM Version 2.2 or later.

Type-2 command software requirements

To issue type-2 commands to IMS and IMS Connect, you must configure IMS with a Common Service Layer (CSL) that contains at least the following two CSL components: an OM and a Structured Call Interface (SCI). Some type-2 commands (such as the type-2 commands associated with the Open Database function) have additional requirements.

Type-2 commands must be issued from an automated operator application program, such as the TSO single point of control (SPOC) application that is shipped with IMS. IMS offers two interfaces that such application programs can use to communicate with IMS: the Operations Manager (OM) application programming interface (API) and the REXX SPOC API.

By definition, one or more IMS systems with a CSL is an IMSplex. Therefore, in order to issue type-2 commands, IMS must be configured as an IMSplex, even if only a single IMS is involved. A single IMS configured as an IMSplex is also called an enhanced command environment.

For an overview of IMS configurations (also called environments), see *IMS Version 12 System Administration*.

For information about configuring IMS, see *IMS Version 12 Installation* or *IMS Version 12 System Definition*.

User exit enhancements software requirements

Exits to be queried or refreshed using type-2 commands must first be defined in the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set. Exit routines that use the latest fields in the standard user exit parameter list (SXPL) must specify version 6 or later.

The SXPL changes with each version of the list. To use the new fields introduced in a new version, exit routines must check to ensure that the SXPL is at least the version level that introduced the new fields before it accesses any of those fields.

For more information about version 6 of the SXPL, see “Exit routine migration considerations” on page 74.

IMS Enterprise Suite software requirements

IMS Enterprise Suite provides APIs, tools, and a web service solution for facilitating application development and extending access to IMS transactions and data.

IMS V12 can be used with the following versions of IMS Enterprise Suite, although some components or functions might have specific IMS requirements.

- IMS Enterprise Suite V3.1
- IMS Enterprise Suite V2.2
- IMS Enterprise Suite V2.1

Related information:

IMS Enterprise Suite V3.1 overview

IMS Enterprise Suite V2.2 overview

IMS Enterprise Suite V2.1 overview

CICS subsystems supported

IBM CICS Transaction Server for z/OS can connect to IMS if minimum version requirements are met. Certain IMS Version 12 functions might include additional version requirements for CICS.

CICS Transaction Server for z/OS Version 3.1 (5655-M15) or later can connect to either the IMS Version 12 Database Manager (DB) or, using the appropriate TM interface, the IMS Version 12 Transaction Manager.

The IMS Universal drivers require CICS Transaction Server for z/OS Version 4.1 (5655-S97) or later.

IBM CICS Transaction Server for z/OS Version 4.2 is required to support the CICS open transaction environment (threadsafe). CICS Version 4.2 takes advantage of the

DRA open thread TCB option that was added by IMS Version 12 APAR/PTF PM31420/UK70991. By specifying the DRA open thread TCB option on an INIT request, a CCTL can avoid the overhead of TCB switching and improve parallel processing. When the DRA open thread TCB option is active, the DRA does not attach dedicated DRA thread task control blocks (TCBs). IMS DL/I calls can run on a CICS thread, eliminating the need for IMS to create additional TCBs for each thread and the need to switch between tasks during call processing. For more information about the DRA open thread TCB option, see:

- INIT request (System Programming APIs)
- Database resource adapter startup table for CCTL regions (System Definition)

DB2 for z/OS subsystems supported

IMS Version 12 Transaction Manager can connect with DB2 for z/OS.

The IMS Version 12 Transaction Manager can be connected to any of the following DB2 products:

- DB2 10 for z/OS Version 10.1 (5605-DB2) or later
- DB2 for z/OS Version 9.1 (5635-DB2)
- DB2 UDB for z/OS Version 8 (5625-DB2)

To support Java application programs that access DB2 UDB for z/OS Version 8 subsystems from JMP or JBP regions, you must apply APAR/PTF PQ74629/UQ77540 to the DB2 subsystem.

IMS/DB2 Coordinated Disaster Recovery Support requires the IMS Version 12 Remote Site Recovery (RSR) feature, and requires the databases to be registered with Recovery Level Tracking (RLT).

Intersystem Communication (ISC) subsystems supported

Using Intersystem Communication (ISC), the IMS Version 12 Transaction Manager can be connected to IMS Version 12 and earlier systems, to IBM CICS Transaction Server for z/OS, and to user-written software.

The IMS Version 12 Transaction Manager can be connected to the following products by using ISC:

- IMS Version 12 (5635-A03)
- IMS Version 11 (5635-A02)
- IMS Version 10 (5635-A01)
- IBM CICS Transaction Server for z/OS Version 3.1 (5655-M15) or later
- User-written software

Multiple Systems Coupling subsystems supported

The IMS Version 12 Transaction Manager can be connected to the supported versions of IMS by using Multiple Systems Coupling (MSC).

The IMS Version 12 Transaction Manager can be connected to the following versions of IMS by using MSC:

- IMS Version 12 (5635-A03)
- IMS Version 11 (5635-A02)
- IMS Version 10 (5635-A01)

Programming languages used to write IMS Version 12

IMS Version 12 is written in High Level Assembler Release 5, PL/X, C, C++, and JDK Version 6.

Programming languages supported

You can write IMS applications in the supported versions of many programming languages.

You can write IMS applications in the currently supported versions of the following languages:

- Ada
- COBOL for OS/390® & VM
- Enterprise COBOL for z/OS

For the latest version of COBOL for z/OS that is supported for a particular version of z/OS, see COBOL Migration Concerns going to New Release of the Compiler or z/OS.

- Enterprise PL/I for z/OS
- IBM High Level Assembler for z/OS & z/VM® & z/VSE®
- Java, using the IBM 31-bit SDK for z/OS, Java Technology Edition, V6
- PL/I for z/OS and OS/390
- TSO/E REXX
- VS Pascal
- z/OS C/C++

Requirements:

If you use Enterprise COBOL for z/OS Version 5.1, the data set that holds the output load modules of the compiler must be a PDSE.

The following languages require the IBM Language Environment® for z/OS:

COBOL for OS/390 & VM

PL/I for z/OS and OS/390

There is no change in IMS Version 12 that affects your ability to run OS/VS COBOL programs. OS/VS COBOL programs will not run under CICS Transaction Server for z/OS Version 3.1. This restriction is specific to that version of CICS. It does not apply to IMS.

Restrictions for OS/VS COBOL II:

- The OS/VS COBOL runtime library is no longer supported. Use the LE runtime instead. This includes code that will run in IMS dependent regions.
- The OS/VS COBOL compiler is no longer supported. If you must alter and recompile any OS/VS COBOL programs, you must use a supported COBOL compiler and make the appropriate changes to conform to the COBOL 74 standard. This includes IMS programs.

These restrictions do not pertain to IMS. They reflect the fact that technical support for the OS/VS COBOL compiler and runtimes is no longer available, so you should no longer use them. Existing OS/VS COBOL programs can run in z/OS regions (including IMS regions) that use the new LE COBOL runtime.

For information about running OS/VS COBOL programs with the LE COBOL runtimes, see the *COBOL for OS/390 & VM V2R2 Compiler and Run-time Migration Guide*, GC26-4764.

Application programs supported

IMS Version 12 supports application programs that are supported by IMS Version 10 and IMS Version 11.

All application programs that are supported under IMS Version 10 and IMS Version 11 are still supported under IMS Version 12. In general, you should not have to recompile, reassemble, or rebind an IMS application program to run under IMS Version 12.

Application programs that use the use the AIB INQY ENVIRON call might need to be changed. For more information about this situation, see “INQY call for system services migration considerations” on page 80.

Packaging for IMS Version 12

The IMS product is packaged under several function modification identifiers (FMIDs). This packaging choice is in response to IMS internal requirements and is subject to change in the future.

The existence of an FMID does not imply that installation of the FMID is optional. Refer to the following table to determine which FMIDs are required, optional, or not applicable. Within the table the following notations are used:

- R FMID installation is required.
- O FMID installation is optional.
- N The FMID is not applicable to this environment.

All FMIDs are installed outside of the Installation Verification Program (IVP). See the *Program Directory for Information Management System Transaction and Database Servers V12.0* for installation instructions.

Table 7. FMID requirements in IMS Version 12.

FMID	Description	DB batch	DBCTL	DB/DC	DB/DC with XRF ⁽¹⁾	DCCTL
HIR2220	Internal Resource Lock Manager V2R2	O	O	O	O	N
HIR2230	Internal Resource Lock Manager V2R3	O	O	O	O	N
HMK1200 ⁽²⁾	System Services component IVP component Database Recovery Control Logging component IMS Connect	R	R	R	R	R
JMK1201	Database Manager function	R	R	R	R	N
JMK1202	Transaction Manager function LU manager for IMS APPC	N	N	R	R	R
JMK1203	Extended Terminal Option feature	N	N	O	O	O
JMK1204	RSR Recovery-Level Tracking feature	O	O	O	O	O
JMK1205	RSR Database-Level Tracking feature	O	O	O	O	O

Table 7. FMID requirements in IMS Version 12 (continued).

FMID	Description	DB batch	DBCTL	DB/DC	DB/DC with XRF ⁽¹⁾	DCCTL
JMK1206	IMS Java On Demand features: Classic Java APIs for IMS IMS Universal drivers for access to IMS DB IMS TM Resource Adapter for access to IMS TM IMS Universal drivers	O	O	O	O	O

Note:

1. Although DCCTL with XRF is a supported combination, it is not included as an IVP option.
2. FMID installation is required even if the primary function provided by this FMID is not used.

Programming considerations

Before you migrate and prepare your own systems, complete both the SMP/E install and the entire IVP process.

The following sections list the programming considerations for installing IMS and activating its functions.

IMS Version 12 is a complex product to install and prepare for execution. The SMP/E install and the IVP processes are not completed as a single process.

Recommendation: Complete both the SMP/E install and the entire IVP process, documented in *IMS Version 12 Installation*, before proceeding with the migration and preparation of your own systems.

The following table lists the sample jobs that are shipped with IMS Version 12.

Table 8. Sample installation jobs that are shipped with IMS Version 12

Job name	Job type	Description
DFSALA	SMP/E	Sample job to allocate and initialize a new SMP/E CSI data set (optional)
DFSALB	SMP/E	Sample job to allocate SMP/E data sets (recommended, but optional)
DFSALLOC	ALLOCATE	Sample job to allocate target and distribution libraries
DFSJMKD	MKDIR	Sample job to invoke the supplied DFSJMKDR EXEC to allocate HFS paths
DFSDDDEF1	DDDEF	Sample job to define SMP/E DDDEFs for IMS
DFSDDDEF2	DDDEF	Sample job to define SMP/E DDDEFs for the IMS Java On Demand Features
DFSAPPLY	APPLY	Sample APPLY job
DFSACCEP	ACCEPT	Sample ACCEPT job

The IVP process:

- Can be used for demonstration and testing of new functions.
- Provides materials that you can use as a guide for working with your own IMS systems.

The IVP process includes:

- Data set allocation
- Post-installation activities on target libraries
- System definition activities
- SVC considerations
- Authorization considerations
- IMS system preparation activities
- IMS application preparation activities
- IMS system and application execution activities

There are no system programming or special programming considerations for IMS Version 12.

Chapter 3. Migration to IMS Version 12

The objective of migration support is to enable an orderly migration from your current release of IMS to IMS Version 12.

These topics describe general migration considerations for IMS Version 12 and migration considerations for specific new features and functions of IMS Version 12.

General migration recommendations

General migration tasks for current IMS installations include researching Preventive Service Planning (PSP), determining hardware and software requirements, backing up your system, and other tasks.

General migration recommendations for current IMS installations are:

- Contact IBM Software Support for current installation, migration, and problem resolution information, and ask for PSP for IMS.
- Read the *Program Directory for Information Management System Transaction and Database Servers V12.0* for the most current hardware requirements, software requirements, prerequisites, and installation information. For general installation information, see *IMS Version 12 Installation*.
- Review the service that has been applied to your current system. Determine if critical service has been included in the new IMS release. If not, acquire the appropriate service for the new IMS release.
- Review the functions and enhancements for IMS Version 12.
- Review changes to:
 - SMP/E, distribution, and system data sets
 - System definition macros
 - Log records
 - RECON records
 - Exit routines
 - Cataloged procedures
 - Control statement members in the IMS.PROCLIB data set
 - Utilities
 - Operator commands
 - Operating procedures
 - Messages and abend codes
- Determine the availability of updates to IBM IMS and DB2 Tools, aids, and related products.
- Prepare a migration plan.
- Prepare a fallback plan. See “Fallback considerations” on page 90 for a sample list of items to consider when preparing a fallback plan.
- Apply the appropriate coexistence APARs/PTFs to your existing system. For a list of the coexistence APARs/PTFs, see “Overview of coexistence APARs” on page 95.

- Perform database recovery for any database data sets for which Extended Error Queue Elements (EEQEs) have been recorded in the DBRC Recovery Control (RECON) data set.
- Back up your system, including:
 - Databases and areas
 - RECON data sets
 - SMP/E data sets, distribution, and target libraries

Recommendation: Examine Hardware Data Compression (HDC) dictionaries when you migrate to a new release of IMS to determine if they incorporate IMS versions that are now out of service. Although rebinding dictionaries is not required when migrating to a new version of IMS, a gradual refresh of these dictionaries to a current release is a good practice.

- Validate your system definition source. You might want to merge the IVP source with your source.
The IMS IVP is used after the installation of a new IMS system. The IVP is used to verify the installation of IMS and can be used sporadically afterward.
The IVP Variable Export utility mitigates the migration of IVP variables values between releases.
- Install the system prerequisites and your new IMS system (including the pre-generation service).
The complete set of IMS Version 12 modules that are needed for execution are built by a combination of SMP/E processing and running an *ALL* type of system definition process.
If needed, you can use the SMP/E GENERATE command to generate the JCL for jobs that build the modules that are not built during the system definition process.
- Install required service that was not included in the pre-generation service.
- Install any needed updates to IBM IMS and DB2 tools, aids, and related products.
- Upgrade the RECON data set.
- Build application control blocks (ACBGEN).

Attention: Never use a higher-level ACB library with a lower-level IMS. You could cause an abend in the IMS control region or you could destroy some or all of your databases. Using a higher-level ACB library with a lower-level IMS is a serious error. Carefully review your fallback plan and JCL. Also, protect your ACB library with RACF (or an equivalent security product), to make the ACB library impossible to use with the lower-level IMS systems.

- Validate cataloged procedures for users.
- Validate user-created members of the IMS.PROCLIB data set.
- Validate, reassemble, and rebind exit routines and user modifications, especially IMS Connect exit routines and code that uses IMS control blocks, such as database randomizers. Check your exit routines before reassembling.
- Validate, reassemble, and rebind user programs that process log records. Some log record formats have changed.
- Validate and update operating procedures (for example, recovery, backup, and restart).
- If necessary, set the appropriate values for the AOIP, CMDP, DYNP, EMHB, FPWP, HIOP, LUMC, and LUMP parameters in the DFSPBxxx member of the IMS.PROCLIB data set to specify an upper limit on the amount of storage a pool can acquire. Specifying a limit is not recommended and should be done only

after careful consideration. You can also use the IMS Syntax Checker to validate the values for the DFSPBxxx parameters. Consider the various execution parameters described in this information that can affect performance and migration.

See DFSPBxxx for more information about the DFSPBxxx IMS.PROCLIB data set member.

- Ensure that appropriate dynamic allocation members are available to the new environment.
- Ensure that any custom routines and exits are available to the new environment (for example, database randomizers, secondary index parsing routines, and others).
- When using MSC to connect IMS systems with different releases, consider all message types (such as ISC, APPC, and OTMA) and the prefix sizes that accompany them.

Recommendation: When message queue data sets are used, make the MSGQ LRECL and block sizes identical across all IMS MSC systems. A problem can occur when an IMS system is migrated to a new release that uses messages with larger prefix sizes and new prefix segment types. When messages that contain these new and larger prefixes are sent to an earlier release of IMS, the new, and larger prefixes might not fit the message queues of the earlier release of IMS. This size mismatch can cause problems when the message is formatted and delivered to its destination, especially with MFS.

For more information, refer to the RECLNG parameter and the “Message prefix size” table in MSGQUEUE macro.

- Consider other products that can be affected by migration.

Any product that is dependent on the format and contents of the IMS log or the RECON data set is potentially affected. Examples of affected products or utilities are:

- IMS Statistical Analysis utility
- IMS Fast Path Log Analysis utility
- IMS Log Transaction Analysis utility
- IMS MSC Log Merge utility
- CICS
- IBM Tools
- Non-IBM products, including user modifications

- Stop your pre-version 12 system.
- Cold start your IMS Version 12 system.
- Test your IMS Version 12 system.

Monitor storage usage in both private/epprivate and CSA/ECSA for differences with previous releases. Make adjustments as necessary.

Migrating to IMS Version 12 from IMS Version 10 or earlier

If you are migrating to IMS Version 12 from IMS Version 10 or earlier, your migration plan must take into account the requirements and enhancements that are introduced into IMS in the versions that you are skipping.

For example, if you are migrating to IMS Version 12 from IMS Version 10, in addition to the requirements and enhancements of IMS Version 12, your migration plan must also account for the requirements and enhancements that are introduced into IMS in IMS Version 11.

Review the Release Planning information specific to both the IMS version that you are migrating to and the IMS version that you are skipping.

Discontinuance of support

Support is discontinued for various utilities, macros, resource adapters, and functions.

IMS Version 12 is the last version of IMS to support the SECURITY macro. You can now use initialization parameters, such as RCLASS and SECCNT, to specify most of the SECURITY macro keyword values. If you use the Transaction Authorization exit routine (DFSCSTRN0) and the Signon/off Security exit routine (DFSCSNG0), you must still use the SECURITY macro to specify the TRANEXIT and SIGNEXIT keywords.

The RCLASS and SECCNT keywords are delivered through the following APARs/PTFs:

- IMS Version 11 - PM48203/UK74050
- IMS Version 12 - PM48204/UK74051

For information about using initialization parameters for security, see “Controlling security during system startup for DB/DC and DCCTL” in the *System Administration* information.

For information about using initialization parameters for security, see Controlling security during system startup for DB/DC and DCCTL (System Administration).

Support for the IMS Control Center is discontinued. To explore, query, start, and stop IMS resources from a browser interface in a distributed environment, use the IMS Explorer for Administration, which is available as an extension of the IBM Tools Base Administration Console for z/OS component of the IBM Tools Base for z/OS, V1.4 (5655-V93).

The JCA 1.0 resource adapter, one of the Java connectors in the IMS DB distributed resource adapter, is stabilized and is no longer being enhanced. **Recommendation:** Because the IMS Universal drivers are built on industry standards and open specifications, and provide more flexibility and improved support for connectivity, data access methods, and transaction processing options, use the IMS Universal Database resource adapter.

IBM has discontinued support for Enterprise Workload Manager™ (EWLM), so IMS can no longer offer this support. IBM is providing a transition for EWLM 2.1 customers to an IBM STG Lab Services-based offering. This offering is designed to provide enhanced capabilities over the EWLM 2.1 product. Customers can contact Darrell Hawkins (darrell.hawkins@us.ibm.com) for more information about this offering, pricing, terms, and conditions. In addition to this offering, IBM Tivoli® offers workload automation and monitoring solutions with the Tivoli Workload Automation Family of products, including Tivoli Dynamic Workload Broker and Tivoli Workload Scheduler, Tivoli Workload Scheduler for z/OS, and Tivoli Composite Application Manager for Response Time Tracking.

IMS Version 11 is the last version of IMS that supports the Knowledge Based Log Analysis (KBLA) facility. Customers using this function should migrate to use other IBM 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 for z/OS, IMS Performance Analyzer, or similar products

The functionality of the IMS Records User Data Scrub utility (DFSKSCR0) is now part of the Tools Base for z/OS.

IMS Version 10 is the last version of IMS that supports:

- The z/OS-based batch DLIModel utility. Customers using this function should migrate to the IMS Enterprise Suite Explorer for Development.
- Product documentation in the BookManager® format.

IMS Enterprise Suite Version 2.1 is the last release of IMS Enterprise Suite that will include the DLIModel utility plug-in. Customers using the IMS Enterprise Suite DLIModel utility plug-in should migrate to using the IMS Enterprise Suite Explorer for Development instead. Although IMS Explorer for Development includes enhancements to most IMS Enterprise Suite DLIModel utility plug-in functions, it does not provide support for IMS database web services or IMS XML DB. You can obtain this support through the following options:

- For IMS database web services, you can generate web-enabled IMS database queries by shell sharing IMS Explorer for Development with IBM Data Studio.
- For XML DB support, customers can continue to use the IMS Enterprise Suite Version 2.1 DLIModel utility plug-in.

Specific migration considerations

Specific migration considerations apply when you are migrating from IMS Version 10 or IMS Version 11 to IMS Version 12.

Specific information about product enhancements that were made for earlier releases of IMS might not be included in this information. When migrating to a more recent release of IMS, be sure to review the Release Planning Guides that span your specific migration path.

The guides that are currently available from the IBM Publications Center or in the Information Management Software for z/OS Solutions Information Center are:

IMS Version 11: Release Planning Guide, GC19-2442

IMS Version 10: Release Planning Guide, GC18-9717

IMS Version 9: Release Planning Guide, GC17-7831

IMS Version 8: Release Planning Guide, GC27-1305

If a new function does not have any migration considerations, it is not discussed in the following topics.

Migrating to IMS Version 12: DB

Specific migration considerations apply when you are migrating from the IMS Version 10 or IMS Version 11 Database Manager to the IMS Version 12 Database Manager.

These topics describe the IMS considerations for migrating to the IMS Version 12 Database Manager.

Database quiesce migration considerations

To use the database quiesce function, all IMS systems must be at the IMS Version 11 level or later and existing DBRC API applications might need to be modified.

The migration considerations for the database quiesce enhancement are as follows:

- To use the database quiesce function, the MINVERS field in the RECON data sets must be set to 11.1 or later.
- DBRC API applications that interrogate the output from Query TYPE=DB, TYPE=DBDS, and TYPE=PART requests do not need to be modified if they will not access the fields added with the database quiesce enhancement. However, applications that access the new output must map to the new output fields and ensure that the block returned has a minimum version of 3.0.

Database recovery utilities migration considerations

In most cases, the IMS Version 12 Database Recovery (DFSURDB0) and Database Change Accumulation (DFSUCUM0) utilities accept as input log, image copy, and change accumulation data sets created by IMS Version 10 or later.

DLIModel utility plug-in migration considerations

IMS Version 10 is the last release of IMS that supports the z/OS-based batch DLIModel utility. Customers using this function should migrate to the IMS Enterprise Suite DLIModel utility plug-in.

IMS Enterprise Suite Version 2.1 is the last release of IMS Enterprise Suite that will include the DLIModel utility plug-in.

- To take advantage of the most current enhancements, customers using the IMS Enterprise Suite DLIModel utility plug-in should migrate to using the IMS Enterprise Suite Explorer for Development instead.
- Although IMS Explorer for Development includes enhancements to most IMS Enterprise Suite DLIModel utility plug-in functions, it does not provide support for IMS XML DB or IMS database web services. Customers should continue to use the IMS Enterprise Suite Version 2.1 DLIModel utility plug-in if these functions are required.

Fast Path migration considerations

Fast Path migration involves possible changes for the Fast Path 64-bit buffer manager.

Fast Path 64-bit buffer manager

If your IMS installation did not use 64-bit storage before IMS Version 12, you will need to make 64-bit storage available to use the Fast Path 64-bit buffer manager.

In IMS Version 12, the default values of the FPBP64C and FPBP64E options for the Fast Path 64-bit buffer manager changed. The default values for both FPBP64C and FPBP64E is N. The change in default values was delivered by IMS Version 12 APAR/PTF PM84873/UK92995.

If your IMS installation used the Fast Path 64-bit buffer manager on z/OS V1R9, the Fast Path 64-bit buffer manager used 64-bit private storage. When using the Fast Path 64-bit buffer manager on z/OS V1R10 or later, the Fast Path 64-bit buffer manager uses 64-bit common storage.

Fast Path usability and serviceability enhancements

Customers that have automated operations that are triggered when messages DFS2555I or DFS2716I are issued will need to modify their automated programs because these messages are no longer issued when MSDBs are not defined in the IMS system. If fallback becomes necessary, and automation programs were modified, users must restore the original programs that were triggered by the messages.

IMS catalog migration considerations

The IMS catalog function does not directly affect version-to-version migrations. However, if you are using the IMS catalog function and you add metadata to your DBD and PSB definitions, you might need to increase the size of your DBDLIB, PSBLIB, and ACBLIB data sets accordingly.

Open Database enhancements migration considerations

You can migrate existing ODBA application servers to use the Open Database Manager (ODBM) and existing IMS DB resource adapter applications to use the IMS Universal Database resource adapter.

You can optionally modify your existing ODBA application servers to use ODBM by adding the IMSPLEX and ODBMNAME parameters to the DFSPRP macro. After you add these parameters, you must recompile and rebind the DFSxxx0 load module (xxxx is the DRA startup table name specified on the APSB call in the AIBRSNM2 field of the AIB).

You can simplify existing ODBA applications by using a single CIMS CONNECT command instead of multiple CIMS INIT commands to connect to more than one IMS DB subsystem.

Recommendation: Because the IMS Universal Database resource adapter is built on industry standards and open specifications, and provides more flexibility and improved support for connectivity, data access methods, and transaction processing options, use the IMS Universal DB resource adapter to develop Java EE applications that access IMS from WebSphere Application Server for z/OS.

WebSphere Application Server for z/OS applications that use the Open Database enhancements must use the IMS Universal Database resource adapter.

For more information about migrating Java applications to use the IMS Universal drivers, see “Java class libraries for IMS migration considerations” on page 83.

Migrating to IMS Version 12: TM

IMS considerations for migrating from IMS Version 10 or IMS Version 11 Transaction Manager to IMS Version 12 Transaction Manager include how the enhancements to IMS affect migration, as well as how major IMS functions are affected by migration.

These topics describe the IMS considerations for migrating from IMS Version 10 or IMS Version 11 Transaction Manager to IMS Version 12 Transaction Manager.

OTMA migration considerations

In IMS Version 12, there are a number of migration considerations for OTMA.

Migration considerations introduced in IMS Version 12

Both the OTMA ACEE reduction and the OTMA TPIPE enhancements modified the output of the /DISPLAY OTMA command. The OTMA TPIPE enhancement modified the output of the /DISPLAY TMEMBER command. To recognize the changes, any automated programs that parse the output of this command might need to be modified.

Migration considerations introduced in IMS Version 11 or earlier

For OTMA clients that operate with IMS Version 10 and earlier, such as IMS Connect, and that do not specify the transaction expiration time in the OTMA prefix or do not exploit the OTMA resources monitoring, only limited OTMA transaction monitoring can be activated in IMS Version 12. In these cases, you can activate transaction expiration (but not message-level expiration) only by specifying the EXPRTIME parameter in the TRANSACT macro or by issuing the CREATE TRAN or UPDATE TRAN SET(EXPRTIME(*seconds*)) commands. OTMA protocol messages regarding OTMA resource information are ignored by IMS Connect and other OTMA clients that are not using OTMA resource monitoring.

XRF and 3745 controllers migration considerations

If you used the 3745 controller for IMS XRF tracking of VTAM terminals before migrating to IMS Version 12, you can continue to use this controller. However, after VTAM discontinues support for the 3745 controller, you must migrate from the traditional XRF tracking with the 3745 controller to use the Communication Controller for Linux on System z (CCL).

For availability purposes, an alternative to using XRF is to set up an IMSplex by using VTAM Generic Resources (VGR) with two or more IMS systems. This option requires a Parallel Sysplex environment.

Migrating to IMS Version 12: System

IMS considerations for migrating from IMS Version 10 or IMS Version 11 systems to IMS Version 12 systems include how the enhancements to IMS affect migration, as well as how major IMS functions such as DBRC and dynamic resource definition (DRD) are affected by migration.

These topics describe the IMS considerations for migrating from IMS Version 10 or IMS Version 11 systems to IMS Version 12 systems.

ACB library enhancements migration tasks

Migration tasks for the ACB library enhancements include enabling your ACBs to use 64-bit storage, and migrating ACB libraries to use dynamic allocation.

Migrating ACBs into 64-bit storage:

To enable your ACBs to use 64-bit storage, specify the ACBIN64 parameter in the <DATABASE> section of the DFSDFxxx PROCLIB member, stop IMS, and restart IMS with the ACBIN64 parameter.

Migrating ACB libraries to use dynamic allocation:

To migrate your ACB libraries to use dynamic allocation, use the DFSMDA macro and change your IMS and DL/I JCL procedures.

To migrate ACB libraries to use dynamic allocation:

1. Create DFSMDA members for the ACBLIBA and ACBLIBB data sets. DFSMDA members can be placed in either the data set specified in the IMS STEPLIB concatenation or in the IMSDALIB DD statement.
2. Remove the IMSACBA and IMSACBB DD statements from the IMS and DL/I JCL procedures.
3. Stop IMS.
4. Restart IMS with the DFSMDA members.

CQS migration considerations

Migrate CQS and any CQS clients on the z/OS image at the same time. If doing so is not possible, CQS must be migrated before any of the CQS clients are migrated.

See “Common Queue Server coexistence considerations” on page 98 for information about CQS coexistence rules.

DBRC migration considerations

Migrating DBRC to IMS Version 12 includes several tasks, including upgrading the RECON data set.

These topics describe the considerations and tasks for migrating DBRC to IMS Version 12.

BPE-based DBRC migration considerations:

To start a BPE-based DBRC address space, create new DBRC JCL and update the IMS EXEC parameter DBRCNM= to specify the new member name. DBRC exit routines might need to be modified, depending on whether they are defined to BPE.

If you will use existing DBRC exit routines and do not define them to BPE, there are no migration considerations for these routines.

If you define your DBRC exit routines to BPE, these routines must be able to use the BPE interface, which is different from the non-BPE DBRC exit interface. Because these exit routines might be required for DBRC executions not using BPE, such as batch jobs and utilities, the non-BPE interface to the exit routines must be maintained also. The following techniques can enable the exit routines to work in both environments:

- The BPE exit routines can have a small front end that calls the exit routines using the non-BPE interface.
- The exit routines can be modified to detect and use either interface. The sample DBRC Security exit routine (DSPDCAX0) and the sample RECON I/O exit routine (DSPCEXT1) that are shipped with IMS Version 12 use this detection technique.

In addition, BPE-based exit routines must have unique names, and must be added to the BPE user exit PROCLIB member.

Changes to the RECON data set:

Certain records in the RECON data set are new or changed from the records in IMS Version 10 and IMS Version 11.

In IMS Version 12:

- The RECON data set listings use full time-stamp precision.
- The LIST.HISTORY TIMELINE Summary output is changed to accommodate the full time-stamp precision.
- Any IMS-related products or user objects that parse the LIST.HISTORY command output or the RECON data set listings might need to change.
- The following RECON records have new or changed fields:
 - DSPRDTRC: New field RDTDBNUM to list the number of registered databases
 - DSPLOGRC: New field LOGBPE replaces the bit in LOGFLAG2
 - DSPSSRC: New SSBPE flag within SSFLAGS2 field to indicate that the IMS subsystem is using a DBRC BPE environment
 - DSPDBHRC: New DBFPFSdflt flag within DBMFlags field to indicate the logging option for Fast Path areas
 - DSPDSHRC: New DSHFULLSEG flag within DSHFLG2 field to indicate the segment logging option for Fast Path areas
 - DSPCAGRC: New CAGRTPRD field to indicate the recovery retention period
 - DSPCHGRC: New CHGOFFU, CHGUSER, CHGLEN, CHGUDATA, CHGUDAT1, and CHGUDAT2 fields containing the offset to the user data and the user data fields themselves
 - DSPRCVRC: A variable-length record with:
 - New RCVEXTCM flag within RCVFLAGS to indicate whether an external command created the recovery record
 - New RCVOFFU, RCVPREORG, RCVNREORG, RCVVARBL, RCVDATA, RCVUSER, RCVLEN, RCVUDATA, RCVUDAT1, and RCVUDAT2 fields containing the offset to the user data and the user data fieldsDSPRCVRC increases in size if user data exists in the record.
 - DSPRRGRC: A variable-length record with:
 - New RRGCMD flag within RRGFLAGS to indicate whether an external command created the reorganization record
 - New RRGOFFU, RRGVARBL, RRGDATA, RRGUSER, RRGLEN, RRGUDATA, RRGUDAT1, and RRGUDAT2 fields containing the offset to the user data and the user data fieldsDSPRRGRC increases in size if user data exists in the record.
- The DSPIMGRC record increases in size if user data exists and the image copy is not a user image.

In IMS Version 11, the following RECON records increased in size and have new or changed fields:

- DSPRCNRC: Increased in size by 48 bytes
- DSPCHGRC: Increased in size by 16 bytes
- DSPDBHRC: Increased by 20 bytes

For a detailed information about the RECON record types, see *IMS Version 12 Diagnosis*.

Parallel RECON access migration considerations:

If you are migrating to IMS Version 12 from IMS Version 10 or IMS Version 11, you must apply the DBRC migration/coexistence APARs.

If you are migrating to IMS Version 12 and parallel RECON access (PRA) is in effect, you must ensure that there is no shunted I/O when the upgrade begins.

The upgrade process begins with a quiesce close and a check for shunted I/O. If there is no shunted I/O, the records in COPY1 and COPY2 are upgraded in PRA mode. After upgrade completes, the quiesce for the RECON data sets is released and other DBRC instances can access the upgraded RECON data sets.

Time-stamp precision migration considerations:

Time-stamp precision is set to the microsecond format in IMS Version 12 with MINVERS set to 10.1 at a minimum. New initialized RECON data sets in IMS Version 10 and later use full time-stamp precision. All instances of IMS or batch jobs accessing IMS Version 12 format RECON data sets must use full time-stamp precision (to the microsecond).

Recommendation: Set the MINVERS value to at least 10.1 before upgrading an IMS Version 10 or IMS Version 11 RECON data set to the IMS Version 12 format.

Certain DBRC commands require the use of the full precision time stamp. For more, see DBRC time stamps.

Unconditional deletion of PRILOG information:

To use this function, which is introduced in IMS Version 11, there are several migration considerations. If you will not use this function, there are no migration considerations.

The RECON cleanup might take longer to execute in IMS Version 12 than in IMS Version 11 because change accumulation records are also being cleaned up.

Recommendation: Cleanup only change accumulation records the first time a CLEANUP.RECON command is executed after a RECON data set is upgraded to IMS Version 12.

If you are using this function for the first time in IMS Version 12, the following migration considerations apply:

- The DBRC security plan must be modified to include the new CLEANUP.RECON resource.
- Customer procedures for maintaining the RECON data set might need to be modified to use the new CLEANUP.RECON command.
- Automated programs or tools that issue DBRC commands might need to be modified to include the new CLEANUP.RECON command.

Upgrading the RECON data set:

A RECON upgrade batch command is provided to enable you to convert the recovery control (RECON) data set from an IMS Version 10 or IMS Version 11 format to an IMS Version 12 format. You are not required to change the MINVERS value to '12.1' when you migrate to IMS Version 12. Change this value only after

you verify that you do not need to coexist with an earlier version of IMS, will not need to fall back, and when you need to use new functions that require the MINVERS value to be set to '12.1'.

When the RECON data set is upgraded to the IMS Version 12 format, the MINVERS value is set to at least 10.1, which sets full time-stamp precision (to the microsecond) in effect.

Attention: Do not issue the IMS Version 12 `CHANGE.RECON.UPGRADE` command to upgrade the RECON data sets until all IMS Version 10, IMS Version 11, and IMS Version 12 systems that access the RECON data sets have the correct supporting products in place and have been tested for IMS Version 12 support.

To upgrade an IMS Version 10 or IMS Version 11 RECON data set:

1. Apply the IMS Version 12 coexistence Small Programming Enhancements (SPEs) to all IMS Version 10 and IMS Version 11 systems before you upgrade the RECON data set. The coexistence SPEs (APARs/PTFs) are:
 - PM05243/UK62970 for IMS Version 10
 - PM05244/UK62971 for IMS Version 11

Attention: Jobs that access the RECON data set and do not create subsystem records, such as the Database Change Accumulation utility (DFSUCUM0) and the Database Recovery Control utility (DSPURX00), are not protected from having the RECON data set upgraded while they are running on a version of IMS that does not have the appropriate migration/coexistence SPE applied. When these types of jobs access the RECON data set after the upgrade, the results might be unpredictable. Ensure that no such jobs are running when you upgrade the RECON data set.

2. Ensure that you have two active RECON data sets (COPY1 and COPY2) and a spare data set when you upgrade the RECON data sets while other jobs are accessing them.
3. Before issuing the `CHANGE.RECON UPGRADE` command against the production RECON data sets, upgrade a copy of the production RECON data sets to verify that the upgrade will complete successfully.

During upgrade, each database record is read to ensure that the internal representation of the DMB number is correct and that the RECON DMB Table record is built or rebuilt if it already exists. The RECON DMB Table record keeps track of all the DMB numbers currently in use. The RECON DMB Table record is updated when a new database is registered in the RECON data set or a database is deleted.

If the internal representation of the DMB number in the database record is incorrect, it is corrected during the upgrade unless the database is being updated. In that case, the RECON upgrade fails.

4. Optionally, issue the `CHANGE.RECON UPGRADE CHECKUP` command. This command checks the status of the RECON data set and records to verify whether the RECON data set is in a state that allows an upgrade. No RECON data set records are changed as a result of issuing the `CHANGE.RECON UPGRADE CHECKUP` command.
5. Issue the `CHANGE.RECON UPGRADE` command by using either the IMS Version 12 DBRC Recovery Control utility (DSPURX00) or the IMS Version 12 DBRC Command API request. This command:
 - Upgrades the RECON data set without shutting down all IMS activity.

- Uses the DBRC I/O recovery algorithms to recover from any failures during upgrade (so you do not need to back up the RECON data set before you upgrade).

After this command successfully completes, DBRC sets the value for MINVERS (the minimum version of IMS that can sign on to DBRC) to '10.1' if the value was less than '10.1'. You can display the MINVERS value in the output for a LIST.RECON command or a Query request using the DBRC API.

Recommendation: If you use DBRC command authorization, consider setting the RECON qualifier as part of your migration process. You can set the RECON qualifier when you upgrade by adding CMDAUTH parameters to the CHANGE.RECON UPGRADE command, or after the RECON has been upgraded by issuing a CHANGE.RECON CMDAUTH command. If CMDAUTH parameters are specified on the CHANGE.RECON UPGRADE command, the RECON is upgraded first and then other parameters (such as CMDAUTH) are processed.

For details about the CHANGE.RECON UPGRADE command, see *IMS Version 12 Commands, Volume 3: IMS Component and z/OS Commands*. For details about the Query request, see *IMS Version 12 System Programming APIs*.

6. When you are sure that a fallback to a previous IMS version is unnecessary and all systems that access the RECON data set are at an IMS Version 12 level, you can update the MINVERS value. Before you issue the CHANGE.RECON MINVERS('12.1') command, read “Minimum version value in the RECON data set” on page 91 to understand the ramifications involved in falling back to a previous version.

After you set the MINVERS level for an IMS system, system signon fails for earlier versions of IMS for online environments. All other jobs accessing the RECON data set fail DBRC initialization if the version of IMS used is lower than the MINVERS level.

The following new messages are added to IMS Version 12 for upgrading the RECON data set:

- DSP1235W
- DSP1236E
- DSP1238I
- DSP1239I
- DSP1240E

Distributed synchronization point migration considerations

IMS ROLB processing changes in IMS Version 11 through the service process with APAR/PTF PK84674/UK59654.

Modified message-driven applications that issue the IMS ROLB call and that can receive protected input messages from OTMA or APPC/MVS (or both) no longer receive an abend 0711 with a return code of X'20'. Also, when an IMS modified application issues an outbound protected conversation, the outbound protected conversation is no longer included in the ROLB processing.

When a modified message-driven IMS application with protected input issues a ROLB call, the ROLB call is now isolated to the IMS application itself without affecting the entire protected unit of work. The protected input message remains in process for the IMS application until a commit point is reached.

If the IMS modified application issues an outbound protected conversation, the outbound protected conversation is no longer included in the ROLB processing. The outbound protected conversation is not backed out as part of the ROLB call. The modified IMS application is responsible for explicitly cleaning up any outbound protected work as part of any ROLB processing.

Dynamic resource definition migration considerations

If you are migrating from IMS Version 10 or IMS Version 11 without DRD enabled to a DRD-enabled IMS Version 12 system, you must complete several tasks to enable DRD.

JCL migration consideration

If you have JCL that was created by the IMS Manage Resources ISPF panels (option 2.7.1.2) to create an RDDS from log records, and intend to use that JCL again, you must regenerate that JCL after migrating to IMS Version 12 when APAR/PTF PM35197/UK76853 is installed.

To regenerate the JCL, execute option 2.7.1.2 using the same field settings that created the original job and save the resulting JCL.

If you have not saved the JCL from the create job or do not intend to reuse that JCL, no action is required.

Enabling DRD

To enable DRD:

1. Shut down IMS normally.
2. Define the following DRD parameters in the <COMMON_SERVICE_LAYER> section of the DFSDFxxx member of the IMS.PROCLIB data set:
 - RDDSDSN=(dsname1, dsnamen)
These system definition data sets are for the resource definitions.
 - AUTOIMPORT=MODBLKS
Enables, at cold start, the automatic importing of the resource definitions from the IMS.MODBLKS data set.
3. Enable DRD by specifying MODBLKS=DYN in either or both of the following locations:
 - The DFSCGxxx member of the IMS.PROCLIB data set
 - The <COMMON_SERVICE_LAYER> section of the DFSDFxxx member of the IMS.PROCLIB data set
4. Start IMS, specifying the EXEC parameter DFSDF=xxx (and CSLG=xxx if DRD was enabled in the DFSCGxxx member). This parameter identifies the resource definition member of the IMS.PROCLIB data set to use: DFSDFxxx.
5. Cold start IMS. IMS cold start uses the resource definitions in the IMS.MODBLKS data set to create the runtime resource definitions. The online change process for the IMS.MODBLKS data set is now disabled.
6. Start using DRD to add (CREATE command), change (UPDATE command), or delete (DELETE command) the runtime resource definitions.
7. At system checkpoint time, IMS automatically exports the definitions to the RDDS if any changes have been made. To export any changes immediately after they have been made, either issue a /CHE command, or issue an /EXPORT command.

8. For subsequent cold starts of this IMS, specify AUTOIMPORT=RDDS in the <DYNAMIC_RESOURCES> section of the DFSDFxxx member of the IMS.PROCLIB data set. When AUTOIMPORT=RDDS is specified, IMS automatically imports resource and descriptor definitions from the RDDS during cold start processing.

Recommendation: After you enable DRD, ensure that the resource definitions are no longer loaded from the IMS.MODBLKS data set by IMS cold start. Otherwise, if you delete runtime resources with a DELETE command and then perform a cold start using the IMS.MODBLKS data set for the resource definitions, those runtime resources will reappear after the next IMS cold start. You can either perform another system definition that omits all those resources, or hereafter start IMS without the IMS.MODBLKS data sets defined and instead, use the resource definitions from the RDDS.

If resources need to be changed during migration, perform a MODBLKS online change operation on the IMS systems that have not migrated to DRD, and issue CREATE, UPDATE, and DELETE commands as necessary on the IMS systems that have migrated to DRD.

Recommendation: Migrate from using an RDDS to an IMSRSC repository because the repository function is a strategic direction for IMS.

To migrate a DRD-enabled IMS to use an IMSRSC repository instead of an RDDS:

1. Create a non-system RDDS that contains definitions for the current runtime and descriptor resources. Use any of the following methods to create this RDDS:
 - Run the Create RDDS from the Log Records utility (DFSURCL0)
 - Run the Create RDDS from the MODBLKS utility (DFSURCM0)
 - Run the DRD IMS SYSGEN stage 1 pre-parser utility (DFSURST0)
 - Run the Copy RDDS utility (DFSURCP0)
 - Use the EXPORT command, if IMS is running
2. Specify attributes of the repository in the FRPCNFG, BPECONFG, CSLRIxxx, and DFSDFxxx PROCLIB members.
3. Create the repository catalog pairs of data sets.
4. Create the IMSRSC repository pairs of data sets.
5. Start the Repository Server (RS) address space.
6. Define the IMSRSC repository data sets to RS, which stores information about the IMSRSC repository in the RS catalog repository data sets.
7. (Optional) Start Common Queue Server (CQS) with a resource structure.
8. Issue the UPDATE RM command (if the Resource Manager address space is running) to enable RM to use the IMSRSC repository dynamically. If RM is not running, restart it so that it will connect to the RS address space.
9. Populate the IMSRSC repository with resource and descriptor definitions by running the batch RDDS to Repository utility (CSLURP10).
10. Cold start IMS with AUTOIMPORT specified or use the UPDATE IMS command if IMS is running.

Requirement: If AUTOEXPORT is enabled and RDDSs are defined, IMS continues to export resource definitions to the RDDSs after each system checkpoint, even if IMS is migrated to use the IMSRSC repository. To disable the AUTOEXPORT to RDDS function so that the RDDSs are no longer used:

1. Issue the UPDATE IMS SET(LCLPARM(AUTOEXPORT(N))) command.
2. Modify the DFSDFxxx PROCLIB member to remove the RDDS definitions.

Related reading: For more information, see “Enabling dynamic resource definition” in the *IMS Version 12 System Definition*.

Exit routine migration considerations

There are migration considerations for some exit routines when migrating to IMS Version 12.

Service and enhancements to IMS can change or add information in the output of certain commands. Any exit routine or automation program that parses the output from these commands might need to be modified. Service changes to the output of a command are documented in ++HOLD statements that describe the changes.

Migration considerations introduced in IMS Version 12

- The Log Filter exit routine (DFSFTFX0) might need to be updated if your IMS system is not using the version of the exit routine that is shipped in the IMS Version 12 SDFSRESL library. The exit routine changed in IMS Version 12 to include a new function code that indicates a log buffer send where the data resides above the 2 GB boundary, and three new fields on the exit routine parameter list. If the IMS log buffers reside in 64-bit storage and DFSFTFX0 is part of the IMS system, the exit routine must be able to use the updated parameter list. The sample exit routine shipped with IMS uses the updated parameter list.
- The Logger exit routine (DFSFLGX0) is changed for IMS Version 12 to include version support of the parameter list and new fields that are used when 64-bit addressing is used for buffer storage. If the IMS log buffers reside in 64-bit storage and the DFSFLGX0 exit routine is part of the IMS system, the exit routine must be able to use the updated parameter list.
- The Destination Creation exit routine (DFSINSX0) can create transactions and programs for scheduling. When the DFSINSX0 exit routine creates a transaction or program, it can specify whether the definition of the transaction or program can be exported to the RDDS data set or the IMSRSC repository by setting TRNQ_FC_EXPORT = ON. IMS Version 12, if the created resource can be exported and the IMSRSC repository is enabled in IMS, the next time the EXPORT DEFN TARGET(REPO) command is issued, the resource created by the DFSINSX0 exit routine is exported to the IMSRSC repository.

Migration considerations introduced in IMS Version 11

If you are migrating to IMS Version 12 from IMS Version 10, you should be aware of the following migration considerations that are related to exit routine enhancements made in IMS Version 11.

The user exit enhancements introduced in IMS Version 11, which are delivered through the IMS service process, introduce version 6 of the standard user exit parameter list (SXPL - SXPLVER6).

The standard user exit parameter list (SXPL) that IMS exit routines use changes with each version of the list. To use the new fields introduced in a new version, exit routines must check to ensure that the SXPL is at least the version level that introduced the new fields before it accesses any of those fields.

Version 6 of the SXPL contains the following changes:

- New fields are added:
 - SXPLASWA - Pointer to a static work area
 - SXPLIMSR - IMS release
 - SXPLRSEN - RSE name
- The version number of the SXPL was changed from 5 (SXPLVER5) to 6 (SXPLVER6).

Exit routines that run in multiple versions of IMS must be sensitive to the version of the SXPL. For example, an exit routine that runs in a mixed-version IMSplex that wants to access the SXPLASCD field in the SXPL must look for SXPLVER5 or later.

The following exit routines can use SXPLVER6 (and later) and, therefore, can access the new fields (SXPLASWA, SXPLIMSR, and SXPLRSEN):

- Build Security Environment exit routine (DFSBSEX0)
- IMS Initialization and Termination user exit
- Log edit exit routine (DFSFLGE0)
- Logger exit routine (DFSFLGX0)
- IMS CQS Event exit routine (ICQSEVNT)
- IMS CQS Structure Event exit routine (ICQSSTEV)
- Non-Discardable Messages exit routine (DFSNDMX0)
- OTMA Destination exit routine (DFSYPRX0)
- OTMA Input/Output Edit exit routine (DFSYIOE0)
- OTMA Resume TPIPE Security exit routine (DFSYRTUX)
- OTMA User Data Formatting exit routine (DFSYDRU0)
- Partner Product exit routine (DFSPPE0)
- Resource Access Security exit routine (DFSRAS00)
- Restart exit routine
- TM and MSC Message Routing and Control User exit routine (DFSMSCE0)
- Type 2 Automated Operator exit routine (DFSABOE0)

Exit routines that do not have exit point or interface changes and are supported in the EXITDEF parameter of the USER_EXITS section of the DFSDFxxx member can be enabled for the command functions introduced in IMS Version 11 by using the new version of the SXPL (SXPLVER6).

If an exit routine is looking for a specific version of the SXPL to use a particular function provided in that version, the exit routine should be modified to look for a version that is at or higher than the version that introduced the function. For example, an exit routine that needs the address of the SCD should be modified to look for an SXPL version of 5 or higher, rather than explicitly looking for a version 5 SXPL.

The IMS Connect exit parameter list (HWSEXPRM) is changed for IMS Version 11. You must reassemble and rebind the IMS Connect exit routines that use HWSEXPRM to pick up the changes. The exits that must be reassembled and rebound include the IMS Connect Sample Exits (HWSSMPL0 and HWSSMPL1) and, if it has been modified, the IMS TM Resource Adapter exit routine (HWSJAVA0).

The TM and MSC Message Routing and Control User exit routine (DFSMSCE0) is changed for IMS Version 11. You must reassemble and rebind DFSMSCE0 to pick up the changes.

Global online change migration considerations

Before the TYPE(ACBMBR) member online change function can be used, all IMS systems in the OLCSTAT data set must be IMS Version 10 or later systems and the OLCSTAT data set must be initialized to version 2. To set the version of the OLCSTAT data set, use the Global Online Change (DFSUOLC0) utility.

Enhanced command environment migration considerations

After you set up the IMS enhanced command environment (a single IMS system with a minimal Common Service Layer: Structured Call Interface and Operations Manager address spaces, but no Resource Manager), if you want to migrate to an environment that requires the Resource Manager, complete these steps.

To migrate to an environment that requires the Resource Manager (RM):

1. Update the DFSCGxxx member of the IMS.PROCLIB data set as appropriate (for example, RMENV=Y). Also, if you specified in the DFSCGxxx member that IMS should start the SCI and OM address spaces (when RMENV=N was specified), remove these statements and ensure that you have procedures in place to start up these address spaces. These address spaces are not started automatically by IMS when RMENV=Y.
2. Start RM.
3. Shut down IMS.
4. Restart IMS.

IMS restart migration considerations

You might need to modify the DFSDFxxx IMS PROCLIB member to indicate whether the BLDL types of DFS826I and DFS830I are issued or suppressed.

Before IMS Version 10, a large number of the messages DFS826I xxx DBD ERRORS SENT TO JOB LOG and DFS830I BLDL FAILED FOR FOLLOWING PSBs could be issued during IMS restart (typically in test environments, where ACB members did not exist for resources defined in the system definition). Many customers had their own user modifications to suppress these messages.

IMS Version 10 introduced two new parameters, MSG0826 and MSG0830, in the <DIAGNOSTICS_STATISTICS> section of the DFSDFxxx IMS PROCLIB member, to indicate whether the BLDL types of DFS826I and DFS830I are issued or suppressed. The default is to issue the messages, as in earlier releases. To suppress these messages, specify MSG0826=SUPPBLDL and MSG0830=SUPPBLDL in the <DIAGNOSTICS_STATISTICS> section of the DFSDFxxx IMS PROCLIB member.

For information about the DFSDFxxx IMS PROCLIB member, see *IMS Version 12 System Definition*.

IMSplex migration considerations

Migrating an IMSplex from one version of IMS to another is a complex process because many factors are involved and many different configurations are possible.

The following considerations apply when planning to migrate an IMSplex:

- Multiple Resource Managers (RMs) and Operations Managers (OMs) can run simultaneously in an IMSplex.

- Only one Structured Call Interface (SCI) can run at any given time in an IMSplex on a single logical partition (LPAR).
- All Common Queue Server (CQS) clients connected to a CQS address space must be stopped before shutting down that CQS.
- CQS clients are limited as to which version of CQS they can connect to. For more information about these rules, see “Common Queue Server coexistence considerations” on page 98.
- Install all appropriate coexistence service onto IMSplexes before attempting to migrate.
- If you are running multiple IMS systems on one logical partition (LPAR), migrate one IMS at a time.
- If you are running multiple LPARs, migrate one LPAR at a time.
- If you activate the automatic RECON loss notification and parallel RECON access functions within the same IMSplex, you must use the CHANGE.RECON IMSPLEX command to ensure that all DBRCs in the IMSplex are using the same IMSplex name that is specified in the RECON data set. If you use the DBRC SCI Registration exit routine (DSPSCIX0) or the IMSPLEX EXEC parameter before issuing the CHANGE.RECON IMSPLEX command, message DSP1136A is issued and subsequent jobs fail due to an unavailable RECON data set.

Example 1: Migrating IMS systems on a single LPAR

The following IMSplex migration example assumes:

- Continuous availability is a high priority.
- All coexistence APARs have been installed.
- All IMS systems in the IMSplex are running on one LPAR (LPAR1).
- One IMS Version 10 (V10) CQS that is using a resource structure.
- One RM and one OM running on the LPAR.
- Two IMS Version 10 systems (named IMSA and IMSB) that are running on LPAR1 and participating in data sharing and shared queues.

To migrate the IMS systems in this example IMSplex to IMS Version 12 (V12):

1. Prepare the IMSA libraries and data sets for IMS Version 12 (for example, perform a system definition, set up JCL, and so on).
2. Stop the V10 SCI.
3. Start the V12 SCI.
4. Start the V12 OM.

Because there is only one LPAR in this example, and one OM must be running at all times to provide OM services, the higher-level OM is started before shutting down the lower-level OM.

5. Stop the V10 OM.
6. Shut down IMSA.
7. Shut down IMSB.
8. Stop the V10 RM.
9. Stop the V10 CQS.
10. Start the V12 CQS.
11. Start the V12 RM.
12. Cold start IMSA.
13. Restart IMSB.

14. Test IMSA.
15. After IMSA (V12) has tested successfully, proceed to the next step. If IMSA does not pass this testing step, consider whether IMSA needs to fall back to IMS Version 10 and repeat this process after any problems are fixed.
16. Stop the V10 OM.
17. Take IMSB offline and migrate it to IMS Version 12.

Example 2: Migrating IMS systems on multiple LPARs

The operational environment for this example consists of two LPARs and a total of three IMS systems that are participating in shared queues and data sharing.

The following IMSplex migration example assumes:

- Continuous availability is a high priority.
- All coexistence APARs have been installed.
- An example IMSplex consisting of:

LPAR1

- One IMS Version 10 (V10) CQS
- One Common Service Layer (CSL), consisting of an OM, RM, and SCI
- One IMS Version 10 system (named IMSC)

LPAR2

- One IMS Version 10 (V10) CQS
- One Common Service Layer (CSL), consisting of an OM, RM, and SCI
- Two IMS Version 10 systems (named IMSD and IMSE)

Recommendation: Migrate less complex LPARs before migrating more complex LPARs.

To migrate the IMS systems in this example IMSplex to IMS Version 12 (V12):

1. Prepare the IMSC libraries and data sets for IMS Version 12 (for example, perform a system definition, set up JCL, and so on).
2. Stop the V10 SCI.
3. Start the V12 SCI.
4. Stop the V10 OM (assuming the same OM name is used before and after the migration).
5. Start the V12 OM.
6. Shut down IMSC.
7. Stop the V10 RM.
8. Shut down the V10 CQS.
9. Start the V12 CQS.
10. Start the V12 RM.
11. Coldstart IMSC.
12. Test IMSC. If IMSC does not pass this testing step, consider whether IMSC needs to fall back to IMS Version 10 and repeat this process after any problems are fixed.
13. After validating that the migration of IMSC is successful, start migrating the IMS systems on LPAR2.

14. Prepare the IMSD libraries and data sets for IMS Version 12 (for example, perform a system definition, set up JCL, and so on).
15. Stop the V10 SCI.
16. Start the V12 SCI.
17. Start the V12 OM.
18. Stop the V10 OM.
19. Shut down IMSD.
20. Shut down IMSE.
21. Stop the V10 RM.
22. Stop the V10 CQS.
23. Start the V12 CQS.
24. Start the V12 RM.
25. Cold start IMSD.
26. Restart IMSE.
27. Test IMSD. If IMSD does not pass this testing step, consider whether IMSD needs to fall back to IMS Version 10 and repeat this process after any problems are fixed.
28. After IMSD (V12) has tested successfully, proceed to the next step.
29. Stop the V10 OM.
30. Take IMSE offline and migrate it to IMS Version 12.

Example 3: Migrating IMS systems on multiple LPARs (with IMS Connect involved)

The operational environment for this example consists of two LPARs and a total of three IMS systems that are participating in shared queues and data sharing.

The following IMSplex migration example assumes:

- Continuous availability is a high priority.
- All coexistence APARs have been installed.
- An example IMSplex consisting of:

LPAR1

- One IMS Version 10 (V10) CQS
- One Common Service Layer (CSL), consisting of an OM, RM, and SCI
- One IMS Version 10 system (named IMSF)
- One IMS Connect that is communicating with IMSF, MSG, and IMSH

LPAR2

- One IMS Version 10 (V10) CQS
- One Common Service Layer (CSL), consisting of an OM, RM, and SCI
- Two IMS Version 10 systems (named MSG and IMSH)

Recommendation: Migrate less complex LPARs before migrating more complex LPARs.

To migrate the IMS systems in this example IMSplex to IMS Version 12 (V12):

1. Prepare the IMSF libraries and data sets for IMS Version 12 (for example, perform a system definition, set up JCL, and so on).
2. Stop the V10 SCI.

3. Start the V12 SCI.
4. Stop the V10 OM (assuming the same OM name is used before and after the migration).
5. Start the V12 OM.
6. Shut down IMS Connect.
7. Shut down IMSF.
8. Stop the V10 RM.
9. Shut down the V10 CQS.
10. Start the V12 CQS.
11. Start the V12 RM.
12. Coldstart IMSF.
13. Start IMS Connect. If you start IMS Connect before IMSF, IMS Connect issues a datastore unavailable message.
14. Test IMSF. If IMSF does not pass this testing step, consider whether IMSF needs to fall back to IMS Version 10 and repeat this process after any problems are fixed.
15. After validating that the migration of IMSF is successful, start migrating the IMS systems on LPAR2.
16. Prepare the IMSG libraries and data sets for IMS Version 12 (for example, perform a system definition, set up JCL, and so on).
17. Stop the V10 SCI.
18. Start the V12 SCI.
19. Start the V12 OM.
20. Stop the V10 OM.
21. Shut down IMSG.
22. Shut down IMSH.
23. Stop the V10 RM.
24. Stop the V10 CQS.
25. Start the V12 CQS.
26. Start the V12 RM.
27. Cold start IMSG.
28. Restart IMSH.
29. Test IMSG. If IMSG does not pass this testing step, consider whether IMSG needs to fall back to IMS Version 10 and repeat this process after any problems are fixed.
30. After IMSG (V12) has tested successfully, proceed to the next step.
31. Stop the V10 OM.
32. Take IMSH offline and migrate it to IMS Version 12.

INQY call for system services migration considerations

Application programs that use the AIB INQY ENVIRON call might need to be changed.

IMS Version 12 APAR/PTF PM42909/UK78069 increased the length of the data returned by the INQY ENVIRON call from 100 bytes to 108 bytes. As a result, the minimum size of the AIB I/O area required for the INQY ENVIRON call increased from 152 bytes to 160 bytes and the offsets of the optional recovery token and application parameter fields have changed. If you need to modify the size of your application AIB I/O area, it is highly recommended you set the size to 512 bytes.

Any application programs that referenced the recovery token or application parameter field by its offset prior to IMS Version 12 APAR/PTF PM42909/UK78069 must be modified for continued access to the field, as described in the following recommendations. These fields must not be referenced by offset.

Recommendations: To account for expansion in the length of the reply data, specify an I/O area length of 512 bytes.

To reference the field that contains the recovery token or the application parameter string, code your application programs to locate the field by using the address of the field that is returned in the data output of the INQY ENVIRON call. This is the only valid programming technique to reference the recovery token field and the application parameter string field. No other programming technique should be used to reference these fields.

The recovery token or the application parameter string are optional and therefore are not always returned. If they are not returned, the value in the address field is zero.

If you are migrating to IMS Version 12 with APAR/PTF PM42909/UK78069 and your applications uses the AIB INQY ENVIRON call, ensure that the application area for the INQY ENVIRON data is a minimum of 108 bytes and corresponding I/O area is a minimum of 160 bytes. It is highly recommended you set the size of your AIB I/O area to 512 bytes instead of the minimum size just described.

Application programs that issue the INQY ENVIRON call that have an I/O area less than the minimum size receive a status code AG. The I/O area will be filled with partial data, as much as would fit in the I/O area provided. AIBOALEN contains the length of the data returned in the I/O area. AIBOAUSE contains the output area length that is required to receive all the data for the INQY ENVIRON call.

IVP enhancements migration considerations

Use the IMS installation verification program (IVP) after installing a new IMS system, to verify the installation of that new system, and use it subsequently for other purposes (for example, as an educational tool). The IVP dialogs are replaced when a new release of IMS is installed.

The IVP Variable Export utility mitigates the migration of IVP variables values between releases.

IMS Connect support migration considerations

Many migration considerations pertain to migrating IMS Connect from IMS Version 10 or IMS Version 11 to IMS Version 12.

Consider the following items when planning to migrate IMS Connect support to IMS Version 12:

- IMS Version 12 introduced new recorder trace records for IMS Connect that make use of BPE's external trace tables.
- In IMS Version 12 and later, IMS ships load modules for the user exit routines HWSUNIT0, HWSJAVA0, HWSSMPL0, HWSSMPL1 in addition to the source. Previously, working samples were provided but always had to be assembled and bound. Even if no changes are made to the provided source samples, IMS Connect always loads HWSUINIT and HWSJAVA0. HWSSMPL0 and HWSSMPL1 must be specified on the EXIT= parameter of the TCPIP configuration statement before they are loaded.

- You can use the default values for the UIDCACHE and UIDAGE statements in the IMS Connect configuration member, but you must update the configuration member if you want to use other values.
- User-written IMS Connect clients that use CM0 Send-Receive interactions can update their applications to specify ACK NoWait and eliminate the receive call for the timeout.
- Automated application programs that interpret the output from the VIEWHWS and QUERY MEMBER commands must be changed to take advantage of:
 - New output fields added in IMS Version 13
 - New output fields added in IMS Version 12
 - New summary characteristics output added in IMS Version 11
- The IMS Connect exit parameter list (HWSEXPRL) changed for IMS Version 11. You must reassemble and rebind the IMS Connect exit routines that use HWSEXPRL to pick up the changes.
- To specify an OTMA super member at the data store level for IMS Connect, you must update the IMS Connect DATASTORE configuration statements to add the SMEMBER parameter.
- Automated application programs that process message HWSP1410W might need to be modified to support the new field for the storage address that is returned with the message.
- Any existing application programs that might receive a user-defined message from IMS Connect must be modified to identify and support user-defined messages.
- If you previously defined more than one SSL port in an IMS Connect configuration member, you must modify the SSLPORT parameter on the TCPIP statement to specify only a single SSL port. To use more than one SSL port with an instance of IMS Connect, disable the IMS Connect support for SSL and use IBM z/OS Communications Server Application Transparent Transport Layer Security (AT-TLS) to manage SSL connections.
- To use the BPE external trace facility, the recorder trace is required. If you implemented the BPE external trace in IMS Version 10, you can migrate to the new recorder trace facility by issuing the following two commands:
 1. If the recorder trace facility is active, stop it by issuing the RECORDER STOP command.
 2. Start the new recorder trace facility by issuing the UPD TRTAB NAME(RCTR) LEVEL(MEDIUM) EXTERNAL(YES) command.
- Code the PORT parameter with the KEEPAV option on the TCP/IP configuration statement in the HWSCFG PROCLIB member to enable the KeepAlive function.
- Code the PORT parameter with the EDIT option on the TCP/IP configuration statement to enable the port input/output edit exit function. Also, an exit routine load module with a name that matches the value specified on the EDIT parameter must be accessible to IMS Connect through the JOBLIB, STEPLIB, or LinkList.
- Change any exits that refer to the HWSIMSO0 and HWSIMSO1 modules to use the newest modules, HWSSMPL0 and HWSSMPL1, because HWSIMSO0 and HWSIMSO1 are no longer shipped with IMS.
- The default specification that IMS Connect uses to support mixed-case passwords is changed with APAR/PTF PK80037/UK45982 for IMS Version 10. Before this APAR is installed, the possible values for the PSWDMC= keyword in the HWSCFGxx PROCLIB member are:

N Do not support mixed-case passwords. N is the default value as originally delivered in IMS Version 10.

Y Support mixed-case passwords.

The APAR introduces a third possibility, R, which means determine the need for mixed-case password support based on the specification for mixed case password support in the RACF configuration. After the APAR is installed, PSWDMC=R is the default value if another value is not specified.

Java class libraries for IMS migration considerations

There are general and specific migration considerations for the Java class libraries for IMS and the applications that use them.

General migration considerations for the Java class libraries for IMS Version 12:

Some classes are deprecated or renamed, so you might need to change your applications as a result.

Recommendation: Because the IMS Universal drivers are built on industry standards and open specifications, and provide more flexibility and improved support for connectivity, data access methods, and transaction processing options, use these drivers for Java applications that access IMS.

The `com.ibm.ims.application.IMSApplication` class of the classic Java APIs for IMS is deprecated in IMS Version 10 and later. Although you are not required to change your applications, doing so is highly recommended. The applications that use or subclass the `IMSApplication` class can be modified as follows:

- Remove “extends `IMSApplication`” from the class declaration line. For example, “public class `CustomerApplication` extends `IMSApplication`” becomes “public class `CustomerApplication`”.
- The main method of the application no longer needs to call the `IMSApplication.begin()` method. Instead, the main method can directly call the public void `doBegin()` method. Alternatively, move the logic from the `doBegin()` method to the main method and delete the `doBegin()` method.
- New Java applications for IMS need to implement only a main method.

Specific migration considerations for the enhancements to the Java class libraries for IMS:

Migration considerations for the enhancements to the Java class libraries for IMS include considerations for IMS support for XQuery, GSAM database access, DB2 stored procedures, and Java dependent regions.

The following topics describe the migration considerations for using the Java class libraries provided with IMS Version 12.

Migration considerations for IMS support for XQuery:

Java applications that use the XQuery support in the IMS classic drivers have several migration considerations.

Although the support in IMS for XQuery uses several features of the JDK 5.0 runtime, no changes to applications are necessary to incorporate JDK 5.0.

IMS Version 10 support for XQuery introduced a new format for representing the XML structure of an IMS database in the defining IMS XML schema, but you are

not required to migrate from the XML that was generated by earlier versions of IMS. XML schemas that were generated by earlier versions of IMS can be used unchanged with applications that are written with the enhancements to the XQuery support in IMS Version 10.

Migration considerations for Java applications that access GSAM databases:

To use the enhancements introduced in IMS Version 10, JBP applications must be modified to use three different classes.

Use of the GSAM interfaces introduced in IMS Version 10 is optional for IMS JDBC applications. Existing JBP applications written for IMS Version 7, IMS Version 8, and IMS Version 9 will continue to run unchanged in IMS Version 10 or later. To use the enhancements provided in IMS Version 10, however, these applications need to be modified to use the following new and changed classes:

- `com.ibm.ims.db.GSAMConnection`, which provides the interface to read and write records in a GSAM database.
- `com.ibm.ims.db.GSAMConnectionFactory`, which is used to create a `GSAMConnection`.
- `com.ibm.com.ims.db.GSAMRecord`, which is used to represent records in a GSAM database. It provides the mapping between the data in the segment and access functions on the class.

Migration considerations for returning IMS database records as DB2 result sets for DB2 stored procedures:

Use of the support for transforming IMS database records into DB2 result sets (introduced in IMS Version 10) is optional for DB2 stored procedures.

Existing DB2 stored procedures that are written to accept IMS information in individual fields will continue to run unchanged in IMS Version 10 and later.

Recommendation: Use the support for returning IMS database records as DB2 result sets for DB2 stored procedures.

Migration considerations for Java dependent regions:

Two path statements are changed as of IMS Version 10, and the classic Java APIs for IMS are stabilized.

For IMS Version 10 and later, the `-Dibm.jvm.shareable.application.class.path` and the `-Dibm.trusted.middleware.class.path` statements are replaced with the `-Djava.class.path` statement.

Recommendation: The Java dependent region (JDR) support provided by the classic Java APIs for IMS is stabilized. Migrate your applications to use the IMS Java dependent region resource adapter (`imsutm.jar`, delivered with IMS Version 11 and later) for this support.

Migration considerations for log record suffix time-stamp uniqueness

In IMS Version 12, the time-stamp value in the log record suffix is no longer necessarily unique in every log record produced by an IMS system. The time stamp in each log record is always greater than or equal to the time-stamp value in the previous log record. The sequence number remains unique per record and is always greater than the sequence number in the previous log record.

The log record suffix of every log record written by IMS contains:

- An 8-byte time stamp in hardware TOD (STCK) format (log record field LOGRC_STCK)
- An 8-byte log sequence number (log record field LOGRC_SEQUENCE_NUMBER)

Before IMS Version 12, every log record produced by one IMS system had a unique time stamp value and a unique log sequence number. The time stamp in each log record was always greater than the time stamp in the previous record. The log sequence number in each log record was always greater than the log sequence number in the previous record.

Recommendation: Use the concatenation of fields LOGRC_STCK and LOGRC_SEQUENCE_NUMBER to establish a unique, time-ordered key for sorting log records. Do not use only the LOGRC_STCK field because the results might be unpredictable.

Remote Site Recovery migration

To avoid a loss of disaster recovery protection during the migration period, plan for an orderly migration to IMS Version 12 of IMS systems that participate in Remote Site Recovery (RSR). Migrating RSR to IMS Version 12 does not depend on any non-IMS software other than that required for RSR to operate.

Planning and administration tasks

The system programmer, system administrator, and the database administrator must carefully plan the migration to IMS Version 12 of IMS systems that participate in RSR. Also, automation programs and procedures might need to be created or modified based on messages issued during an RSR migration.

To take advantage of added IMS function, RSR users must migrate from IMS Version 10 and IMS Version 11 to IMS Version 12. The migration path must be chosen carefully for the IMS subsystems that are participating in RSR. Migration of any IMS system that participates in RSR includes all the steps that are required to move to the new level.

To migrate from IMS Version 10 or IMS Version 11 to IMS Version 12 in an RSR environment:

1. Migrate the tracking IMS and Transport Manager Subsystem (TMS) to the IMS Version 12 level.
2. Migrate the active site TMS that is running isolated log sender (ILS) to the IMS Version 12 level. You must complete this step before or during migration of the first active IMS. Stop ILS on all the other TMSs so that the tracking IMS does not attempt to establish conversations with an ILS at an earlier level.
3. Migrate the rest of the active IMS subsystems and active site TMS systems to the IMS Version 12 level as necessary.

Pre-Version 12 library retention

Retain all pre-IMS Version 12 libraries that are required for processing the pre-IMS Version 12 tracking log data sets until there is no possibility of needing the pre-IMS Version 12 log data sets. If a tracking log data set must be recovered for any reason, it must be processed by the Log Recovery utility (DFSULTR0) from the same version of IMS. Therefore, even after a remote takeover, you might need to retain pre-IMS Version 12 libraries at the remote site, even if all active IMS

subsystems have been migrated to IMS Version 12.

Takeover considerations

Active IMS systems must restart at the remote site after a remote takeover to access to tracking log data sets (for normal and emergency restart). The new active IMS systems must run at the same IMS version level as the old active IMS systems that created the log records that are used for restart processing.

Handling error situations

If the tracking IMS terminates abnormally while at the pre-IMS Version 12 level, perform an emergency restart at the pre-IMS Version 12 level and successfully shut down before you migrate to IMS Version 12. Doing so allows the tracking IMS to create an RSR position data set that is used during cold start processing of the new IMS Version 12 RSR tracker. The RSR position data set helps the RSR tracker reestablish routing positions on the various PRILOG records.

If a deallocate or close error message for the RSR position data set is issued by the IMS Version 10 or IMS Version 11 tracking IMS during shutdown, resolve the problem that is causing the error before you migrate the tracking IMS system to IMS Version 12. If the problem causes an error during RSR position data set allocation such that the tracking IMS is unable to find or access the position data set, you can continue normal cold-start processing. However, normal cold-start processing will result in the tracking IMS processing only log data from new active IMS systems because the tracking IMS has no indication of where the previous tracking IMS stopped. You can restart the tracking IMS at the pre-IMS Version 12 level if a new RSR position data set needs to be created to alleviate this problem.

The following steps describe what can happen if an active IMS spans the migration of a tracking IMS and an RSR position data set is not available:

1. Log data is received at the tracking site from an active IMS Version 10 or IMS Version 11 system before migrating the tracking IMS to IMS Version 12 (the active PRILOG is not closed).
2. The tracking IMS migrates to an IMS Version 12 level but the active IMS does not shut down (the PRILOG did not close in the active site RECON data sets).
3. After a cold start, the IMS Version 12 tracker is unable to find the RSR position data set.
4. The user elects to continue cold start processing.
5. Log data is received from the active IMS with the same PRILOG start time as was processed by the previous release tracking IMS. This log data is not applied to any remote site database.

RSR migration path to IMS Version 12

The following table describes steps for migrating IMS and TMS from IMS Version 10 or IMS Version 11 to IMS Version 12, and the combinations of IMS systems and resources that are supported. In the table:

- The Steps column shows the order in which you can migrate the components of the RSR complex (where A = Active and R = Remote).
- The bold type in a table cell shows in which IMS version the current changes occur.

Table 9. Supported paths and configurations for migrating RSR to IMS Version 12

Steps			Active site state			Remote site state		Notes
A	R	IMS	TMS/ILS	RECON	IMS	TMS/ILS	RECON	
0	0	pre-V12	pre-V12	pre-V12	pre-V12	pre-V12	pre-V12	1
1	1	pre-V12	pre-V12	V12	pre-V12	pre-V12	V12	2
1	2	pre-V12	pre-V12	V12	V12	V12	V12	3
2	2	pre-V12	V12	V12	V12	V12	V12	4
3	2	V12	V12	V12	V12	V12	V12	5

Note:

1. (0,0) - This is the initial state. All subsystems at both the active and remote sites are running at the pre-IMS Version 12 level.
2. (1,1) - Both RECON data sets are upgraded by using the CHANGE.RECON UPGRADE command. It does not matter which site (active or remote) is run first. It only matters that both RECON data sets are upgraded before proceeding.
3. (1,2) - The tracking IMS and remote site TMS are migrated to IMS Version 12. These IMS systems can be migrated separately, but to ensure integrity, simultaneous migration is preferable.
4. (2,2) - The active site TMS is migrated to IMS Version 12. This can be accomplished as part of migrating the active IMS to IMS Version 12. All non-IMS Version 12 isolated log senders (ILSs) must be stopped and ILS started on the IMS Version 12 TMS so that missing log data from the IMS Version 12 IMS can be sent to the tracking IMS.
5. (3,2) - The active IMS subsystems are migrated to IMS Version 12. Each IMS subsystem can be migrated independently.

Alternatives to RSR migration and coexistence

The alternatives to RSR migration and coexistence are:

- Require IMS users of the RSR function to migrate all systems that are participating in RSR to IMS Version 12 simultaneously.
- Disable the RSR function while active site systems migrate to IMS Version 12.

Changed interfaces

The interface between the log router and various other components has been changed to support multiple release log record handling. The interfaces of the following components have changed:

- Active site IMS logger
- Active system tracker
- DBRC
- DL/I tracker
- Fast Path tracker
- Isolated log sender

Security enhancements migration considerations

The SECURITY macro will not be supported as of IMS Version 13..

SECURITY macro migration considerations

IMS Version 12 is the last version to support the SECURITY macro. You can use initialization parameters to specify most of the SECURITY macro keyword values.

Initialization parameters for the RCLASS and SECCNT keywords were added to IMS Version 11 and IMS Version 12 with the following APARs/PTFs:

- IMS Version 11 - PM48203/UK74050
- IMS Version 12 - PM48204/UK74051

To prepare you IMS system for the removal of the SECURITY macro, move your security specifications from the SECURITY macro to initialization parameters, use the following procedure:

1. Replace the SECLVL and TYPE security specifications in the SECURITY macro with the corresponding security specifications in the DFSPBxxx PROCLIB member.

The following table shows SECLVL and TYPE specifications in the SECURITY macro parameters and the parameter specifications in the DFSPBxxx PROCLIB member that replace them.

Table 10. EXEC parameters available in IMS Version 12 listed by the SECURITY macro parameters that they replace

SECURITY macro parameter	Corresponding DFSPBxxx parameter
SECLVL=NOSIGN	SGN=N
SECLVL=SIGNON	SGN=Y
SECLVL=FORCSIGN	SGN=F
SECLVL=NOTRAN	TRN=N
SECLVL=TRANAUTH	TRN=Y
SECLVL=FORCTRAN	TRN=F
TYPE=NORACTRM+NORACFCM	RCF=N
TYPE=RACFTERM	RCF=T
TYPE=RACFCOM	<ul style="list-style-type: none">• RCF=C (specifies command authorization for ETO terminals)• RCF=S (specifies command authorization for ETO terminals and statically defined terminals)
TYPE=RACFTERM+RACFCOM	<ul style="list-style-type: none">• RCF=A (specifies command authorization for both ETO and statically defined terminals, sign on security, and transaction authorization)• RCF=Y (specifies command authorization for ETO terminals, sign on security, and transaction authorization)
TYPE=NORAS	ISIS=N
TYPE=RASRACF	ISIS=R
TYPE=RASEXIT	ISIS=C
TYPE=RAS	ISIS=A

Table 10. EXEC parameters available in IMS Version 12 listed by the SECURITY macro parameters that they replace (continued)

SECURITY macro parameter	Corresponding DFSPBxxx parameter
TYPE=SIGNEXIT, TYPE=NOSIGNEX	You must still specify SIGNEXIT in the SECURITY macro. SIGNEXIT does not have a corresponding initialization parameter.
TYPE=TRANEXIT, TYPE=NOTRANEX	You must still specify TRANEXIT in the SECURITY macro. TRANEXIT does not have a corresponding initialization parameter.

2. Move SECCNT parameter to the COMM or IMSGEN macro.
3. Move the RCLASS and SECCNT parameter specifications from the SECURITY macro to the appropriate PROCLIB member.
 - For DB/DC or DCCTL systems, you can move both the RCLASS and SECCNT parameter specifications to the DFSDCxxx PROCLIB member.
 - For all system types, you can move the RCLASS parameter specification to the DFSPBxxx PROCLIB member.
4. Comment out the SECURITY macro in the stage 1 system definition input. For fallback purposes, do not delete it.
5. Start using IMS Version 12 with the security options specified in initialization parameters.
6. When there is no need to fall back to or coexist with a previous version of IMS, remove the SECURITY macro from the stage 1 system definition input.

For information about using initialization parameters for security, see “Controlling security during system startup for DB/DC and DCCTL” in the *IMS Version 12 System Administration*.

Security exit routines migration considerations

If you use either the Signon/off Security exit routine (DFSCSGN0) or the Transaction Authorization exit routine (DFSCTRN0), you must still specify SIGNEXIT and TRANEXIT in the SECURITY macro. SIGNEXIT and TRANEXIT do not have corresponding initialization parameters.

Syntax Checker enhancements migration considerations

The Syntax Checker assists with IMS release-to-release migrations by providing the ability to convert supported IMS.PROCLIB members from one release to the other.

When you use the Syntax Checker to check parameters for earlier releases of IMS, you must verify that the correct release number is displayed.

WADS migration considerations

The IMS Version 12 and later write-ahead data set (WADS) must be preallocated and formatted on a DASD device that supports Extended Count-Key-Data (ECKD) architecture.

The WADS channel program is rewritten and replaced as of IMS Version 12.

For information about other IMS logger enhancements for IMS Version 12, see “IMS logger enhancements overview” on page 31.

Fallback considerations

Major functions of IMS are not generally compatible with earlier versions.

Consider the following guidelines when preparing your migration fallback plan. This information is a guide to fallback inhibitors, and is not comprehensive:

- The ACB Maintenance utility, ACBGEN, is required.
- For each IMS that you are migrating to a pre-Version 12 level, complete the following steps:
 1. Ensure that the status of all databases updated by IMS Version 12 is correct.

Recommendation: Establish a new recovery point for these databases by creating image copies of them before allowing updates in the fallback release.

2. Resolve DBRC issues. See “DBRC fallback considerations.”
 3. Shut down IMS Version 12.
 4. Install the version of IMS that you want.
 5. Cold start the IMS.
- You can use the IBM IMS Queue Control Facility for z/OS (QCF) to requeue IMS Version 12 messages to IMS Version 10 or IMS Version 11 message queues.

If you fall back from IMS Version 12 to IMS Version 11, ensure that the IMS Version 11 DBRC Coexistence SPE (PM05244) is applied to the IMS Version 11 system.

If you fall back from IMS Version 12 to IMS Version 10, ensure that the IMS Version 10 DBRC Coexistence SPE (PM05243) is applied to the IMS Version 10 system.

DBRC fallback considerations

Certain steps must be taken to revert the level of DBRC from IMS Version 12 to IMS Version 10 or IMS Version 11.

BPE-based DBRC

If you are falling back from a BPE-based IMS Version 12 DBRC to a BPE-based IMS Version 11 DBRC, there are no fallback considerations for the BPE DBRC base.

To revert to using a non-BPE based DBRC:

1. Shut down the IMS control region that is associated with the BPE-based DBRC address space.
2. Modify the DBRC procedure to use JCL appropriate for a non-BPE based DBRC region.
3. Restart IMS with the DBRCNM parameter specifying the non-BPE DBRC region startup JCL.

Database Change Accumulation utility (DFSUCUM0)

If you fall back from IMS Version 12 to IMS Version 10 and you have change accumulation (CA) data sets created at the Version 12 level, the database changes in these CA data sets are not recoverable because the IMS Version 10 utility cannot process them. Invalidate the Version 12 change accumulation data sets by running an image copy of the related databases at the IMS Version 10 level.

DBRC applications

If you fall back from IMS Version 12 to IMS Version 10 and your system includes an application program that uses version 3 or version 4 of the DBRC output blocks, you must change the application to use version 1 or version 2 output blocks. Versions 3 and 4 DBRC API output blocks are supported only with IMS Version 11 and later.

Minimum version value in the RECON data set

If the MINVERS value is set to '12.1' and you need to fall back from IMS Version 12 to an earlier version, you must lower the MINVERS value because jobs in an earlier release cannot access the RECON data if the current MINVERS value is set to '12.1'.

To change the MINVERS value to '10.1':

1. Shut down all IMS Version 12 subsystems.
2. Ensure that all IMS Version 12 subsystem records were removed from the RECON data set. Issue a LIST.SUBSYS command to see the subsystem records in the RECON data set. Delete all IMS Version 12 subsystem records in the RECON data set using the DELETE.SUBSYS command.
3. Reset the MINVERS value by issuing a CHANGE.RECON MINVERS('10.1') command using IMS Version 12.
4. If you receive message DSP1205E (meaning that the database quiesce flags are active), use the CHANGE.DB or CHANGE.DBDS command to set off the flags. After the flags are turned off, reissue the CHANGE.RECON MINVERS('10.1') command.

To change the MINVERS value to '11.1':

1. Shut down all IMS Version 12 subsystems.
2. Ensure that all IMS Version 12 subsystem records have been removed from the RECON data set. Issue a LIST.SUBSYS command to see the subsystem records in the RECON data set. Delete all IMS Version 12 subsystem records in the RECON data set using the DELETE.SUBSYS command.
3. Reset the MINVERS value by issuing a CHANGE.RECON MINVERS('11.1') command using IMS Version 12.
4. If you receive message DSP1205E (meaning that the database quiesce flags are active), use the CHANGE.DB or CHANGE.DBDS command to set off the flags. After the flags are off, reissue the CHANGE.RECON MINVERS('11.1') command.

Dynamic resource definition fallback considerations

You can fall back from an IMS system that has dynamic resource definition (DRD) enabled to an earlier version of IMS.

To fall back from an IMS Version 12 system that uses the IMS repository function to an IMS Version 11 or IMS Version 10 system that uses a resource definition data set (RDDS):

1. Ensure that you have a non-system RDDS that contains a complete set of all the resource definitions before shutting down IMS Version 12.
2. Cold start the IMS Version 11 or IMS Version 10 system and import the resource definitions from the RDDS.

To fall back from an IMS system that has DRD enabled and uses an RDDS to an IMS system that does not use DRD:

1. Ensure that the IMS.MODBLKS data set has a complete set of all the resource definitions while you have DRD enabled. This set of resource definitions includes resource definitions that were originally in the IMS.MODBLKS data set at cold start time, and the resource definitions (or removal thereof) for the resources that were added, changed, or deleted dynamically. Having this set enables you to fall back to using online change for the IMS.MODBLKS data set with all the resources that were defined either by system definition originally or dynamically.

Optionally, you can use the Resource Definition Data Set (RDDS) Extraction utility (DFSURDD0) to extract the resource definitions to create Stage-1 macro statements from the stored resource definitions in an RDDS.

2. Shut down IMS normally.
3. Remove or change the MODBLKS keyword to enable online change for the IMS.MODBLKS data set:
 - Remove the MODBLKS keyword from the DFSCGxxx member or the DFSDFxxx member of the IMS.PROCLIB data set (or from both members). If both members are defined, any values specified in the DFSCGxxx member override the values specified in the DFSDFxxx member.
 - Change the value of the MODBLKS keyword from DYN to OLC in the DFSCGxxx member or in the <COMMON_SERVICE_LAYER> section of the DFSDFxxx member of the IMS.PROCLIB data set (or in both members).
4. Ensure that the IMS JCL includes the MODBLKS DD statement.
5. Cold start IMS. An IMS cold start creates runtime resource definitions from the stored resource definitions in the IMS.MODBLKS data set. The online change process for the IMS.MODBLKS data set is now enabled. Variations of the dynamic resource definition CREATE, DELETE, and UPDATE commands that change definitions are no longer permitted.
6. Reinstitute your in-house procedures that use the online change process for the IMS.MODBLKS data set and disable the procedures that use DRD commands.
7. Perform other pertinent tasks related to falling back to a previous version.

IMS catalog fallback

An IMS system in which the IMS catalog is enabled can fall back to an earlier version of IMS.

If you are falling back to an IMS Version 12 system in which the IMS catalog was enabled, unless the IMS Version 12 DBD and PSB instances were purged from the IMS catalog, you do not need to change the IMS catalog.

If the IMS Version 12 DBD and PSB instances were not purged, fallback to the IMS Version 12 IMS catalog is achieved by making the IMS Version 12 ACBLIB library (ACBLIB) the active ACBLIB again. The active ACB library determines which DBD and PSB instances are active in the IMS catalog.

If the IMS Version 12 DBD and PSB instances were purged from the IMS catalog, you must repopulate the IMS catalog with the IMS Version 12 DBD and PSB instances after you make the IMS Version 12 ACBLIB active.

After fallback is complete, you can leave the IMS Version 12 DBD and PSB instances in the IMS catalog or you can purge them to save storage.

If you are falling back to a version of IMS that does not support the IMS catalog, and the IMS catalog was registered to DBRC in the IMS Version 12 system, remove the database definitions for IMS catalog from DBRC.

IMS Version 11 and earlier systems do not recognize the CATALOG section of the DFSDFxxx PROCLIB member, so the catalog specifications in the DFSDFxxx PROCLIB member do not need to be removed.

The following figure shows the IMS catalog before fallback. The ACBLIB for the new version is active. The new DBDs are used in the DMB pool of the new version of IMS and the new DBD instances in the DBD record in the IMS catalog are used.

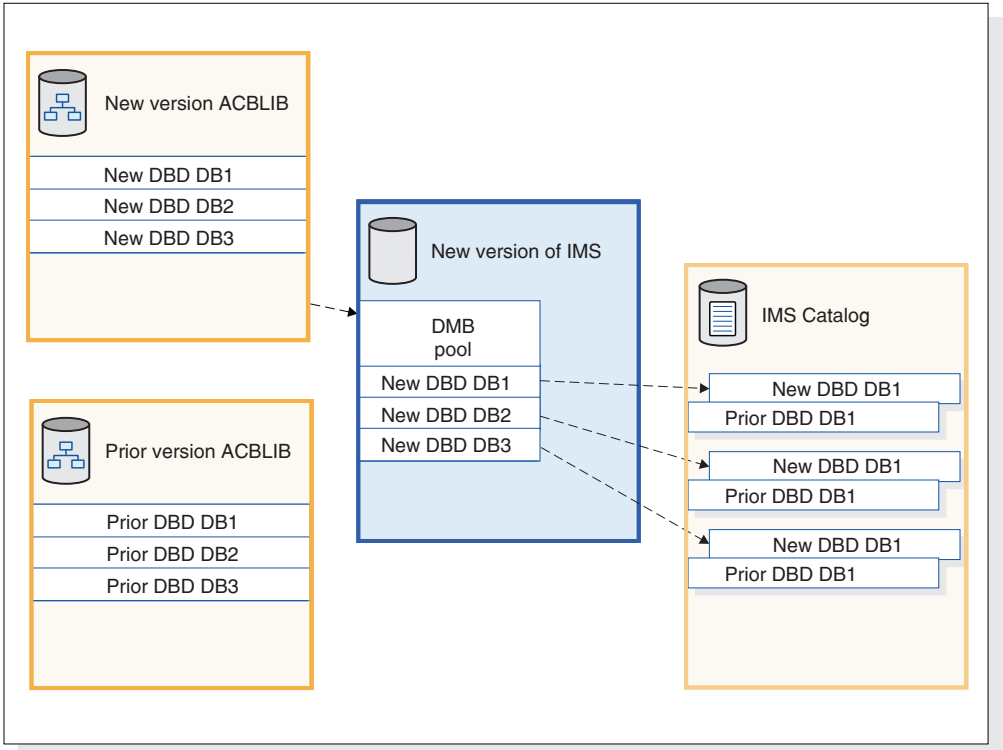


Figure 1. DBDs that IMS uses before fallback

The following figure shows the IMS catalog after fallback. The ACBLIB for the prior version is made active again. The prior version of IMS loads the prior DBDs into the DMB pool and uses the prior DBD instances in the DBD records in the IMS catalog.

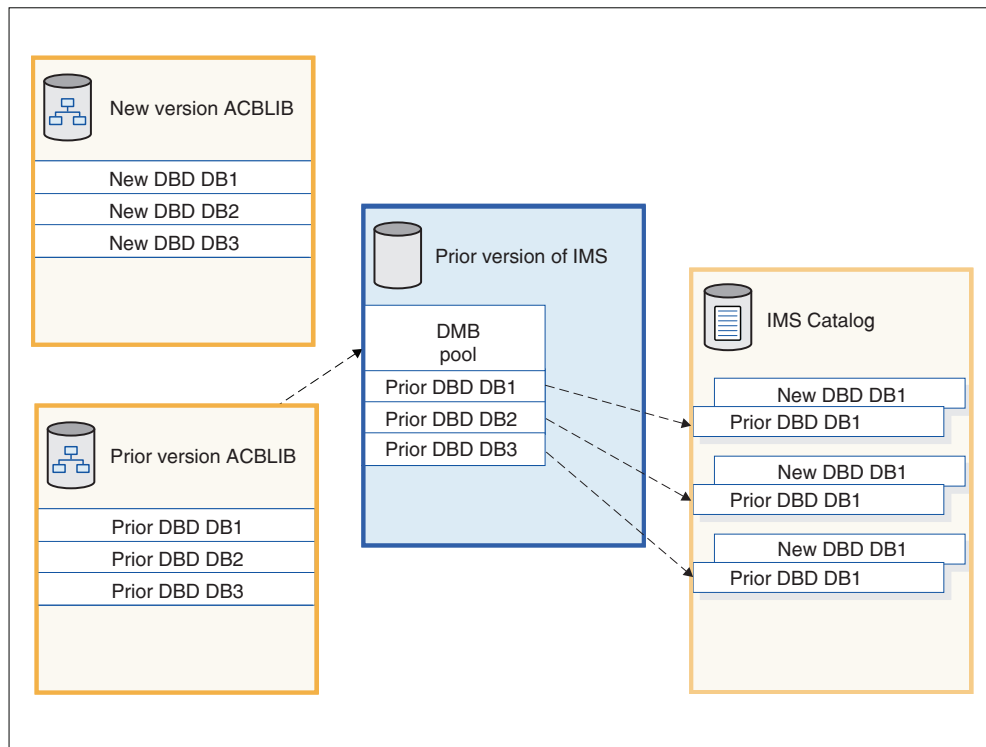


Figure 2. DBDs that IMS uses after fallback

Chapter 4. Coexistence with IMS Version 12

Restrictions and compatibility considerations apply for coexistence of IMS Version 12 with earlier versions of IMS.

If an IMS Version 12 enhancement, or any other IMS function, has no coexistence or compatibility considerations, it is not described in these topics.

Overview of coexistence APARs

IMS Version 10 and IMS Version 11 must have certain APARs installed to coexist with IMS Version 12.

The following table describes the coexistence APARs and PTFs needed for various IMS functions. For detailed information about individual APARs and PTFs, go to the IMS home page at www.ibm.com/ims and click **Support**.

Table 11. APARs and PTFs needed for IMS Version 12 coexistence with IMS Version 10 and IMS Version 11

IMS Version 12 function	IMS Version 10 coexistence APAR/PTF	IMS Version 11 coexistence APAR/PTF	Additional information
Database Change Accumulation utility (DFSUCUM0)	PM37034/UK67282	PM37033/UK67281	For more information, see “Database utility coexistence considerations” on page 100.
DBRC RECON data sets	PM05243/UK62970	PM05244/UK62971	For more information, see “Database Recovery Control (DBRC) coexistence considerations” on page 98.
HALDB online reorganization (OLR)	PM31789/UK67484	PM31791/UK67485	For more information, see “OLR ownership enhancement” in “HALDB enhancements overview” on page 10.
IMS synchronous callout function	<ul style="list-style-type: none">Preconditioning APARs/PTFs:<ul style="list-style-type: none">– PK70078/UK40363– PK73224/UK40813– PK70330/UK40215Activation APARs/PTFs:<ul style="list-style-type: none">– PK71135/UK42415– PK74168/UK42459– PK75209/UK45249– PK75824/UK43077– PK75460/UK43595	None	For more information, see “IMS synchronous callout function coexistence considerations” on page 104.
ODBA	PK66022/UK42410	None	For more information, see “ODBA coexistence considerations” on page 105.
PSB library	<ul style="list-style-type: none">PM23840/UK64012PM32548/UK65496	<ul style="list-style-type: none">PM23843/UK64013PM32390/UK65495PM35639/UK66632	For more information, see “PSB library coexistence considerations” on page 106.

Table 11. APARs and PTFs needed for IMS Version 12 coexistence with IMS Version 10 and IMS Version 11 (continued)

IMS Version 12 function	IMS Version 10 coexistence APAR/PTF	IMS Version 11 coexistence APAR/PTF	Additional information
IMS repository enhancements	<ul style="list-style-type: none"> PM19025/UK63960 PM32951/UK68883 	<ul style="list-style-type: none"> PM19026/UK63964 PM32766/UK68882 	For more information, see Chapter 11, “IMS repository function enhancements,” on page 159.

Determining which coexistence service needs to be installed

You can identify the outstanding service that needs to be installed on your IMS Version 10 and IMS Version 11 systems to enable them to coexist with IMS Version 12 by using SMP/E and the IMS Version 12 FIXCAT category.

The FIXCAT category for IMS Version 12 is IBM.Coexistence.IMS.V12 with the keyword IMSV12C0EX.

The following is an example of the steps to determine what IMS service needs to be installed on IMS Version 10 or IMS Version 11 to coexist with IMS Version 12:

1. Download the current enhanced HOLDDATA
2. SMP/E RECEIVE the current enhanced HOLDDATA
3. Run the SMP/E REPORT MISSINGFIX command pointing to your IMS Version 10 or IMS Version 11 zone (for example):

```
SET BOUNDARY (GLOBAL) .
REPORT MISSINGFIX ZONES (targetzone)
```

```
FIXCAT(IBM.Coexistence.IMS.V12)
```

Related information:

Enhanced HOLDDATA for z/OS

IBM Fix Category Values and Descriptions

General coexistence considerations

Although IMS Version 12 can coexist with earlier versions of IMS, general coexistence considerations apply.

IMS Version 12 can coexist with earlier versions, so existing applications and data can be used without change. Migration and coexistence support is provided for IMS Version 10 and IMS Version 11.

The following general coexistence considerations apply:

- You must build new application control blocks (ACBs) for all existing program specification blocks (PSBs) and database definitions (DBDs).
- An all-system generation and a cold start are required for online systems (DBCTL, DB/DC, DCCTL). All data sets must be formatted when IMS is initialized the first time.
- If you are installing multiple copies of IMS systems at different release levels in the same processor, the latest version of the IMS SVCs must be used by all the IMS systems.
- The IMS dump formatting module (DFSADFMD0) installed in the host z/OS system must be from the most recent IMS release. The Offline Dump Formatter

from IMS Version 12, IMS Version 11, or IMS Version 10 works without modification, provided the appropriate formatter libraries are used. For more information about installing DFSAFMD0, see “Abend dump formatting exit coexistence considerations.”

- IMS Version 8 uses the IMS module DFSMRCL0 in the host z/OS system as a static resource cleanup module.

All versions later than IMS Version 8 use a dynamic resource cleanup module (DFSMRCL0). You do not need to install the static resource cleanup module (DFSMRCL0) on the host z/OS system for any IMS Version 9 or later system.

The DFSMRCL0 module is still shipped with IMS Version 9 and later systems as a precaution (in case you still have the DFSMRCL0 zap installed in IEAVTRML and the LPA pointing to the IMS SDFSRESL data set directly). The DFSMRCL0 module is available to ensure that z/OS can find it at IPL. DFSMRCL0 is not used by IMS Version 9 and later systems. DFSMRCL0 is needed only when running earlier versions of IMS.

Recommendation: Do not uninstall DFSMRCL0 from releases of IMS earlier than IMS Version 9 until both of the following conditions are true:

- Your migration to IMS Version 9 or later is complete.
- There is no possibility that you will run an earlier version of IMS.

DFSMRCL0 and the dynamic resource cleanup module (DFSMRCL0) can coexist on the same system.

- For DB/DC and DCCTL online systems, the MFS format library is a required data set, regardless of whether MFS is used. DBCTL systems do not require an MFS format library.
- Utilities and logs

You might need to change programs that process the log because some log records that are created by database changes have been modified. For a list of the log records that are new, deleted, or changed for IMS Version 12, see Chapter 7, “New, changed, and deleted log records,” on page 117.

- **Extended checkpoint restriction:** You cannot use extended checkpoint to restart applications across different releases of IMS.

Specific coexistence considerations

Functional areas of or enhancements to IMS Version 12 have specific coexistence considerations.

The following topics describe specific coexistence considerations for IMS Version 12.

Abend dump formatting exit coexistence considerations

IMS Version 12 dynamically installs theabend dump formatting exit module (DFSADMD0) during IMS startup. If you use IMS Version 10, or use both IMS Version 12 and IMS Version 10, you must still install the DFSADMD0 module as part of the IMS installation if you want to use IMS online dump formatting.

The DFSADMD0 module must be the highest version prior to IMS Version 12. When all IMS systems (control region and batch regions) are IMS Version 11 or later, you can remove DFSADMD0 from SYS1.LPALIB and from the IEAVADFM CSECT of z/OS module IGC0805A.

For more information about the IMSabend dump formatting exit routine, see Binding theabend formatting routine.

Common Queue Server coexistence considerations

Restrictions limit whether Common Queue Servers (CQSs) from earlier versions of IMS can coexist.

The following coexistence considerations exist for CQS:

- A Version 10 IMS or a Version 11 IMS can register with an IMS Version 12 CQS.
- A Version 12 IMS cannot register with a pre-IMS Version 12 CQS.
- A Version 11 IMS cannot register with a pre-IMS Version 11 CQS.
- A Version 10 IMS cannot register with a pre-IMS Version 10 CQS.
- User or vendor-written CQS clients that want to register with an IMS Version 12 CQS must be compiled with the IMS Version 10 or later CQS macros.
- User or vendor-written CQS clients that are compiled with the IMS Version 12 CQS macros cannot register with a pre-IMS Version 12 CQS.
- User or vendor-written CQS clients that are compiled with the IMS Version 11 CQS macros cannot register with a pre-IMS Version 11 CQS.
- User or vendor-written CQS clients that are compiled with the IMS Version 10 CQS macros cannot register with a pre-IMS Version 10 CQS.
- An IMS Version 10 CQS, an IMS Version 11 CQS, and an IMS Version 12 CQS can connect to the same coupling facility structure.
- Any supported version of CQS can run on the same central processing complex (CPC).

For example:

- An IMS Version 12 CQS supports clients that are assembled with the IMS Version 10, IMS Version 11, or IMS Version 12 CQS macros.
- A client that is assembled with the IMS Version 12 CQS macros can register only with an IMS Version 12 CQS. The IMS Version 12 client cannot register with an IMS Version 10 or an IMS Version 11 CQS. Similarly, a client that is assembled with the IMS Version 11 CQS macros cannot register with an IMS Version 10 CQS.

Database Recovery Control (DBRC) coexistence considerations

An IMS Version 12 DBRC can coexist with an IMS Version 10 DBRC or an IMS Version 11 DBRC if you install the DBRC coexistence small programming enhancements (SPEs) to the IMS Version 10 or IMS Version 11 systems, and upgrade your RECON data set to the IMS Version 12 format by issuing a `CHANGE.RECON UPGRADE` command. Additional coexistence considerations apply to other DBRC functions.

SPEs are available for IMS Version 10 and IMS Version 11 that enable the coexistence of the earlier version DBRC with DBRC for IMS Version 12. With the appropriate SPE installed, IMS Version 12 and earlier version DBRCs can share the upgraded RECON data set. If the RECON data set has not been upgraded to IMS Version 12, the SPE has no effect. After the RECON data set has been upgraded, the SPE enables DBRC to convert records to the appropriate release format, depending on whether the record is being written to or the record is being read from the RECON data set. The SPE does not, however, enable the earlier level DBRC for the new functions delivered with DBRC in IMS Version 12.

The following coexistence SPEs must be installed to the IMS Version 10 or IMS Version 11 DBRC for coexistence purposes:

- IMS Version 10: PM05243/UK62970
- IMS Version 11: PM05244/UK62971

Restriction: After a RECON data set is upgraded to the IMS Version 12 level, it is not accessible to any pre-IMS Version 12 system that does not have the DBRC Coexistence SPE installed.

The MINVERS level must be set to the lowest level of IMS that uses or shares the RECON data sets.

Attention: Set a region size of 0M for all pre-IMS Version 12 Log Archive utility (DFSUARC0) jobs when an upgraded RECON data set is used. Unpredictable results can occur for any DBRC job that reads, writes, or changes any RECON record when inadequate storage is available for the job.

DBRC application coexistence considerations

There are two versions of each DBRC API (DSPAPI) macro: Version 1.0 (delivered with IMS Version 9) and Version 2.0 (delivered with IMS Version 10 and later). DBRC applications compiled with the Version 1.0 DSPAPI macros work without modification or reassembly with Version 2.0 of the DBRC API. However, these applications cannot use any of the newer functions (such as AUTH) or newer options (such as READONLY=YES) that are supported in the Version 2.0 macros.

For IMS Version 9, the default version level of the DSPAPI macros is 1.0. For IMS Version 10 and later, the default version level of the DSPAPI macros is 2.0. If a DBRC application that was originally assembled with the version 1.0 macros is reassembled using an IMS Version 10 or later macro library, and does not specify VERSION=1.0, the application might not work as expected because of the default version change.

Recommendation: If the functionality of an IMS Version 9 DBRC application remains unchanged and is reassembled using an IMS Version 10 or later macro library, specify VERSION=1.0 on the DSPAPI macros.

The enhancements in Version 2.0 of the DBRC API are available only with IMS Version 10 and later. These enhancements can be used only by DBRC applications that are compiled with Version 2.0 or later of the DBRC API.

The output blocks for the IMS Version 12 DBRC API requests contain more information than the output blocks for earlier-version API requests. DBRC applications must use the latest maps to access the additional information.

In a coexistence environment, the RECON data set can be managed (read, updated, and so on) using the functions that each sharing DBRC supports. For example, a shared RECON data set could be:

- Updated by a DBRC instance using the batch DBRC commands that are processed by the Database Recovery Control (DBRC) utility (DSPURX00), and queried by using the Query requests through Version 1.0 of the DBRC API
- Updated or queried by an IMS Version 10 or later DBRC using either the batch DBRC commands or API requests through Version 2.0 of the DBRC API

DRA coexistence considerations

The version of the IMS DRA modules that are used by a DRA client must be the same version as the IMS with which the DRA client is communicating. A DRA

client that communicates with multiple versions of IMS must use the appropriate version of the IMS DRA modules for each version of IMS.

The database resource adapter (DRA) enhancement that was introduced in IMS Version 10 enables IMS to allocate the PCB list that the DRA passes to applications in 31-bit addressable storage. The IMS Version 10 and later DRA startup table option PCBLOC=31 causes the PCB address list and the PCBs to be placed above the 16 MB line. This placement is incompatible with AMODE 24 applications.

When IBM CICS Transaction Server for z/OS connects to DBCTL, IMS returns an indicator if PCBLOC=31 is in effect. If the PSB is AMODE 24 and PCBLOC=31 is in effect, IBM CICS Transaction Server for z/OS abends the application with a CICS abend code ADCF during the schedule of the PSB.

IBM CICS Transaction Server for z/OS Version 3.1 and IBM CICS Transaction Server for z/OS Version 3.2 require the installation of APAR/PTF PK54100/UK30299/UK30300 to cause the abend.

Recommendations:

- Concatenate the IMS.SDFSRESL library to the DRA client step library so the correct version of the DRA Startup/Router routine (DFSPRRC0) is loaded into the DRA client load library.
- Ensure that the DRA Startup Table (DFSPZPxx) points to the correct version of IMS.SDFSRESL.

Database utility coexistence considerations

Coexistence restrictions apply to the use of some database utilities.

When the IMS Version 12 Database Change Accumulation utility (DFSUCUM0) must coexist with other versions of IMS, the following APARs must be installed:

- Version 10 - PM37034/UK67282
- Version 11 - PM37033/UK67281

JCL from earlier versions of IMS might need to be changed because IMS Version 12 DBRC uses time-stamp precision to the microsecond.

Recommendation: Use DBRC with all IMS Version 12 database change accumulation and database recovery jobs, especially during migration and coexistence.

Attention: Other utility programs (such as Log Merge and Log Analysis) work properly only when they process data that was created by an IMS subsystem or batch application program that is at the same release level as the utility program. Otherwise, the results are unpredictable and the output is unreliable.

Restrictions:

- IMS Version 12 utilities must be used whenever the input data for a DBDS contains log, image copy, or change accumulation records created by the IMS Version 12 system.
- Log records generated by a particular version of IMS must use that same version (or later) of the Database Recovery (DFSURDB0) and Database Change Accumulation (DFSUCUM0) utilities to process those logs. For example, the IMS Version 11 utilities can process either IMS Version 10 or IMS Version 11 log records, but cannot process IMS Version 12 log records.

Dynamic resource definition coexistence considerations

Coexistence considerations for dynamic resource definition (DRD) exist for changes to several type-2 commands, how the Destination Creation exit routine (DFSINSX0) supports IMSplexes that are enabled for DRD and RDDSs.

The Destination Creation exit routine (DFSINSX0) supports an IMSplex in which some systems are enabled for DRD and some are not. If the DFSINSX0 exit routine is set up to create runtime resource definitions (and the same exit is used across the IMSplex), the routing behavior differs, depending on whether the master is enabled for DRD or not. If the master has DRD enabled, the created definition is routed to one or all IMS systems in the IMSplex. If the master does not have DRD enabled, you cannot route the created definition to other IMS systems in the IMSplex. The local exit creates the definition for a local DRD-enabled system.

With the appropriate coexistence APAR applied and all IMS systems using an RDDS, IMS Version 12 can coexist with either IMS Version 10 or IMS Version 11. The coexistence APARs/PTFs for RM are:

- IMS Version 10 - PM19025/UK63960 and PM32951/UK68883
- IMS Version 11 - PM19026/UK63964 and PM32766/UK68882

When an instance of IMS Version 12 is using an IMSRSC repository and is coexisting with an earlier-version IMS that is using an RDDS, changes to online resources or descriptors made on the IMS Version 12 system are not exported to the earlier-version RDDS unless an EXPORT DEFN TARGET(RDDS) command is issued.

Recommendation: When changes are made to DRD runtime resources or descriptors in a multi-version IMSplex, store the definitions for those resources and descriptors in the IMSRSC repositories and RDDS as appropriate.

Restriction: Only IMS Version 12 or later systems can use the IMS repository function.

Related concepts:

 [IMS repository function coexistence considerations \(Release Planning\)](#)

Exit routine coexistence considerations

Exit routines that run in IMS Version 10 or IMS Version 11 will work without modification in IMS Version 12. They will not, however, be able to use the latest functions without being modified.

The Standard User Exit Parm List (SXPL) that exit routines use changes with each version of the list. The user exit enhancements in IMS Version 11, which are delivered through the IMS service process, introduce version 6 of the list (SXPLVER6).

Exit routines that run in multiple versions of IMS must be sensitive to the version of the SXPL. For example, an exit routine that runs in a mixed-version IMSplex that wants to access the SXPLASCD field in the SXPL must look for SXPLVER5 or later.

For more information about migrating exit routines from IMS Version 10 or IMS Version 11 to IMS Version 12, see “Exit routine migration considerations” on page 74.

Fast Database Recovery (FDBR) coexistence considerations

An FDBR region must be at the same release level as the IMS system that it is tracking. As of IMS Version 10, FDBR JCL is simplified. An FDBR region no longer requires MODBLKS DD statements (even if dynamic resource definition is not enabled). MODBLKS definitions are acquired from the checkpoint log records. MODBLKS definitions can be removed from the FDBR JCL.

Fast Path coexistence considerations

The IMS Version 12 Fast Path function of IMS has certain considerations for coexistence with earlier versions.

If the Operations Manager (OM) issues either an UPDATE AREA START(ACCESS) OPTION(OPEN) command or an UPDATE DB AREA(*) START(ACCESS) OPTION(OPEN) command in an IMSplex that includes IMS Version 10 or earlier IMS systems, the parameter OPTION(OPEN) is processed only on the IMS Version 11 and later systems. The parameter is ignored by IMS Version 10 and earlier IMS systems.

HALDB OLR coexistence considerations

Coexistence restrictions apply to the use of the High Availability Large Database (HALDB) online reorganization (OLR) process.

When IMS Version 12 is coexisting with other versions of IMS and you want to use the OLR ownership release function, the following service must be installed:

- Version 10 - APAR/PTF PM31789/UK67484
- Version 11 - APAR/PTF PM31791/UK67485

Image copy coexistence considerations

Image copies taken using the fast replication option (available in IMS Version 10 and later) of the Database Image Copy 2 utility cannot be used by IMS Version 9 except for list or query processing.

IMS catalog coexistence considerations

Although there are no coexistence considerations for IMS catalog, all systems that use this function must be IMS Version 12 or later. Also, the utilities that populate the IMS catalog must be at the same version as the ACBLIB. After the IMS catalog is populated, any IMS version that has the catalog function enabled can access the IMS catalog.

IMS repository function coexistence considerations

The IMS repository function in IMS Version 12 can coexist with lower-level versions of IMS.

With the appropriate coexistence APARs/PTFs installed, an IMS Version 12 that uses DRD can coexist with either an IMS Version 10 or IMS Version 11 that have DRD enabled.

Two possible scenarios for keeping stored resource definitions synchronized across multi-version IMSplexes are shown as follows:

Scenario 1: Making attribute changes in a mixed environment of IMS systems that use RDDS and IMSRSC repository

In this scenario:

- IMSA is running IMS Version 10, using DRD with an RDDS.
- IMSB is running IMS Version 11, using DRD with an RDDS.
- IMSC is running IMS Version 12 and using DRD with an IMSRSC repository.
- All three IMS systems are in the same IMSplex and using shared queues.

The following steps illustrate changing an attribute of a transaction and storing its resource definition for scenario 1.

1. Check for work in progress by issuing a QRY TRAN SHOW(WORK) command. Either wait for the work to finish or address the work in progress.
2. When the transaction is not in use, an attribute of a transaction is changed on each IMS system by issuing an UPDATE or CREATE command.
3. IMSA and IMSB store the changed resource definition into their respective RDDSs by issuing the EXPORT command. IMSC stores the changed resource definition into its IMSRSC repository by issuing the EXPORT command.
4. Work for the transaction is restarted.

Scenario 2: Changing a transaction definition on one IMS and propagating the change to the other IMS systems

In this scenario:

- IMSA is running IMS Version 10, using DRD with an RDDS, and using an IMS Version 12 CSL.
- IMSB is running IMS Version 11, using DRD with an RDDS, and using an IMS Version 12 CSL.
- IMSC and IMSD are running IMS Version 12 and are using DRD with a single IMSRSC repository.
- All four IMS systems are participating in shared queues.

The following steps illustrate changing an attribute of a transaction and storing its resource definition for scenario 2.

1. Check for work in progress by issuing a QRY TRAN SHOW(WORK) command. Either wait for the work to finish or address the work in progress.
2. When the transaction is not in use, change an attribute of the transaction on IMSC by issuing an UPDATE command.
3. Store the changed transaction definition in the IMSRSC repository for IMSC and IMSD by issuing the EXPORT command from IMSC.
4. Update the runtime definition of the transaction on IMSD by importing the stored resource definition from the IMSRSC repository by issuing the IMPORT command
5. Export the changed transaction definition from IMSC to a non-system RDDS by issuing the EXPORT command.
6. Update the runtime definition of the transaction on IMSA and IMSB by importing the stored resource definition from the non-system RDDS by issuing the IMPORT command.
7. Export the changed transaction definition from IMSA and IMSB to their respective system RDDSs by issuing the EXPORT command.
8. Work for the transaction is restarted.

Coexistence with IMS Version 11

The following APARs/PTFs must be installed in an IMS Version 11 system for an IMS Version 12 RM to coexist with an IMS Version 11 RM:

- IMS Version 11 APARs PM19026/UK63964 and PM32766/UK68882

Coexistence with IMS Version 10

The following APARs/PTFs must be installed in an IMS Version 10 system for an IMS Version 12 RM to coexist with an IMS Version 10 RM:

- IMS Version 10 APARs PM19025/UK63960 and PM32951/UK68883

IMS synchronous callout function coexistence considerations

There are no coexistence considerations for application programs that use the synchronous callout function in IMS Version 12 exclusively within IMS Version 12 or IMS Version 11. However, if you want to deploy that application program from IMS Version 12 or IMS Version 11 to an IMS Version 10 system, you must enable the synchronous callout function in the IMS Version 10 system.

To enable the synchronous callout function in IMS Version 10, you must install the following IMS and IMS Connect APARs/PTFs:

- Preconditioning APARs/PTFs PK70078/UK40363, PK73224/UK40813, and PK70330/UK40215.
- Activation APARs/PTFs PK71135/UK42415, PK74168/UK42459, and PK75824/UK43077.
- To issue a synchronous callout request from JBP or JMP address spaces, you also must install APAR/PTF PK75209/UK45249 and download the Sun Java Message Service (JMS) 1.1 JAR file. Go to <http://www.oracle.com/technetwork/java/jms/> and download the version 1.1 API documentation, JAR file, and source.
- To use the IMS TM Resource Adapter for synchronous callout processing, you must also install APAR/PTF PK75460/UK43595.

IMS Connect support coexistence considerations

The IMS Version 12 IMS Connect function supports IMS Version 11 and IMS Version 10, although new functions might not be available when connecting with the older versions.

The following considerations might apply:

- The IMS Connect function of IMS Version 12 supports the assignment of data store connections to different super member queues in any version of IMS that supports OTMA super member queues.
- An IMS Version 12 IMS Connect can coexist with an IMS Version 11 or IMS Version 10 system with the following considerations:
 - IMS Version 12 introduces new and changed IMS type-2 commands for IMS Connect. If a type-2 command is broadcast to an IMSplex in which multiple versions of IMS Connect coexist, the IMS Version 11 and earlier instances of IMS Connect ignore the command, unless the command is routed specifically to an IMS Version 10 or earlier instance of IMS Connect, in which case, the Operations Manager (OM) rejects the command.
 - IMS Connect instances that do not specify a TCP/IP KeepAlive value on the port will continue to use the TCP/IP stack setting.
 - IMS Connect instances can specify ports both with and without the Port Input/Output Edit exit.

- The IMS Connect instance can use the default OTMA queue name or specify the CM0ATOQ parameter for the OTMA CM0 ACK Timeout Support.
- IMS Connect will still accept sessions from the IMS TM Resource Adapter, both with and without Client IDs.
- Obsolete user exits (HWSIMSO0 and HWSIMSO1) are removed and can no longer be used. You must either change the exit that is requested by your clients or create new versions of HWSIMSO0 and HWSIMSO1 from the samples that are provided as source (HWSSMPL0 and HWSSMPL1).
- The IMS Connect XML-to-COBOL conversion support in IMS Version 12 can coexist with IMS Version 10 the following requirements are met:
 - You must have the copybook for the COBOL IMS application program that processes the input messages from the IMS Enterprise Suite SOAP Gateway (an XML-based messaging protocol).
 - You must increase the IMS Connect region size to accommodate the storage used by the XML converters. The XML converters run in a Language Environment for z/OS enclave in the IMS Connect region and use approximately 33 MB of storage.

Java application coexistence considerations

Coexistence considerations apply to Java applications that use DB2 UDB for z/OS Version 8.

To enable Java Dependent Regions to access DB2 UDB for z/OS Version 8 (program number 5625-DB2), APAR/PTF PQ74629/UQ77540 must be applied to DB2.

ODBA coexistence considerations

The ODBA interface from earlier versions of IMS can coexist with IMS Version 12 without modification. To take advantage of the additional functionality in the IMS Version 11 and later ODBA, you must apply the appropriate coexistence APAR.

To enable an IMS Version 10 ODBA application to use the IMS Version 12 ODBA interface:

1. Apply the coexistence APAR/PTF:
 - For IMS Version 10: PK66022/UK42410
2. Optional: Simplify the ODBA applications by replacing multiple CIMS INIT commands with a single CIMS CONNECT command.

Open Database enhancements coexistence considerations

To use the Open Database enhancements in conjunction with an IMS Version 10 system, you must apply coexistence APAR/PTF PK66022/UK42410.

The IMS Universal drivers that come with IMS Version 12 can be used by Java applications that access IMS Version 11 databases as long as the IMS Version 11 systems are part of a mixed-version IMSplex that includes an IMS Version 12 system (along with its ODBM and IMS Connect address spaces).

The IMS Universal drivers can be used by Java applications that access IMS Version 10 databases as long as the IMS Version 10 systems are part of a mixed-version IMSplex that includes an IMS Version 12 system (along with its ODBM and IMS Connect address spaces) and coexistence APAR/PTF PK66022/UK42410 is installed.

IMS Version 10 ODBA applications can use the IMS Version 12 ODBA interface as long as the coexistence APAR is installed to the IMS Version 10 system. Optionally, the IMS Version 10 ODBA applications can be simplified by replacing multiple CIMS INIT commands with a single CIMS CONNECT command to connect to more than one IMS DB subsystem.

OTMA coexistence considerations

When an IMS Version 12 OTMA coexists with earlier versions, certain considerations apply.

If the OTMA transaction expiration function is activated by OTMA clients, you must ensure that the target IMS for the transaction is running IMS Version 11 or later. If the target IMS is IMS Version 10, the expiration request is ignored by IMS.

PSB library coexistence considerations

The vector tables in the PSB library are larger in IMS Version 12 and later than in previous versions.

The following coexistence APARs/PTFs are provided to enable IMS Version 10 and IMS Version 11 jobs to process an IMS Version 12 PSB library:

- IMS Version 10 - PM23840/UK64012, and PM32548/UK65496
- IMS Version 11 - PM23843UK64013, PM32390/UK65495, and PM35639/UK66632

Remote Site Recovery (RSR) coexistence considerations

RSR coexistence supports configurations that meet certain version level requirements.

IMS Version 12 RSR coexistence supports configurations in which:

- The tracking site Transport Manager Subsystem (TMS) is at the IMS Version 12 level and the active site is at IMS Version 10 or IMS Version 11 level.
- The active site RECON data sets are at the IMS Version 10 or IMS Version 11 level (with the IMS Version 12 DBRC coexistence SPE applied).
- The active TMS that is running ILS is at the IMS Version 10 or IMS Version 11 level.
- One or more active IMS systems are at the IMS Version 10 or IMS Version 11 level.

The following table describes the supported configurations of a simple set of subsystems in an RSR Global Service Group (GSG). Some unsupported configurations are not included because a prerequisite configuration is also not supported. Some unsupported configurations are included even though a prerequisite configuration is supported so that the reason for non-support can be explained.

The simple set of configurations in the table assumes:

- A single active IMS
- A single TMS that is running the Isolated Log Transport
- A single set of active site RECON data sets
- A single tracking IMS
- A single remote site TMS
- A single set of remote site RECON data sets

The table also describes valid and invalid RSR coexistence configurations. The following notation is used to denote the state of the subsystems and RECON data sets in this table:

- pre-V12: IMS Version 10 or IMS Version 11
- pre-V12 + SPE: IMS Version 10 or IMS Version 11, with the appropriate IMS Version 12 DBRC coexistence SPE applied
- V12: IMS Version 12

Table 12. Valid RSR coexistence subsystem configurations and migration progression.

Active site state			Remote site state			Notes
IMS	TMS/ILS	RECON	IMS	TMS	RECON	
pre-V12	pre-V12	pre-V12	pre-V12	pre-V12	pre-V12	Supported.
pre-V12 + SPE	pre-V12	pre-V12	pre-V12	pre-V12	pre-V12	Supported.
pre-V12 + SPE	V12	V12	pre-V12	pre-V12	pre-V12	Supported.
pre-V12	V12	pre-V12	pre-V12	pre-V12	pre-V12	Not supported. The local TMS/ILS cannot be migrated to IMS Version 12 if the RECON data sets have not been upgraded to IMS Version 12.
pre-V12 + SPE	pre-V12 + SPE	pre-V12	pre-V12	pre-V12	pre-V12	Supported.
V12	pre-V12 + SPE	pre-V12	pre-V12	pre-V12	pre-V12	Not supported. The RECON data sets must be upgraded to IMS Version 12 before running any IMS at the IMS Version 12 level. The active IMS cannot be at the IMS Version 12 level if the local site TMS that is running ILS is not at the same version level. The local site IMS cannot be at a later version level than the remote IMS.
pre-V12 + SPE	pre-V112 + SPE	V12	pre-V12	pre-V12	pre-V12	Supported.
pre-V12	V12	V12	pre-V12	pre-V12	pre-V12	Not supported. The local site TMS that is running ILS cannot be at the IMS Version 12 level if the tracking IMS is at the pre-Version 12 level. Also, if the active RECON is at IMS Version 12, the IMS must have the SPE applied.
V12	V12	V12	pre-V12	pre-V12	pre-V12	Not supported. The local site TMS that is running ILS and the active IMS cannot be at the IMS Version 12 level if the tracking IMS is at the pre-Version 12 level. The active IMS also cannot be at the IMS Version 12 level.
pre-V12	pre-V12	pre-V12	pre-V12 + SPE	pre-V12	pre-V12	Supported.
pre-V12 + SPE	pre-V12	pre-V12	pre-V12 + SPE	pre-V12	pre-V12	Supported.
pre-V12 + SPE	pre-V12 + SPE	pre-V12	pre-V12 + SPE	pre-V12	pre-V12	Supported.

Table 12. Valid RSR coexistence subsystem configurations and migration progression (continued).

Active site state			Remote site state			Notes
IMS	TMS/ILS	RECON	IMS	TMS	RECON	
V12	pre-V12 + SPE	V12	pre-V12 + SPE	pre-V12	pre-V12	Not supported. An active IMS cannot be at the IMS Version 12 level if the tracking IMS is not at the IMS Version 12 level. The active site TMS that is running ILS also cannot be at the pre-Version 12 level or at the pre-Version 12 + SPE level. 1
pre-V12	pre-V12 + SPE	pre-V12	pre-V12 + SPE	pre-V12	pre-V12	Supported 1.
pre-V12 + SPE	pre-V12 + SPE	pre-V12	pre-V12 + SPE	pre-V12	pre-V12	Supported 1.
pre-V12 + SPE	pre-V12 + SPE	V12	pre-V12 + SPE	pre-V12	pre-V12	Supported 1.
pre-V12 + SPE	pre-V12 + SPE	V12	V12	pre-V12	pre-V12	Not supported. The tracking IMS cannot be at the IMS Version 12 level if the remote site RECON data sets are not upgraded to IMS Version 12. 1 2
pre-V12 + SPE	pre-V12 + SPE	V12	pre-V12 + SPE	pre-V12 + SPE	V12	Supported.
V12	pre-V12 + SPE	V12	pre-V12 + SPE	pre-V12 + SPE	V12	Not supported. The active IMS cannot be at the IMS Version 12 level if neither the tracking IMS nor the active site TMS that is running ILS is not at the IMS Version 12 level.
pre-V12 + SPE	pre-V12 + SPE	V12	V12	V12	V12	Supported.
V12	pre-V12 + SPE	V12	V12	V12	V12	Not supported. The active IMS cannot be at the IMS Version 12 level if the active site TMS that is running ILS is not at the IMS Version 12 level.
pre-V12 + SPE	V12	V12	V12	V12	V12	Supported.
V12	V12	V12	V12	V12	V12	Supported.

Note:

1. The remote site TMS can also be at the IMS Version 10 or IMS Version 11 level.
2. Regardless of the configuration of the active site subsystems and the RECON data sets, this state is not supported.

Shared message queue coexistence considerations

Instances of IMS Version 10, IMS Version 11, and IMS Version 12 can share an IMS message queue in an IMSplex.

Sysplex serialized program management coexistence considerations

IMS Version 12 supports sysplex serialized program management.

As of IMS Version 12 APAR/PTF PM31422/UK70974, you can control the sysplex serial program management feature using the GBL_SERIAL_PGM parameter in the

DFSCGxxx member of the IMS PROCLIB data set. Sysplex serial program management requires Shared Queues, RM and RM structures be defined in order to be active. The default is Yes.

Support for sysplex serialized program management is limited to IMS Version 10 and later systems. If an IMSplex includes versions of IMS that do not support sysplex serialized program management, the IMS systems that support it must use the same program management considerations as the IMS systems that do not to prevent serial application programs from being scheduled in parallel. IMS systems earlier than IMS Version 10 cannot use a Resource Manager to manage serial application programs.

Syntax Checker coexistence considerations

The IMS Version 12 Syntax Checker supports IMS Version 10, IMS Version 11, and IMS Version 12.

Be sure that the version shown is correct when you use the Syntax Checker to check the parameters of earlier versions.

Restrictions for IMS Version 12 during coexistence

There are no general restrictions for IMS Version 12 in a coexistence environment; however, certain restrictions apply to new functions.

The database quiesce function can be used only after all IMS systems are migrated to IMS Version 11 or later.

Chapter 5. Changes to the IMS library for IMS Version 12

In IMS Version 12, the IMS glossary is delivered differently, information about functions that are no longer supported has been removed, and one publication has been reorganized. In addition, as of IMS Version 11, the IMS publications are no longer provided in BookManager format.

The IMS Version 12 library does not include a *Master Index and Glossary* in PDF book format. Individual book indexes are provided in the PDF books. The IMS glossary is available only in the information center.

Because IMS Version 11 is the last version of IMS that supports the Knowledge Based Log Analysis (KBLA) facility, information about KBLA has been removed from the IMS Version 12 library.

Because IMS Version 9 is the last version of IMS that supports the Security Maintenance utility (SMU), information about the SMU has been removed from the IMS Version 12 library.

IMS Version 10 is the final version of IMS that provides product documentation in the BookManager format. IMS Version 12 product information is provided only in PDF book and HTML (information center) formats.

IMS Version 12 Exit Routines is now organized by the call interface and available services for each group of exit routines, as follows:

IMS control region exit routines

IMS system exits, database manager exits, and transaction manager exit routines. These exit routines use IMS interfaces and callable services, as described in the topic "Overview of exit routines for IMS."

Base Primitive Environment-based exit routines

Exit routines that run in an address space with BPE support, including exit routines for CQS, BPE-based DBRC, and most CSL components. BPE-based exit routines use the interfaces and services provided by the Base Primitive Environment, as described in the topic "BPE user-supplied exit routine interfaces and services."

CQS exit routines

The CQS exit routines are now divided into two groups: those that run in the CQS address space and have access to BPE services are grouped under "BPE-based CQS user-supplied exit routines," and those that run in a CQS client address space are grouped under "CQS client exit routines."

DBRC exit routines

Standard DBRC exit routines are grouped under "IMS system exit routines," while the variants that run in BPE are grouped under "BPE-based DBRC exit routines."

CSL SCI exit routines

CSL SCI exit routines are now divided into two categories: those that run in the CSL SCI address space are grouped under "BPE-based SCL SCI user exit routines," and those that run in the address space of a registered IMSplex member are grouped under "CSL SCI IMSplex member exit routines."

IMS Connect exit routines

IMS Connect exit routines are divided into two categories: those that manage the messages to and from the various types of IMS Connect TCP/IP clients are grouped under “IMS Connect user message exit routines,” and those that provide general functionality, such as security and routing, are grouped under “IMS Connect function-specific exit routines.”

IMS publication packaging

When you order IMS Version 12, you will receive one copy of the entire IMS library on a CD. A PDF of the *Program Directory for Information Management System Transaction and Database Servers V12.0* is also included on the publications CD.

All of the IMS Version 12 information is also available in the Information Management Software for z/OS Solutions Information Center, at <http://publib.boulder.ibm.com/infocenter/imzic>. The information is optimized for viewing in the information center, which also includes books in PDF format.

You can download or order printed copies of any IMS publication from the IBM Publications Center at www.ibm.com/shop/publications/order. You can also download any of the IMS publications in softcopy format from the IMS Library page at www.ibm.com/software/data/ims/library.html.

Chapter 6. New, changed, and deleted messages and abend codes

IMS Version 12 includes new and changed messages and abend codes. No messages or abend codes have been deleted from IMS Version 12.

Messages and codes that were added or changed in earlier versions of IMS are not listed.

For messages and codes that were added or changed through the service process, the APARs or PTFs contain appropriate ++HOLD cards to indicate the updates.

Recommendation: Always check the ++HOLD cards in the service stream for information about new, deleted, or changed messages and abend codes.

New messages and abend codes for Version 12

IMS Version 12 includes new AREA, CQS, CSL, DBD, DFS, DSP, FLD, FRP and other new messages, as well as new abend and AIB (DL/I) codes.

Table 13. New messages and codes for IMS Version 12

AREA, CQS, CSL, and DBD messages	DFS, DSP, and FLD messages		FLD messages (continued)	FRP, PCB, PGEN, SEG, SEGM, and SFLD messages		Other messages	Abend and AIB (DL/I) codes
AREA644	DFS0066	DFS4462E	FLD629	FRP0001E	FRP3105E	DGEN332	0100
AREA645	DFS0287A	DFS4463E	FLD630	FRP0002E	FRP3106E	DMAN600	0062
	DFS0288E	DFS4464E	FLD631	FRP0003E	FRP3107E	DMAN601	0109
CQS0282W	DFS0415W	DFS4465W	FLD632	FRP0006E	FRP3108E	HWSA0375I	0199
	DFS0448W	DFS4466W	FLD633	FRP0007E	FRP3109E	HWSA0380E	0229
CSL0010E	DFS0510E	DFS4467W	FLD634	FRP0008E	FRP3110E	HWSE3130W	0288
CSL0012I	DFS650E	DFS4468E	FLD635	FRP0009E	FRP3111I	HWSE3135W	0400
CSL1000I	DFS0897A	DFS4469W	FLD636	FRP0010E	FRP3112E	HWSE3300I	0670
CSL2500I	DFS1509W	DFS4470W	FLD637	FRP0011E	FRP3113E	HWSE3305I	ODBM 0400
CSL2501I	DFS1512E	DFS4471W	FLD638	FRP0011I	FRP4000E	HWSE3310I	OTMA 0033
CSL2502A	DFS1769W	DFS4472W	FLD639	FRP0012E	FRP4001E	HWSE3315E	DE
CSL2503A	DFS1852W	DFS4473E	FLD640	FRP0013E	FRP4002E	HWSE3330W	SD
CSL2510E	DFS1913I	DFS4474E	FLD641	FRP0014E	FRP4003E	HWSE3340W	0104/0248
CSL2511E	DFS1919I	DFS4475E	FLD642	FRP0015E	FRP4004E	HWSE3345W	0108/0338
CSL2512W	DFS2198E	DFS4476E	FLD643	FRP0016E	FRP4005E	HWSE3370E	0108/033C
CSL2513E	DFS2199E	DFS4477E	FLD644	FRP0017E	FRP4006E	HWSE3375E	0108/0340
CSL2514E	DFS2291I	DFS4478E	FLD645	FRP0018E	FRP4008E	HWSE3400E	0108/0342
CSL2515E	DFS2292E	DFS4479E	FLD646	FRP0019E	FRP4009E	HWSE3405W	0108/0344
CSL2516E	DFS2293E	DFS4480E	FLD647	FRP0020E	FRP4010E	HWSE1601W	0108/0900
CSL2517E	DFS2294E	DFS4481E	FLD648	FRP0021E	FRP4022E	HWSE1650I	
CSL2518E	DFS2295E	DFS4482E	FLD649	FRP0022E	FRP4031E	HWSE1655W	
CSL2600I	DFS2341I	DFS4483E	FLD650	FRP0023I	FRP4032E	HWSE1660E	
CSL2601E	DFS2366E	DFS4484E	FLD651	FRP0024E	FRP4040W	HWSE1665E	
CSL2602E	DFS2367E	DFS4485E	FLD652	FRP0025I	FRP4041E	HWSE0538E	
CSL2603I	DFS2384W	DFS4486E	FLD653	FRP0026I	FRP4042E	HWSE0540E	
CSL2604E	DFS2404A	DFS4487E	FLD654	FRP0027I	FRP4043E	HWSE1501I	
CSL2605E	DFS2406I	DFS4488W	FLD655	FRP0028E	FRP4044E	HWSE1504I	
CSL2606E	DFS3254I	DFS4489W	FLD656	FRP0029E	FRP4045E	HWSE1506I	
CSL2607E	DFS3175E	DFS4490W	FLD657	FRP0030E	FRP4046E	HWSE1507E	
CSL2608E	DFS3176E	DFS4491W	FLD658	FRP0031E	FRP4273E	HWSE0777W	
CSL2609E	DFS3177E	DFS4492W	FLD659	FRP0032E	FRP4700E	HWSE3500I	
CSL2610E	DFS3178E	DFS4493W	FLD660	FRP0033E	FRP4701E	HWSE3505I	

Table 13. New messages and codes for IMS Version 12 (continued)

AREA, CQS, CSL, and DBD messages	DFS, DSP, and FLD messages		FLD messages (continued)	FRP, PCB, PGEN, SEG, SEGM, and SFLD messages		Other messages	Abend and AIB (DL/I) codes
CSL2611E	DFS3189W	DFS4494E	FLD661	FRP0033I	FRP4702E	HWST3510E	
CSL2612E	DFS3216A	DFS4495E	FLD662	FRP0034E	FRP4703E	HWST3515E	
CSL2613E	DFS3248W	DFS4496E	FLD663	FRP0035E	FRP4704E	HWST3520E	
CSL2614E	DFS3249W	DFS4497E	FLD664	FRP0036E	FRP4705E	HWST3525I	
CSL2615E	DFS3251W	DFS4498W	FLD665	FRP0037I	FRP4706E	HWST3530W	
CSL2616E	DFS3252I	DFS4499E	FLD666	FRP0038I	FRP4710E	HWST3540E	
CSL2617E	DFS3253I	DFS4810I	FLD667	FRP0039I	FRP4711E	HWST3545E	
CSL2618I	DFS3347A	DFSIX107	FLD668	FRP0040E	FRP4712E	HWST3550W	
CSL2619E	DFS3406I	DSP1118I	FLD669	FRP0041W	FRP4713E	HWST3560W	
CSL2620I	DFS3407E	DSP1119I	FLD670	FRP1001E	FRP4714E	HWST3570E	
CSL2621E	DFS3409I	DSP1190W	FLD671	FRP1002E	FRP4715E	HWST3575W	
CSL2622E	DFS3511I	DSP1223E	FLD672	FRP1005E	FRP4716E	HWST3600E	
CSL2625I	DFS3678E	DSP1225I	FLD673	FRP1007E	FRP4717E	HWST3700E	
CSL3120E	DFS3685I	DSP1227E	FLD674	FRP1008E	FRP4718E	HWST3730W	
CSLM130I	DFS3686I	DSP1228I	FLD675	FRP1009E	FRP4719E	HWST3735W	
DBD200	DFS3687I	DSP1229A	FLD676	FRP1010E	FRP4720E	HWX0920W	
DBD210	DFS4147E	DSP1230I	FLD677	FRP1011E	FRP4721E	LCHD230	
DBD600	DFS4148I	DSP1231W	FLD678	FRP1012E	FRP4730E	LCHD240	
DBD601	DFS4149W	DSP1232I	FLD679	FRP1015E	FRP4733W	LCHD241	
DBD602	DFS4350E	DSP1233I	FLD680	FRP1016E	FRP4734W	LCHD242	
DBD603	DFS4351E	DSP1235W	FLD681	FRP1018E	FRP4736W	LCHD243	
DBD770	DFS4352E	DSP1236E	FLD682	FRP1019E	FRP4737I	LCHD244	
	DFS4353I	DSP1238I	FLD683	FRP2001I	FRP4739W	LCHD245	
	DFS4354E	DSP1239I	FLD684	FRP2002I	FRP4740E	LCHD246	
	DFS4355E	DSP1240E	FLD685	FRP2003I	FRP4741W	XDFLD115	
	DFS4356I	DSP1242E	FLD686	FRP2004I	FRP4750I	XDFLD116	
	DFS4357E	DSP1243W	FLD687	FRP2005I	FRP4751I	XDFLD230	
	DFS4358E	DSP1244E	FLD692	FRP2007I	FRP4752I	XDFLD231	
	DFS4359E	DSP1245W	FLD700	FRP2011E	FRP4753I	XDFLD232	
	DFS4360E	DSP1246E	FLD701	FRP2012I	PCB234	XDFLD233	
	DFS4361E	DSP1247W	FLD702	FRP2013I	PCB235	XDFLD234	
	DFS4362E	DSP1252E	FLD703	FRP2014I	PCB236	XDFLD235	
	DFS4363E	DSP1253W	FLD705	FRP2015I	PCB237	XDFLD236	
	DFS4364E		FLD706	FRP2016I	PCB600	XDFLD237	
	DFS4365E	FLD600	FLD707	FRP2017I	PCB601	XDFLD240	
	DFS4366E	FLD601	FLD710	FRP2018E	PCB602	XDFLD241	
	DFS4367E	FLD602	FLD711	FRP2020I	PCB603	XDFLD242	
	DFS4368E	FLD603	FLD712	FRP2021I	PCB605	XDFLD243	
	DSF4400E	FLD604	FLD713	FRP2022E	PGEN600	XDFLD244	
	DFS4401E	FLD605	FLD714	FRP2023E	PGEN601	XDFLD245	
	DFS4402W	FLD606	FLD715	FRP2024E	SEG600	XDFLD246	
	DFS4403E	FLD607	FLD716	FRP2025I	SEG601	XDFLD247	
	DFS4404I	FLD608	FLD717	FRP2026I	SEGM600	XDFLD248	
	DFS4405W	FLD609	FLD730	FRP2027E	SEGM601	XDFLD249	
	DFS4406E	FLD610	FLD731	FRP2028E	SEGM602	XDFLD250	
	DFS4407A	FLD611	FLD732	FRP2029E	SEGM603	XDFLD251	
	DFS4407E	FLD613	FLD733	FRP2030E	SEGM604		
	DFS4419I	FLD614	FLD734	FRP2031I	SEGM605		
	DFS4420E	FLD616	FLD735	FRP2032I	SEGM607		
	DFS4421E	FLD617	FLD738	FRP2034I	SEGM608		
	DFS4422E	FLD618	FLD739	FRP2100I	SEGM610		
	DFS4423E	FLD619	FLD740	FRP2101I	SEGM611		
	DFS4424E	FLD620	FLD741	FRP2102I	SFLD600		
	DFS4425E	FLD621	FLD742	FRP2103I	SFLD601		
	DFS4426I	FLD622	FLD743	FRP2104I			
	DFS4427E	FLD623	FLD751	FRP2105I			
	DFS4428E	FLD624	FLD752	FRP2106E			

Table 13. New messages and codes for IMS Version 12 (continued)

AREA, CQS, CSL, and DBD messages	DFS, DSP, and FLD messages		FLD messages (continued)	FRP, PCB, PGEN, SEG, SEGM, and SFLD messages	Other messages	Abend and AIB (DL/I) codes
	DFS4429E	FLD625	FLD753	FRP2107E		
	DFS4430I	FLD626	FLD754	FRP3101E		
	DFS4431I	FLD627	FLD756	FRP3102E		
	DFS4461E	FLD628	FLD997	FRP3103E		
			FLD999	FRP3104E		

Changed messages and abend codes for Version 12

Some messages and abend codes have changed for IMS Version 12.

The following messages and abend codes are changed. An asterisk (*) indicates that the message text is changed.

Table 14. Changed messages and codes for IMS Version 12

BPE, CQS, and CSL messages	DFS messages			DSP and other messages	Abend codes	Component, DL/I, and AIB codes
BPE0045E	DFS030I	DFS0909I	DFS2868W	DSP0012I	AC6	FM
BPE0014E	DFS070	DFS0927I	DFS2930I	DSP0044I	RM 0010	OTMA 002F
	DFS074	DFS0947I	DFS2991E	DSP0049I	0070	OTMA 0035
CQS0350W	DFS110I	DFS1176E	DFS2992E	DSP0087I	0071	CSL ODBM 0010
	DFS154I	DFS1188E	DFS2993E	DSP0144I	0073	CSL ODBM 0400
CSL0001E	DFS216	DFS1269E	DFS2994E	DSP0126I	0080	
CSL0300I	DFS0413I	DFS1922I	DFS2996E	DSP0249I	0101	AC
CSL2502A	DFS0415W	DFS1987I	DFS2997E	DSP0292I	0102	AJ
CSL2503A	DFS0488I	DFS2082	DFS2998E	DSP0313I	0107	AK
CSL2510E	DFS0527A	DFS2088I	DFS3187W	DSP1076I	0168	A6
CSL2511E	DFS554A	DFS2205I	DFS3204	DSP1100I	0182	CG
CSL2518E	DFS0565I	DFS2270	DFS3218	DSP1164E	0369	NA
CSL2621E	DFS0586I	DFS2272	DFS3265I		0407	QC
CSL3114I	DFS627W	DFS2342E	DFS3286W	G018	0427	
CSL3115E	DFS0651W	DFS2419A	DFS3395I	G947	0457	0004/0004
	DFS686W	DFS2482I	DFS3397E		0657	0100/000C
	DFS0730I	DFS2572I	DFS3399I	HWSA0340E	0709	0104/0224
	DFS0733I	DFS2627I	DFS3402W	HWSC0001I	0711	0108/0214
	DFS0738I	DFS2628I	DFS3407E	HWSC0112W	0718	
	DFS0738X	DFS2838I*	DFS3422X	HWSK2805E	0735	
	DFS0757I	DFS2840W	DFS3490I*	HWSR0698W	0737	
	DFS0800I	DFS2842I	DFS3530I		0775	
	DFS0840I	DFS2858E	DFS3688I	LCHD140	0830	
	DFS0842I	DFS2859I	DFS3724I		0844	
	DFS0887A		DFS4342E	MDA022	0845	
			DFS4427E		0929	
			DFS4429E	XDFLD009	1011	
			DFS4489W	XDFLD249	1026	
			DFS4570E	XDFLD300	2482	
			DFS4574W		3041	
					3308	
					3310	
					3368	
					3499	

Table 14. Changed messages and codes for IMS Version 12 (continued)

BPE, CQS, and CSL messages	DFS messages	DSP and other messages	Abend codes	Component, DL/I, and AIB codes
			3303	

Deleted messages and abend codes for Version 12

Messages were removed from IMS Version 12. No abend codes were removed from IMS Version 12.

Table 15. Deleted messages for IMS Version 12

DFS and DFSK messages	DFSK messages (continued)	DFSK messages (continued) and DSP messages
DFS0004I	DFSK406E	DFSK435E
DFS2384E	DFSK408E	DFSK501E
DFSK201E	DFSK409E	DFSK502E
DFSK202I	DFSK410E	DFSK503E
DFSK203E	DFSK411E	DFSK504E
DFSK204E	DFSK412E	DFSK505E
DFSK205E	DFSK413E	DFSK506E
DFSK206E	DFSK414E	DFSK507E
DFSK207E	DFSK415E	DFSK508E
DFSK208E	DFSK416E	DFSK509W
DFSK209E	DFSK417E	DFSK601E
DFSK300E	DFSK418E	DFSK602E
DFSK301E	DFSK419E	DFSK603E
DFSK302E	DFSK420E	DFSK604E
DFSK303E	DFSK421E	DFSK605E
DFSK304E	DFSK422E	DFSK606E
DFSK305E	DFSK423E	DFSK607E
DFSK306E	DFSK424I	DFSK608E
DFSK307E	DFSK425E	DFSK609E
DFSK308E	DFSK426E	DSP1165E
DFSK309E	DFSK427E	
DFSK401E	DFSK428E	DSP1201A
DFSK402E	DFSK430E	
DFSK403E	DFSK431E	
DFSK404I	DFSK432E	
DFSK405E	DFSK433E	
	DFSK434E	

Chapter 7. New, changed, and deleted log records

These log records are new or changed for IMS Version 12.

The following log records are new or changed for IMS Version 12:

Table 16. New or changed log records for IMS Version 12

X'07'	X'56'	X'4507'
X'22'	X'56A'	X'4513'
X'29'	X'220E'	X'5950'
X'50'	X'2910'	X'6701'
X'51'	X'2911	X'67D0'
X'52'	X'4001'	X'9904'
X'53'		

The Fast Path log records are included in ILOGREC if you use ILOGREC RECID=ALL. For a specific Fast Path log record, specify ILOGREC RECID=59nn. The old Fast Path log record macros are still available, for example DBFLGSYN and DBFLSRT.

For details about the DSECT names that are associated with these log records and descriptions of why the log record was issued, see the topic “Log records” in *IMS Diagnosis* information.

Part 2. Planning for IMS Version 12 enhancements

Planning for the IMS Version 12 enhancements includes understanding how the following areas are affected: installation, system definition, administration, troubleshooting, and reference.

These topics provide planning information for the larger enhancements to IMS Version 12.

Chapter 8. DBRC enhancements

IMS Version 12 enhancements to DBRC provide improved support for large output for /RMLIST commands, enhanced commands, and additional information in the RECON data set.

Database Recovery Control (DBRC) for IMS Version 12 includes the following enhancements:

- Enhanced LIST commands

Before IMS Version 12, the output of all forms of the DBRC LIST commands was limited to the amount of data that would fit into a 32 KB buffer. With IMS Version 12, the online DBRC /RMLIST command entered from OM API is enhanced to have greater than 32 KB output. The /RMLIST output not from OM API input sources is still limited to 32 KB.

If recovery-related information is not of interest, you can reduce the amount of output from LIST.DB or LIST.DBDS commands by using the new NORCVINF keyword. The NORCVINF keyword suppresses the recovery-related information from ALLOC, IC, RECOV and REORG records. The new keyword can be entered from all input sources and is not limited to the OM API.

The output from LIST.HISTORY commands is enhanced to include full-precision (to the microsecond) time stamps.

Timeline summaries from LIST.HISTORY TIMELINE commands contain the following new information:

- Additional information about HALDBs, such as the last digit of the reorganization number listed in the reorganization event and last digit of a new reorganization number in the recovery event.
- Additional information about deallocation records. For example, a “DQ” instead of “D” is included if the deallocation resulted because of a database quiesce command, and if a database quiesce command created a recovery point, the deallocation record will include “QUIESCE”.
- Information about concurrent events that were taking place when the LIST.HISTORY TIMELINE command was processed.
- For partitioned HALDB DBDSs that are being or have been reorganized online, the timeline summary now includes which data sets are active for the affected DBDSs.
- If reorganization number verification is active in the RECON data set, the timeline summary will include the current reorganization number if it is not zero.

The LIST.RECON is enhanced to show the number of registered databases, which enables users to see whether they are nearing the 32 767 limit. A RECON DMB Table record (DSPRDTRC) will be created when the first database is registered. The number of registered databases stored in the RECON DMB Table record is updated as each database is registered or deleted from the RECON data set. The DBRC Application Programming Interface (API) returns the number of registered databases in the RECON status block (DSPAPQRC).

- Support for up to 80 characters of user data in the following RECON records: CA, IMAGE, RECOV, and REORG.

In addition to enhancing the records in the RECON data set, the new UDATA('string') parameter is added to the following DBRC commands: CHANGE.CA, CHANGE.IC, NOTIFY.CA, NOTIFY.IC, NOTIFY.RECOV, and

NOTIFY.REORG. Also, the CA (DSPAPQCA), IMAGE (DSPAPQIC), RECOV (DSPAPQRV), and REORG (DSPAPQRR) DSECTs are enhanced to support the user data fields for DBRC API processing.

To change user data in a RECOV or REORG record, delete the record and issue a NOTIFY.RECOV or NOTIFY.REORG command with the UDATA parameter to record the recovery or reorganization record into the RECON data set.

- Support for deleting CA records with the CLEANUP.RECON command

Because change accumulation (CA) data sets can expire or become obsolete, the CLEANUP.RECON command is enhanced to support the deletion of CA records from the RECON data set. The new CAGRANGE, CAONLY, and LASTCA keywords are added to the CLEANUP.RECON command.

Logs are not cleaned up if DBRANGE, DBONLY, CAGRANGE, or CAONLY are specified.

- New and expanded GENJCL functions

The number of user keys that can be defined for all GENJCL functions is increased from 32 to 64.

The new %DBTYPE keyword can be added to any GENJCL.USER SELECT ALLOC group. The valid values for %DBTYPE are:

- FP - Fast Path ALLOC records
- DLI - non-HALDB ALLOC records
- PDATA - ALLOC records for data DBDSs of HALDBs

- VOLLIST parameter enhancement

The VOLLIST parameter is now optional for the following commands if the RECON status record indicates that the data sets are to be treated as cataloged:

- INIT.CA
- INIT.IC
- NOTIFY.CA
- NOTIFY.IC

- CA group retention period enhancement

The INIT.CAGRP and CHANGE.CAGRP commands are enhanced to include the new parameter (RECOVPD) for specifying the retention period for a CA group. Also, the CA group DSECT DSPAPQCG is updated to include the retention period for DBRC API processing.

CA group records (CAGRP) in the RECON data set are enhanced with the recovery period (RECOVPD) field that appears when a recovery period is in effect for the CA group.

- BPE-based DBRC enhancements

The character string "BPE" is added to the LIST output of the PRILOG and SYSS records in the RECON data set if the instance of DBRC is BPE-based. RECON records for non-BPE based DBRC instances will not contain this character string. This BPE indicator is also added to the output from DBRC API requests.

- DELETE.LOG command enhancement

Before IMS Version 12, if a DELETE.LOG INACTIVE or TOTIME command was issued and a LOGALL record did not exist for the inactive log, DBRC set a fatal return code, the command failed, and subsequent commands were not processed.

DBRC now issues a message (DSP0115I), returns a warning return code, and continues processing other commands.

Migration considerations

When migrating DBRC to an IMS Version 12 level, these migration considerations apply:

- Column positions are different in the output of LIST.RECON HISTORY commands because of the additional 5 characters in full-precision time stamps. Timeline parsing routines might need to change to accommodate the longer time stamps.
- CLEANUP.RECON commands might take additional time to process because additional records (CA) are being considered for deletion.
- Routines that parse the output from a LIST.HISTORY timeline summary must be reviewed and changed as necessary because of the expanded time stamps. The position of other items in the timeline also moved their location to accommodate the 5 extra spaces in the time stamps.
- Routines that use information from CA, IMAGE, RECOV, and REORG records must be reviewed and changed as necessary to accommodate the possibility of encountering up to 80 characters of user data.
- Two obsolete keywords, DBDS and TRACK, are no longer accepted on a NOTIFY.RECOV command. If these keywords are used, an informational message is issued and the command fails.
- The RECON DMB table record is built (or rebuilt if it already exists) when an IMS Version 10 or IMS Version 11 RECON data set is upgraded to IMS Version 12.

Coexistence considerations

No impact.

Log record changes

No impact.

Requirements

No impact.

Restrictions

No impact.

Impact to installing and defining IMS

This enhancement does not affect installing or defining IMS.

Impact to administering IMS

The system administration information is updated to include information associated with changes to the DBRC commands and API requests, and to include the following list of DBRC resource names for command authorization:

Verb	Modifier	Qualifier
CLEANUP	RECON	CAGRANGE
CLEANUP	RECON	CAONLY

Verb	Modifier	Qualifier
CLEANUP	RECON	LASTCA

Impact to programming for IMS

The system programming information is update to include:

- Changes to the CA (DSPAPQCA), CA group (DSPAPQCG), IMAGE (DSPAPQIC), RECOV (DSPAPQRV), REORG (DSPAPQRR), and subsystem (DSPAPQSS) DSECTs
- The BPE indicator in the output from DBRC API requests, if DBRC is based on BPE

Impact to troubleshooting for IMS

The following new messages are added:

DSP1225I

DBRC determined that the change accumulation records specified in the CLEANUP.RECON command are obsolete and has deleted them.

DSP1227E

The values specified on the CAGRANGE parameter are not valid.

DSP1228I

DBRC determined that no CA records were obsolete, so no records were deleted.

DSP1230I

A CLEANUP.RECON command was issued without the LASTCA option. DBRC determined the last change accumulation execution record for the specified CA group met the deletion criteria but was not deleted.

DSP1231W

DBRC determined that all the existing change accumulation execution records for the specified CA group were obsolete and therefore have been deleted.

DSP1229A

DBRC detected a problem with the CA group recovery period.

DSP1232I

Before executing the Change Accumulation utility, DBRC determined that: the GRPMAX value was reached and the oldest change accumulation data set is within the recovery period and, therefore, cannot be reused.

DSP1233I

Before executing the Change Accumulation utility, DBRC determined that: the oldest change accumulation data set is within the recovery period and, therefore, cannot be deleted.

The following messages are changed:

- DSP0057I
- DSP0085I
- DSP0122I
- DSP0115I

- DSP1100I

The 2490 abend is enhanced with new explanations and reason codes.

For a complete list of new, changed, and deleted messages, codes, and abends for IMS Version 12, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 113.

Impact to IMS reference information

Impact to commands

The following commands are enhanced to support the IMS Version 12 DBRC enhancements:

CLEANUP.RECON	LIST.DB
CHANGE.IC	LIST.DBDS
CHANGE.CA	LIST.HISTORY
CHANGE.CAGRP	LIST.RECON
CHANGE.RECOV	LIST.RECON STATUS
CHANGE.REORG	NOTIFY.CA
DELETE.LOG	NOTIFY.IC
GENJCL	NOTIFY.REORG
INIT.CA	NOTIFY.RECOV
INIT.CAGRP	/RMLIST
INIT.IC	

The sample listings of the RECON data set are replaced for IMS Version 12.

Impact to exit routines

This enhancement does not affect exit routines.

Impact to utilities

This enhancement does not affect utilities.

Chapter 9. IMS catalog enhancements

IMS Version 12 includes the IMS catalog, a comprehensive view of IMS database metadata that is fully managed by IMS.

The IMS catalog is a PHIDAM database that contains trusted metadata about IMS databases and applications. All the information that is contained in the runtime application control block (ACB) library is available in the IMS catalog. The IMS catalog is the single, authoritative source of database and application metadata for all client applications, as shown in the following illustration.

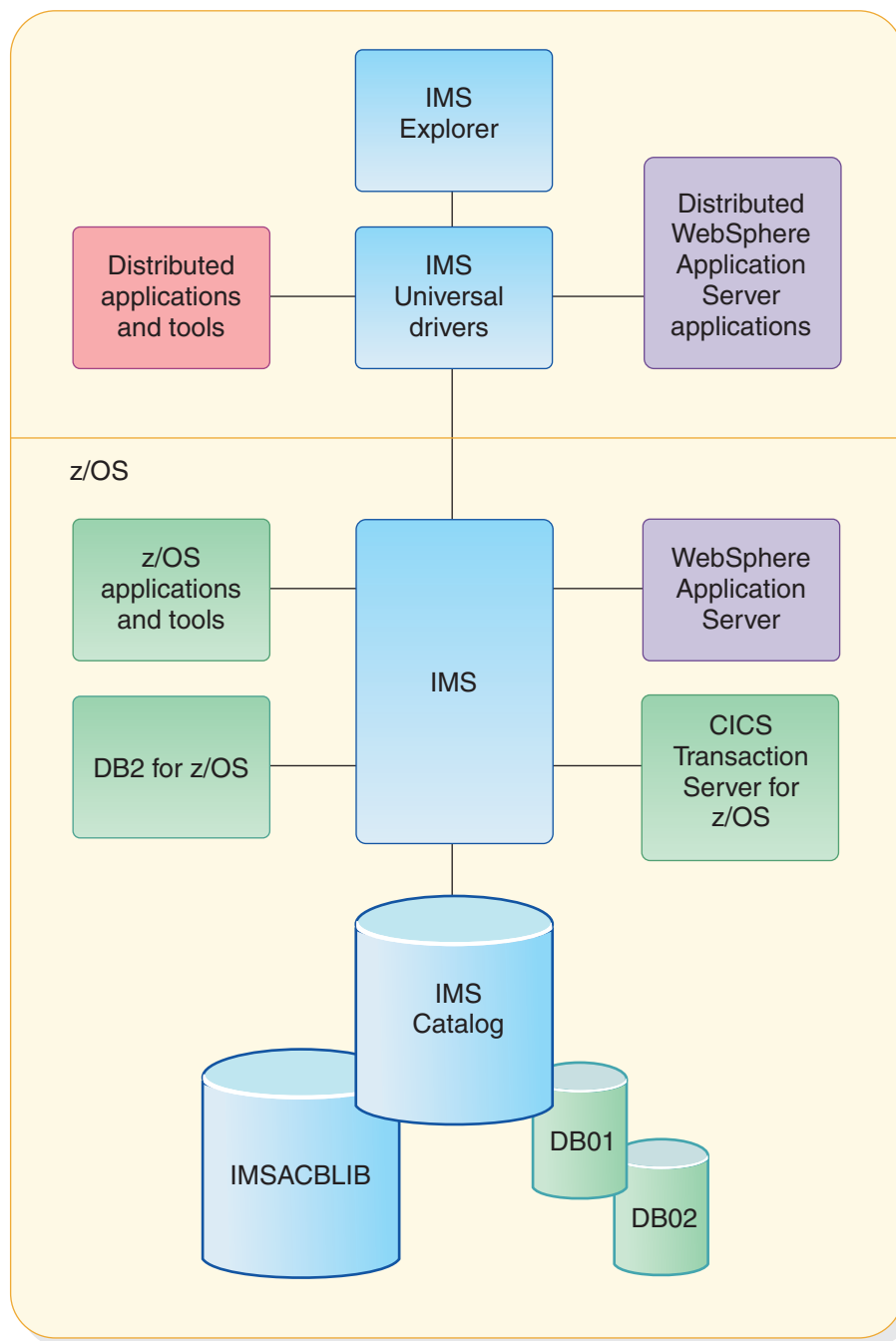


Figure 3. How the IMS catalog in the z/OS environment interacts with applications and tools in both the z/OS and non-z/OS environments

IMS supports the IMS catalog as it supports other HALDBs: with utilities, back up processes, recovery processes, and the online reorganization function. However, unlike other HALDBs, the IMS catalog does not need to be registered to DBRC.

The runtime access to the IMS catalog is provided for:

- Open systems, by using the IMS Universal drivers. Applications or tools that use the IMS Universal drivers can access the IMS metadata:
 - Directly with SQL and DL/I interfaces.
 - As an XML instance document that describes the IMS metadata schema.

- z/OS, by using the IMS Universal drivers or traditional IMS database query techniques. Batch access is also supported.

Each IMS system can use its own IMS catalog, and multiple IMS systems can share a single IMS catalog.

The IMS catalog includes the following major enhancements:

IMS catalog database

IMS catalog initialization

The IMS catalog is created during system definition with the new CATALOG section of the DFSDFxxx member of the IMS PROCLIB data set. The IMS catalog database DFSCD000 is defined as a resident database, so its control blocks are loaded during IMS initialization.

The IMS Catalog Populate utility (DFS3PU00) initially populates the IMS catalog with information from the IMS ACB library.

Enhancements to the existing DBDGEN, PSBGEN, and ACBGEN processes can automatically update the IMS catalog to keep it in a trusted state at all times after initialization.

IMS catalog administration

An instance of the IMS catalog metadata is generated each time an ACBGEN is done. The DFSDFxxx member of the IMS PROCLIB data set is used to configure how many instances are stored and when IMS removes old instances.

Unlike other HALDBs, the IMS catalog does not require DBRC. If DBRC is not used to manage the IMS catalog, IMS manages the partitions internally. If DBRC is used, the IMS catalog is treated as any other HALDB. Standard command security restrictions can be used to prevent unauthorized users from altering the IMS catalog database. When managed by DBRC, all the standard HALDB management features can be used with the IMS catalog. For example, online reorganization, image copy, and both point-in-time recovery and full database recovery.

Recommendation: For database integrity and ease of recovery, use DBRC with the IMS catalog.

The IMS catalog supports many environments: one-catalog-per-system, one-catalog-per-sysplex, or any combination of shared and independent catalogs. However, each IMS system can be linked to only one instance of the IMS catalog, regardless of system configuration.

New utility programs that support administrative tasks for the IMS catalog are described in Impact to IMS reference information.

Enhancements for IMS data access

Online application access to the IMS catalog

The IMS.SDFSRESL library contains a database description (DBD) for the catalog database and program specification blocks (PSBs) for IMS catalog data access. To enable user access to the IMS catalog, these resources must be copied to the DBDLIB and PSBLIB

before ACBGEN. Alternatively, the DBD and PSBs can be loaded with online change or member online change. The associated MODBLKS resources are managed by IMS and do not require any user configuration.

Online applications can access IMS catalog data with standard DL/I calls whenever PROCOPT=G is specified in the user PCB. The required PCB list for the IMS catalog is dynamically allocated without modifications to the user PCB.

SSA enhancements

Segment search arguments (SSAs) can now be based on the offset and field length of the target segment, and do not require a field name. This enhancement allows SSAs for fields that were not included in the DBD. The SSA enhancements are delivered in separate APARs.

DL/I Get Unique Record (GUR) call

The new GUR DL/I call returns a target segment and all dependent segments in a single response. The data is returned in the form of an XML instance document. The GUR call is valid only for the IMS catalog database.

Enhancements to IMS infrastructure

Enhancements to DBD and PSB source

The format of DBD and PSB source is expanded so that the DBDs and PSBs can contain metadata about IMS databases and IMS application programs.

Enhancements to the DBDGEN, PSBGEN, and ACBGEN processes

The ACBGEN process is enhanced to support automatic updates to the IMS catalog metadata. During the ACBGEN process, the information that is stored in the PSBLIB and DBDLIB is used to create the ACBLIB. When the IMS catalog is active, the ACBGEN process also transfers the information from the PSBLIB and DBDLIB into the IMS catalog database. Each instance of the IMS catalog metadata is identified with a time stamp that is linked to a specific ACBGEN operation.

The IMS catalog can be updated only from an IMS Version 12 or later ACBLIB. Use one of the following methods to update the IMS catalog:

- Run both the ACB Maintenance utility and the IMS Catalog Populate utility (DFS3PU00)
- Run the IMS Catalog ACBGEN utility (DFS3UACB), which builds the ACBs and populates the IMS catalog in a single job step

Enhancements to the IMS Universal drivers

New data types

The IMS Universal drivers support two new data types: arrays and structs. This support increases the range of data types that the drivers can manage.

Application-transparent metadata access

The IMS Universal drivers no longer rely on the Java metadata class generated by the IMS Enterprise Suite DL/I Model utility plug-in. In IMS Version 12, the drivers can now automatically

connect to the IMS catalog for metadata information during the connection setup process for a user database. Instead, the IMS Universal drivers communicate with the IMS catalog to acquire the necessary database metadata. This results in increased scalability in terms of operational management of the metadata. The IMS Universal drivers use trusted metadata information directly from the IMS catalog.

IMS database and application information can be imported dynamically from within the Data Source Explorer view of the IMS Enterprise Suite Explorer for Development. For more information, see IMS Enterprise Suite Explorer for Development.

Segment map support

The IMS Universal drivers now support segment maps. A segment map consists of different cases (sets of fields) within a segment where each case is valid only for a unique value of the specified control field.

Field redefine support

The IMS Universal drivers added additional support for field redefines.

Migration considerations

The IMS catalog does not affect version-to-version migrations of IMS. However, because you can use the IMS catalog function to add application and database metadata to your DBDs and PSBs, as you add metadata, you might need to increase the size of your DBDLIB, PSBLIB, and ACBLIB data sets.

Coexistence considerations

All systems that use the IMS catalog must be IMS Version 12 or later.

Log record changes

The X'07' and X'56' log records are modified to include statistics for the new GUR DL/I call. The X'29' OLR log record is modified for automatic data set creation for catalog database data sets.

Requirements

The IMS catalog uses the same hardware and software as IMS Version 12 and later.

Before you can use the IMS catalog, you must install APARs listed in “IMS catalog function software requirements” on page 45.

Restrictions

HALDB online reorganization (OLR) is not supported for an IMS catalog database that is not registered with DBRC.

Impact to installing and defining IMS

The IMS Installation Verification Program (IVP) is enhanced to verify the installation and demonstrate the use of the IMS catalog. The updates are contained in the EX and OX steps.

The system definition information is enhanced:

- New topics describe how to define and tailor the IMS catalog.
- Information about the new TYPE=CATDBDEF statement is added to the DFSMDA macro.
- Information about the new CATALOG section is added to the DFSDFxxx PROCLIB member.
- The IMS Syntax Checker is updated to support the CATALOG section of the DFSDFxxx PROCLIB member.

Impact to administering IMS

Information about defining and configuring the catalog to WebSphere Application Server is added to the communications and connections information.

The database administration information is enhanced with information about:

- An overview of the IMS catalog
- Backup and recovery of the IMS catalog
- Coding metadata into DBDs to be used as input to the Database Description (DBD) Generation utility
- Coding metadata into PSBs to be used as input to the Program Specification Block (PSB) Generation utility
- Building application control blocks (ACBs) for IMS and the IMS catalog with the Application Control Blocks Maintenance utility (with metadata embedded)
- The format of records in the IMS catalog database

Impact to programming for IMS

The application programming information is enhanced with information about:

- Application programming in general with the IMS catalog
- Application programming using the new DL/I Get Unique Record (GUR) call
- How the IMS Universal drivers can be used with the IMS catalog

Impact to troubleshooting for IMS

The following tables list the new and changed messages and codes. For a complete list of new, changed, and deleted messages, codes, and abends for IMS Version 12, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 113.

Table 17. New IMS catalog messages and codes for Version 12

AREA messages

AREA644

DBD and DFS messages

Table 17. New IMS catalog messages and codes for Version 12 (continued)

DBD600	DFS4360E	DFS4461E	DFS4480E	DFS4490W
DBD601	DFS4361E	DFS4462E	DFS4481E	DFS4491W
DFS1509W	DFS4362E	DFS4463E	DFS4482E	DFS4492W
DFS1512E	DFS4363E	DFS4464E	DFS4483E	DFS4493W
DFS1769W	DFS4364E	DFS4465W	DFS4484E	DFS4494E
DFS1852W	DFS4365E	DFS4466W	DFS4485E	DFS4495E
DFS3685E	DFS4366E	DFS4467W	DFS4486E	DFS4496E
DFS3686I	DFS4367E	DFS4468E	DFS4487E	
DFS3787I	DFS4368E	DFS4469W	DFS4488W	
DFS4350E		DFS4470W	DFS4489W	
DFS4351E		DFS4471W		
DFS4352E		DFS4472W		
DFS4353E		DFS4473E		
DFS4354E		DFS4474E		
DFS4355E		DFS4475E		
DFS4356EI		DFS4476E		
DFS4357E		DFS4477E		
DFS4358E		DFS4478E		
DFS4359E		DFS4479E		
FLD messages				
FLD6	FLD626	FLD651	FLD677	FLD731
FLD600	FLD628	FLD652	FLD678	FLD732
FLD601	FLD629	FLD653	FLD682	FLD733
FLD602	FLD630	FLD654	FLD683	FLD734
FLD603	FLD631	FLD655	FLD684	FLD735
FLD604	FLD632	FLD656	FLD685	FLD738
FLD605	FLD633	FLD657	FLD686	FLD739
FLD606	FLD634	FLD659	FLD692	FLD740
FLD607	FLD635	FLD660	FLD700	FLD741
FLD608	FLD636	FLD661	FLD701	FLD742
FLD609	FLD637	FLD662	FLD702	FLD751
FLD610	FLD638	FLD663	FLD703	FLD752
FLD611	FLD639	FLD664	FLD705	FLD753
FLD613	FLD640	FLD665	FLD706	FLD754
FLD614	FLD641	FLD666	FLD707	FLD756
FLD616	FLD642	FLD667	FLD710	
FLD617	FLD643	FLD668	FLD711	
FLD618	FLD644	FLD670	FLD712	
FLD619	FLD645	FLD671	FLD713	
FLD620	FLD646	FLD672	FLD714	
FLD621	FLD647	FLD673	FLD715	
FLD622	FLD648	FLD674	FLD716	
FLD623	FLD649	FLD675	FLD717	
FLD624	FLD650	FLD676	FLD730	
FLD625				
Other messages				
	PCB600	SEGM600	SEGM604	SFLD600
	PCB601	SEGM601	SEGM605	
	PCB602	SEGM602	SEGM607	
	PCB603	SEGM603	SEGM608	
Abend codes				
0108				

Table 18. Messages and codes that changed in Version 12 for the IMS catalog

DFS messages

Table 18. Messages and codes that changed in Version 12 for the IMS catalog (continued)

DFS0415W	DFS2991E	DFS2994E	DFS2997E	DFS3686I
DFS1176E	DFS2992E	DFS2995E	DFS2998E	DFS3687I
DFS1987I	DFS29931E	DFS2996E	DFS3685I	
Abend codes				
0071	0718	0929		

Impact to IMS reference information

Impact to commands

The INITIATE OLC command is enhanced to support the IMS catalog.

Impact to exit routines

The Catalog Definition exit routine (DFS3CDX0) enables the IMS catalog in a batch processing environment. This exit routine is provided as an alternative to the CATALOG section of the DFSDFxxx member of the IMS.PROCLIB data set for batch environments.

Impact to utilities

IMS Version 12 includes the following new utilities for the IMS catalog:

ACB Generation and Catalog Populate utility (DFS3UACB)

Generates ACB members in an IMS.ACBLIB data set and creates the corresponding metadata records in the IMS catalog in a single job step.

IMS Catalog Alias Names utility (DFS3ALI0)

Defines multiple IMS catalog databases in an IMSplex environment.

IMS Catalog Copy utility (DFS3CCE0, DFS3CCI0)

Copies IMS catalog database definitions and metadata between IMS systems. This utility can also

- Migrate an IMS catalog database from a test environment to a production environment.
- Copy a production IMS catalog database to another installation for disaster recovery purposes (or for other similar purposes).

IMS Catalog Partition Definition Data Set utility (DFS3UCD0)

Creates and populates the IMS catalog partition definition data set, which stores information about IMS catalog database partitions when DBRC is not used to manage the database partitions.

IMS Catalog Populate utility (DFS3PU00)

Loads or inserts records into the IMS catalog database data sets. This utility also estimates the size of the IMS catalog data sets.

IMS Catalog Record Purge utility (DFS3PU10)

Removes unnecessary versions of IMS catalog records from the IMS catalog database based on criteria that you specify.

The following utility programs are changed in IMS Version 12 to support the IMS catalog:

- Application Control Blocks Maintenance utility
- Database Description (DBD) Generation utility

- Program Specification Block (PSB) Generation utility

Chapter 10. IMS Connect enhancements

In IMS Version 12, IMS Connect provides a complete set of type-2 commands, the ability to communicate with other instances of IMS Connect, and enhancements that improve usability.

General IMS Connect enhancements

In IMS Version 12, enhancements to IMS Connect improve installation, serviceability, performance, and usability.

CM0 ACK NoWait for user-written clients

The CM0 ACK NoWait enhancement includes two new features for user-supplied IMS Connect clients:

- For commit-then-send (CM0) send-and-receive transactions, the option to eliminate the final receive on the client side by suppressing the timeout notification sent by IMS Connect after the client acknowledges receipt of the response.
- The ability to determine the protocol level supported by a given instance of IMS Connect.

After an IMS Connect client sends a positive acknowledgment (ACK) for a response to a CM0 send-and-receive transaction, IMS Connect uses a timeout function to clear the response message from the IMS output queue. The client must switch to a receive state again and wait at least 0.01 seconds to accept the timeout message from IMS Connect.

To reduce processing costs and increase the number of CM0 send-and-receive transactions that can be input to IMS over a time, user-supplied IMS Connect clients can now prevent IMS Connect from sending the final timeout message by specifying `IRM_F1_NoWait (X'02)` in the IRM of the acknowledgment to the CM0 response.

In IMS Version 12, the NoWait option on CM0 ACK messages requires IMS Connect protocol level 2.

User-supplied IMS Connect clients can determine which protocol level a given instance of IMS Connect supports by checking any CSM returned by the IMS Connect instance. The ability to determine the protocol level of a given instance of IMS Connect can be useful in environments where multiple versions of IMS Connect are used.

Load modules for exit routines

To simplify the installation and modification of IMS Connect, ready-to-use load modules are provided for the IBM-supplied versions of the following user exit routines:

- HWSUINIT
- HWSJAVA0
- HWSSMPL0
- HWSSMPL1

HWSUINIT and HWSJAVA0 are automatically loaded. HWSSMPL0 and HWSSMPL1 must be specified in the IMS Connect configuration member before they can be loaded.

READ status of messages

IMS Connect clients specify the length of input messages in a 4-byte length field at the beginning of each message. If the actual length of a message is less than the length specified in the length field, the client connection can hang because, after the client sends the message data, the client switches to a receive state to wait for a response. But because IMS Connect expects more message data, IMS Connect never sends a response and the client remains in a receive state indefinitely.

To help detect errors of this type, while IMS Connect is reading or waiting for input messages from a client, IMS Connect now displays the status of the client connection as READ. If the status of a client connection is READ for an unusually long time, it might indicate an error. IMS Connect administrators can view both the status of a client connection and how long the connection has had that status by issuing existing view and query commands.

RACF user ID cache

IMS Connect can now cache RACF user IDs across client sessions for improved performance. RACF user ID caching can be turned on by either using the UIDCACHE statement in the IMS Connect configuration member or by issuing IMS Connect commands.

Cached security data can be set to expire at specified intervals using the UIDAGE statement in the IMS Connect configuration member. After a cached RACF user ID expires, when IMS Connect receives another request from that user ID, IMS Connect calls RACF to verify the user ID and refreshes the cache.

Individual user IDs can also be refreshed by issuing an online IMS Connect command.

The following command formats support the administration of RACF user ID caching for IMS Connect:

- IMS type-2
- WTOR
- z/OS MODIFY

RACF return codes

If a RACROUTE VERIFY request fails, IMS Connect now includes the RACF return code in the request status message (RSM) that is returned to the client so that the client can take appropriate action based on the type of security failure.

Recorder trace new records

When the IMS Connect Recorder trace writes to the BPE trace and the trace level is set to HIGH, the IMS Connect Recorder trace now captures message information at the following new trace points:

- When messages are received from or delivered to TCP/IP
- When messages are received from or delivered to OTMA

Recommendation: Only use LEVEL(HIGH) when that level of detail is required for problem determination.

Message information recorded at the new trace points is flagged in the Recorder Trace records by the following caller IDs:

ICONTR

Message information received from TCP/IP

ICONTS

Message information sent to TCP/IP

ICONIR

Message information received from OTMA

ICONIS

Message information sent to OTMA

XML Converter Refresh

Users can now update the converters that are used to convert XML to either COBOL or PL/I and back again without stopping and restarting IMS Connect. The updates are applied to the converters online by issuing an online IMS Connect command in any one of the following command formats:

- IMS type-2
- WTOR
- z/OS MODIFY

Migration considerations

You can use the default values for the UIDCACHE and UIDAGE statements in the IMS Connect configuration member, but you must update the configuration member if you want to use other values.

User-written IMS Connect clients that use CM0 Send-Receive interactions can update their applications to specify ACK NoWait and eliminate the receive call for the timeout.

Coexistence considerations

No impact.

Log record changes

No impact.

Requirements

No impact.

Restrictions

No impact.

Impact to installing and defining IMS

The BPE configuration parameter member is updated to include new information in the Recorder trace table for IMS Connect.

The HWSCFGxx PROCLIB member is updated to describe the new UIDCACHE and UIDAGE parameters.

The procedure for configuring IMS Connect to convert XML data from the client into COBOL or PL/I application program data is modified so that you no longer need to restart IMS Connect when you update an existing XML converter.

Impact to administering IMS

The communications and connections information is updated to include the following items:

- The concept of caching and refreshing RACF user IDs is introduced.
- Information is added that states that RACF return codes are returned to the client in the RSM message structure.
- Information is clarified to describe the new behavior for CM0 ACK NOWAIT specifications.
- Information is added that describes how load modules, in addition to the source, are provided for the following exits: HWSUINIT, HWSJAVA0, HWSSMPL0, and HWSSMPL1. IMS Connect always loads HWSUINIT and HWSJAVA0, but HWSSMPL0 and HWSSMPL1 are optional and must be specified in the IMS Connect configuration file on the EXIT parameter of the TCPIP statement of the IMS Connect HWSCFGxx PROCLIB member.
- Information is added to state that XML converters can be refreshed without taking IMS Connect offline.

Impact to programming for IMS

This enhancement does not affect programming for IMS.

Impact to troubleshooting for IMS

The output of message HWSC0001I is enhanced to display RACF user ID cache information and shows the client in READ state when a command is issued that displays the client state.

The following new messages are added:

HWSA0375I

XML CONVERTER *cotrname* WAS SUCCESSFULLY REFRESHED,M=xxxx

HWSP1501I

RACF USERID CACHING ENABLED,M=SDRC or RACF USERID
CACHING DISABLED,M=SDRC

HWSP1504I

RACF USERID *uidname* WAS SUCCESSFULLY REFRESHED,M=SDRC

HWSP1506I

For a complete list of new, changed, and deleted messages, codes, and abends for IMS Version 12, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 113.

Impact to IMS reference information

Impact to commands

The examples for the BPE UPDATE TRACETABLE command are updated to show how to start the IMS Connect recorder trace using the BPE external trace.

The following new IMS Connect commands are added.

Table 19. IMS Connect WTOR and z/OS commands added to IMS Version 12.

IMS Connect WTOR command	IMS Connect z/OS MODIFY command	Command description
REFRESH CONVERTER	UPDATE CONVERTER	Refreshes the specified converter or all the converters matching the mask.
REFRESH RACFUID	UPDATE RACFUID	Refreshes a cached RACF user ID.
SETUIDC ON	UPDATE MEMBER TYPE(IMSCON)SET(UIDCACHE(ON))	Enables caching of RACF user IDs.
SETUIDC OFF	UPDATE MEMBER TYPE(IMSCON)SET(UIDCACHE(OFF))	

The following IMS Connect WTOR commands are updated with new output fields:

- VIEWHWS
- VIEWPORT

The following IMS Connect z/OS MODIFY commands are updated:

- QUERY MEMBER
- QUERY PORT
- UPDATE MEMBER

The following *Impact to exit routines*

This enhancement does not affect exit routines, but load modules for HWSUINIT, HWSJAVA0, HWSSMPL0, and HWSSMPL1 are delivered with IMS Version 12.

Impact to utilities

This enhancement does not affect utilities.

IMS Connect command enhancements

IMS Connect WTOR and IMS Connect z/OS MODIFY commands are enhanced to support the IMS-to-IMS TCP/IP communications function. In addition, IMS Connect type-2 commands are added that extend the benefits of IMS type-2 commands, and their associated improved ease of use, to IMS Connect.

IMS Connect type-2 command enhancements:

- Improve the task of managing IMS Connect resources by enhancing the IMS type-2 command architecture to include IMS Connect resources.
- Increase efficiency by consolidating the output of several IMS Connect WTOR and IMS Connect z/OS MODIFY commands into a single IMS Connect type-2 command.
- Support all functionality that is available in existing IMS Connect WTOR and IMS Connect z/OS MODIFY commands, so users no longer need to switch between WTOR, z/OS MODIFY, and type-2 commands. A complete set of type-2 commands is available for IMS Connect.

- Support the IMS strategy of providing consistent new functionality through type-2 commands.

Previously, the IMS Connect WTOR commands were sometimes called IMS Connect *type-1 commands*. As of IMS Version 12, these commands are called IMS Connect *WTOR commands*.

Certain IMS Connect WTOR commands, IMS Connect z/OS MODIFY commands, and IMS Connect type-2 commands perform similar tasks.

The following table shows the different instances of the IMS Connect WTOR, z/OS MODIFY, and type-2 commands that perform similar tasks.

Table 20. IMS Connect Type-2, WTOR, and z/OS MODIFY command equivalents

IMS Connect type-2 command	IMS Connect WTOR command	IMS Connect z/OS MODIFY command
QUERY IMSCON TYPE(ALIAS) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWIA ALL	QUERY ALIAS NAME(*)
QUERY IMSCON TYPE(ALIAS) NAME(<i>alias_name</i>) SHOW(ALL <i>show_parm</i>)	VIEWIA <i>alias_name</i>	QUERY ALIAS NAME(<i>aliasName</i>)
QUERY IMSCON TYPE(ALIAS) NAME(<i>alias_name</i>) ODBM(<i>odbm_name</i>)	VIEWIA <i>alias_name</i> <i>odbm_name</i>	QUERY ALIAS NAME(<i>aliasName</i>) ODBM(<i>odbmName</i>)
QUERY IMSCON TYPE(CONFIG) SHOW(ALL <i>show_parm</i>)	VIEWHWS	QUERY MEMBER TYPE(IMSCON) SHOW(ALL)
QUERY IMSCON TYPE(DATASTORE) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWDS ALL	QUERY DATASTORE NAME(*) SHOW(ALL)
QUERY IMSCON TYPE(DATASTORE) NAME(<i>datastore_name</i>) SHOW(ALL <i>show_parm</i>)	VIEWDS <i>datastore_name</i>	QUERY DATASTORE NAME(<i>datastore_name</i>)
QUERY IMSCON TYPE(IMSPLEX) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWIP ALL	QUERY IMSPLEX NAME(*) SHOW(ALL)
QUERY IMSCON TYPE(IMSPLEX) NAME(<i>IMSplex_name</i>) SHOW(ALL <i>show_parm</i>)	VIEWIP <i>IMSplex_name</i>	QUERY IMSPLEX NAME(<i>imsplexName</i>) SHOW(ALL)
QUERY IMSCON TYPE(MSC) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWMSC ALL	QUERY MSC NAME(*)
QUERY IMSCON TYPE(MSC) NAME(<i>msc_id</i>) SHOW(ALL <i>show_parm</i>)	VIEWMSC <i>msc_id</i>	QUERY MSC NAME(<i>msc_id</i>)
QUERY IMSCON TYPE(PORT) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWPORT ALL	QUERY PORT NAME(*) SHOW(ALL)
QUERY IMSCON TYPE(PORT) NAME(<i>portid</i>) SHOW(ALL <i>show_parm</i>)	VIEWPORT <i>port_id</i>	QUERY PORT NAME(<i>port_id</i>) SHOW(ALL)
QUERY IMSCON TYPE(PORT) NAME(LOCAL) SHOW(ALL <i>show_parm</i>)	VIEWPORT LOCAL	QUERY PORT NAME(LOCAL) SHOW(ALL)
QUERY IMSCON TYPE(RMTIMSCON) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWRMT ALL	QUERY RMTIMSCON NAME(*)

Table 20. IMS Connect Type-2, WTOR, and z/OS MODIFY command equivalents (continued)

IMS Connect type-2 command	IMS Connect WTOR command	IMS Connect z/OS MODIFY command
QUERY IMSCON TYPE(RMTIMSCON) NAME(<i>rmtimscon_name</i>) SHOW(ALL <i>show_parm</i>)	VIEWRMT <i>rmtimscon_name</i>	QUERY RMTIMSCON NAME(<i>rmtimscon_name</i>)
QUERY IMSCON TYPE(UOR) NAME(*) SHOW(ALL <i>show_parm</i>)	VIEWUOR ALL	QUERY UOR NAME(*) SHOW(ALL)
QUERY IMSCON TYPE(UOR) NAME(<i>uor_id</i>) SHOW(ALL <i>show_parm</i>)	VIEWUOR <i>uor_id</i>	QUERY UOR NAME(<i>uor_id</i>) SHOW(ALL)
UPDATE IMSCON TYPE(ALIAS) NAME(<i>alias_name</i>) ODBM(<i>odbm_name</i>) START(COMM)	STARTIA <i>alias_name</i> <i>odbm_name</i>	UPDATE ALIAS NAME(<i>aliasName</i>) ODBM(<i>odbmName</i>) START(ROUTE)
UPDATE IMSCON TYPE(ALIAS) NAME(<i>alias_name</i>) ODBM(<i>odbm_name</i>) STOP(COMM)	STOPIA <i>alias_name</i> <i>odbm_name</i>	UPDATE ALIAS NAME(<i>aliasName</i>) ODBM(<i>odbmName</i>) STOP(ROUTE)
UPDATE IMSCON TYPE(CLIENT) NAME(<i>client_name</i>) PORT(<i>portid</i>) STOP(COMM)	STOPCLNT <i>portid</i> <i>clientid</i>	DELETE PORT NAME(<i>portName</i>) CLIENT(<i>clientName</i>)
UPDATE IMSCON TYPE(CONFIG) SHUTDOWN(COMM)	CLOSEHWS	SHUTDOWN MEMBER
UPDATE IMSCON TYPE(CONFIG) SHUTDOWN(COMM) OPTION(FORCE)	CLOSEHWS FORCE	SHUTDOWN MEMBER OPTION(FORCE)
UPDATE IMSCON TYPE(CONFIG) SHUTDOWN(COMM) OPTION(QUIESCE)	CLOSEHWS QUIESCE	SHUTDOWN MEMBER OPTION(QUIESCE)
UPDATE IMSCON TYPE(CONFIG) SET(OAUTO(ON))	SETOAUTO YES	UPDATE MEMBER TYPE(IMSCON) SET(OAUTO(ON))
UPDATE IMSCON TYPE(CONFIG) SET(OAUTO(OFF))	SETOAUTO NO	UPDATE MEMBER TYPE(IMSCON) SET(OAUTO(OFF))
UPDATE IMSCON TYPE(CONFIG) SET(PSWDMC(ON))	SETPWMC ON	UPDATE MEMBER TYPE(IMSCON) SET(PSWDMC(ON))
UPDATE IMSCON TYPE(CONFIG) SET(PSWDMC(OFF))	SETPWMC OFF	UPDATE MEMBER TYPE(IMSCON) SET(PSWDMC(OFF))
UPDATE IMSCON TYPE(CONFIG) SET(PSWDMC(RCF))	SETPWMC RCF	UPDATE MEMBER TYPE(IMSCON) SET(PSWDMC(RCF))
UPDATE IMSCON TYPE(CONFIG) SET(RACF(ON))	SETRACF ON	UPDATE MEMBER TYPE(IMSCON) SET(RACF(ON))
UPDATE IMSCON TYPE(CONFIG) SET(RACF(OFF))	SETRACF OFF	UPDATE MEMBER TYPE(IMSCON) SET(RACF(OFF))
UPDATE IMSCON TYPE(CONFIG) SET(RRS(ON))	SETRRS ON	UPDATE MEMBER TYPE(IMSCON) SET(RRS(ON))
UPDATE IMSCON TYPE(CONFIG) SET(RRS(OFF))	SETRRS OFF	UPDATE MEMBER TYPE(IMSCON) SET(RRS(OFF))
UPDATE IMSCON TYPE(CONFIG) SET(UIDCACHE(ON))	SETUIDC ON	UPDATE MEMBER TYPE(IMSCON) SET(UIDCACHE(ON))
UPDATE IMSCON TYPE(CONFIG) SET(UIDCACHE(OFF))	SETUIDC OFF	UPDATE MEMBER TYPE(IMSCON) SET(UIDCACHE(OFF))

Table 20. IMS Connect Type-2, WTOR, and z/OS MODIFY command equivalents (continued)

IMS Connect type-2 command	IMS Connect WTOR command	IMS Connect z/OS MODIFY command
UPDATE IMSCON TYPE(CONFIG) START(RECORDER)	RECORDER OPEN	UPDATE MEMBER TYPE(IMSCON) START(TRACE)
UPDATE IMSCON TYPE(CONFIG) STOP(RECORDER)	RECORDER CLOSE	UPDATE MEMBER TYPE(IMSCON) STOP(TRACE)
UPDATE IMSCON TYPE(CONVERTER) NAME(<i>converter_name</i>) OPTION(REFRESH)	REFRESH CONVERTER NAME(<i>converter_name</i>)	UPDATE CONVERTER NAME(<i>converter_name</i>) OPTION(REFRESH)
UPDATE IMSCON TYPE(DATASTORE) NAME(<i>datastore_name</i>) START(COMM)	OPENDS <i>datastore_id</i> STARTDS <i>datastore_id</i>	UPDATE DATASTORE NAME(<i>datastoreName</i>) START(COMM)
UPDATE IMSCON TYPE(DATASTORE) NAME(<i>datastore_name</i>) STOP(COMM)	STOPDS <i>datastore_id</i>	UPDATE DATASTORE NAME(<i>datastoreName</i>) STOP(COMM)
UPDATE IMSCON TYPE(IMSPLEX) NAME(<i>imsplex_name</i>) START(COMM)	OPENIP <i>imsplex_id</i> STARTIP <i>imsplex_id</i>	UPDATE IMSPLEX NAME(<i>imsplex_name</i>) START(COMM)
UPDATE IMSCON TYPE(IMSPLEX) NAME(<i>imsplex_name</i>) STOP(COMM)	STOPIP <i>imsplex_id</i>	UPDATE IMSPLEX NAME(<i>imsplex_name</i>) STOP(COMM)
UPDATE IMSCON TYPE(LINK) NAME(<i>link_name</i>) STOP(COMM)	STOPLINK <i>linkName</i>	DELETE LINK NAME(<i>linkName</i>)
UPDATE IMSCON TYPE(MSC) NAME(<i>lclPlkid</i>) START(COMM)	STARTMSC <i>lclPlkid</i>	UPDATE MSC NAME(<i>lclPlkid</i>) START(COMM)
UPDATE IMSCON TYPE(MSC) NAME(<i>lclPlkid</i>) STOP(COMM)	STOPMSC <i>lclPlkid</i>	UPDATE MSC NAME(<i>lclPlkid</i>) STOP(COMM)
UPDATE IMSCON TYPE(ODBM) NAME(<i>odbm_name</i>) START(COMM)	STARTOD <i>odbm_name</i>	UPDATE ODBM NAME(<i>odbmName</i>) START(COMM)
UPDATE IMSCON TYPE(ODBM) NAME(<i>odbm_name</i>) STOP(COMM)	STOPOD <i>odbm_name</i>	UPDATE ODBM NAME(<i>odbmName</i>) STOP(COMM)
UPDATE IMSCON TYPE(PORT) NAME(<i>port_name</i>) START(COMM)	OPENPORT <i>port_id</i> STARTPT <i>port_id</i>	UPDATE PORT NAME(<i>port_name</i>) START(COMM)
UPDATE IMSCON TYPE(PORT) NAME(<i>port_name</i>) STOP(COMM)	STOPPORT <i>port_id</i>	UPDATE PORT NAME(<i>port_name</i>) STOP(COMM)
UPDATE IMSCON TYPE(RACFUID) NAME(<i>userid</i>) OPTION(REFRESH)	REFRESH RACFUID NAME(<i>userid</i>)	UPDATE RACFUID NAME(<i>userid</i>) OPTION(REFRESH)
UPDATE IMSCON TYPE(RMTIMSCON) NAME(<i>rmtimscon_name</i>) START(COMM)	STARTRMT <i>rmtimsconName</i>	UPDATE RMTIMSCON NAME(<i>rmtimsconName</i>) START(COMM)
UPDATE IMSCON TYPE(RMTIMSCON) NAME(<i>rmtimscon_name</i>) STOP(COMM)	STOPRMT <i>rmtimsconName</i>	UPDATE RMTIMSCON NAME(<i>rmtimsconName</i>) STOP(COMM)

Table 20. IMS Connect Type-2, WTOR, and z/OS MODIFY command equivalents (continued)

IMS Connect type-2 command	IMS Connect WTOR command	IMS Connect z/OS MODIFY command
UPDATE IMSCON TYPE(SENDCLNT) NAME(<i>sendclient_name</i>) RMTIMSCON(<i>rmtimscon_name</i>) STOP(COMM)	STOPSCLN <i>rmtimscon sendclient</i>	DELETE RMTIMSCON NAME(<i>rmtimsconname</i>) SENDCLNT(<i>clientid</i>)

Migration considerations

No impact.

Coexistence considerations

No impact.

Log record changes

No impact.

Requirements

Although no special hardware or software is required to use the IMS Connect type-2 commands, IMS Connect must be configured with an Operations Manager (OM) and a Structured Call Interface (SCI) because all type-2 commands must come into IMS Connect through the OM API or the REXX SPOC API.

Restrictions

No impact.

Impact to installing and defining IMS

The system definition information is updated to include the new IMS Connect type-2 commands.

Impact to administering IMS

Automation programs and tools that are used to administer IMS Connect can be updated to use the new IMS Connect type-2 commands.

Impact to programming for IMS

This enhancement does not affect programming for IMS.

Impact to troubleshooting for IMS

The following new messages are added:

HWSI1650I

IMS Connect has successfully registered its command set to the Operations Manager component of an IMSplex.

HWSI1655W

IMS Connect has attempted to register its command set to the Operations

Manager component of an IMSplex, but the Operations Manager is either unavailable, or is not ready to accept commands.

HWSI1660E

IMS Connect has attempted to register its command set to the Operations Manager component of an IMSplex, but the registration request has failed for this command and keyword combination.

HWSI1665E

IMS Connect has received an unexpected return code, reason code, or both from a CSL service request.

HWSM0538E

IMS Connect has received a command from OM, but is unable to process the command due to an unexpected internal IMS Connect error.

HWSM0540E

IMS Connect has received a READY notification from SCI, which indicates that an OM system is ready to accept command registration requests from IMS Connect, but IMS Connect is unable to process the command due to an unexpected internal IMS Connect error.

For a complete list of new, changed, and deleted messages, codes, and abends for IMS Version 12, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 113.

Impact to IMS reference information

Impact to commands

The following IMS Connect WTOR commands have new output fields: VIEWHWS and VIEWPORT

The following IMS Connect z/OS MODIFY commands have new output fields: QUERY MEMBER and QUERY PORT.

The following new IMS Connect WTOR commands are added:

REFRESH CONVERTER

Refreshes the specified converter or all the converters that match the mask.

REFRESH RACFUID

Refreshes the specified RACF user ID or all the RACF user IDs that match the mask.

STARTMSC

Starts communications for a specified MSC physical link defined in the LCLPLKID parameter of the MSC statement in the IMS Connect configuration member.

STARTRMT

Enables the remote IMS Connect connection after it has been disabled by either the STOPRMT or UPDATE RMTIMSCON STOP(COMM) command.

STOPLINK

Terminates the MSC logical link resource type.

STOPMSC

Terminates communications for a specified MSC physical link defined in the LCLPLKID parameter of the MSC statement in the IMS Connect configuration.

STOPRMT

Disables the remote IMS Connect connection.

STOPSCLN

Terminates the send client sockets for a specified remote IMS Connect connection.

VIEWMSC

Displays information of the MSC physical link defined in the MSC statement in the IMS Connect configuration member.

VIEWRMT

Displays the remote IMS Connect connection information.

The following new IMS Connect z/OS MODIFY commands are added:

DELETE LINK

Terminates the MSC logical link resource type.

DELETE RMTIMSCON SENDCLNT

Terminates the send client sockets for a specified remote IMS Connect connection.

QUERY MSC

Displays information of the MSC physical link defined in the MSC statement in the IMS Connect configuration member.

QUERY RMTIMSCON

Displays the remote IMS Connect connection information.

UPDATE CONVERTER

Refreshes the specified converter or all the converters that match the mask.

UPDATE MSC

Starts or terminates communications for a specified MSC physical link defined in the LCLPLKID parameter of the MSC statement in the IMS Connect configuration member.

UPDATE RACFUID

Refreshes the specified RACF user ID or all the RACF user IDs that match the mask.

UPDATE RMTIMSCON

Enables or disables the remote IMS Connect connection after it has been disabled by either the STOPRMT or UPDATE RMTIMSCON STOP(COMM) command.

The following type-2 commands are added to support IMS Connect:

QUERY IMSCON

Displays the current status and activity of one or more IMS Connect resources. The TYPE keyword specifies the type of IMS Connect resource to display, which can be one of the following:

TYPE(ALIAS)

Displays the current status and activity of one or more IMS aliases and their associated Open Database Manager (ODBM) address spaces that are defined to IMS Connect.

TYPE(CLIENT)

Displays the current status and activity of one or more clients active in IMS Connect.

TYPE(CONFIG)

Displays the current status and activity of IMS Connect.

TYPE(DATASTORE)

Displays the current status and activity of one or more data stores defined to IMS Connect.

TYPE(IMSPLEX)

Displays the current status and activity of the IMSplex.

TYPE(LINK)

Displays the current status of one or more MSC logical links defined to IMS Connect.

TYPE(MSC)

Displays the current status of one or more MSC physical link definitions defined to IMS Connect.

TYPE(ODBM)

Displays the current status, alias, and activity of one or more ODBM address spaces that are defined to IMS Connect

TYPE(PORT)

Displays the current status, client, and activity of one or more ports defined to IMS Connect.

TYPE(RMTIMSCON)

Displays the current status of one or more remote IMS Connect definitions defined to IMS Connect.

TYPE(SENDCLNT)

Displays the current status of one or more send clients defined to IMS Connect.

TYPE(UOR)

Displays the current status and activity of the unit of recovery (UOR) identifiers in IMS Connect.

UPDATE IMSCON**TYPE(ALIAS)**

Sets or changes the attributes of an IMS alias that is associated with an instance of an ODBM address space.

TYPE(CLIENT)

Immediately terminates communication with a client that uses a specific TCP/IP port.

TYPE(CONFIG)

Performs one the following tasks:

- Terminates IMS Connect with the options QUIESCE or FORCE.
- Enables or disables automatic ODBM registration.
- Enables or disables mixed-case password support in IMS Connect.
- Enables or disables the RACF user identification and verification.
- Enables or disables communication between IMS Connect and z/OS Resource Recovery Services (RRS). RRS is required for two-phase-commit support.
- Opens and closes the line trace data set for IMS Connect.
- Enables or disables RACF user ID caching when RACF authentication is enabled.

TYPE(CONVERTER)

Refreshes one or more XML converters.

TYPE(DATASTORE)

Updates the current status of one or more data stores defined to IMS Connect.

TYPE(IMSPLEX)

Starts or stops communication between IMS Connect and the requested IMSplex.

TYPE(LINK)

Cleans up the MSC logical link blocks in IMS Connect, including the associated send and receive sockets.

TYPE(MSC)

Performs one of the following tasks:

- Restarts the MSC communications after it has been terminated.
- Terminates all communications to an MSC physical link, including all associated logical links.

TYPE(ODBM)

Starts, reestablishes, or stops communication between IMS Connect and an ODBM address space.

TYPE(PORT)

Performs one of the following tasks:

- Immediately terminates listening on a TCP/IP port and deactivates the port when work currently in progress (for existing clients) finishes.
- Reestablishes a TCP/IP connection to enable listening on a TCP/IP port.

TYPE(RACFUID)

Refreshes one or more RACF user IDs in the user ID cache.

TYPE(RMTIMSCON)

Performs one of the following tasks:

- Enables communications for the remote IMS Connect connection after it has been stopped.
- Stops the communications of the remote IMS Connect connection.

TYPE(SENDCLNT)

Terminates the send socket clients for a specified remote IMS Connect connection.

Impact to exit routines

This enhancement does not affect exit routines.

Impact to utilities

This enhancement does not affect utilities.

IMS Connect to IMS Connect enhancement

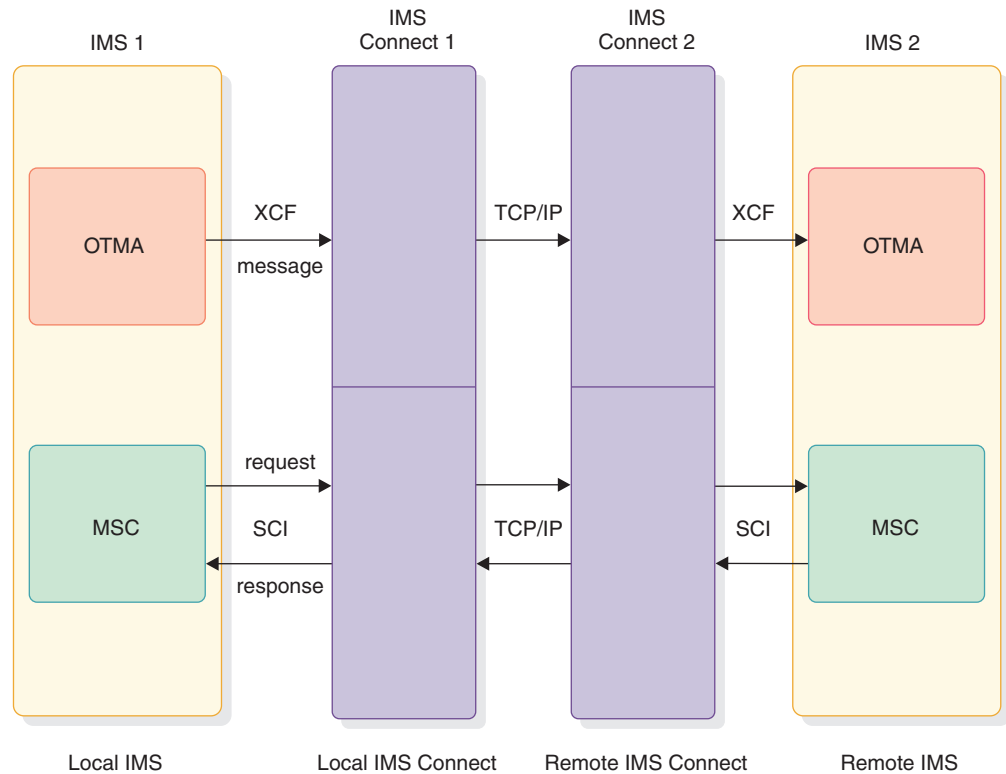
The IMS Connect to IMS Connect function introduces the concept of *IMS-to-IMS TCP/IP communications*: two IMS systems communicating with each other across an Internet Protocol network without the requirement of a third-party application to relay the TCP/IP messages between multiple instances of IMS TCP/IP servers (IMS Connect). IMS-to-IMS TCP/IP communications supports both the Multiple Systems Coupling (MSC) and Open Transaction Manager Access (OTMA) components of IMS.

The MSC support for IMS-to-IMS TCP/IP communications enables request and response messages to be sent between a local IMS system and a remote IMS system across an MSC physical link that uses TCP/IP. Communications between MSC and IMS Connect is a new concept. Regardless of whether an MSC message is a request or a response message, IMS Connect always processes it as a one-way asynchronous message.

The OTMA support for IMS-to-IMS TCP/IP communications enables an IMS application program running in a local IMS system to send a one-way asynchronous message across an Internet Protocol network to a remote IMS system. The local application sends the message by inserting it to an ALTPCB destination defined to OTMA by using either an OTMA destination descriptor or the OTMA User Data Formatting exit routine (DFSYDRU0).

The methods MSC and OTMA use to communicate with IMS Connect are different. MSC uses the Structured Call Interface (SCI) to communicate with IMS Connect. Consequently, MSC TCP/IP communication requires the IMS Common Service Layer (CSL). OTMA uses z/OS cross-system coupling facility (XCF), the existing method of communications between OTMA and IMS Connect.

The following figure illustrates the communications methods.



To enable IMS-to-IMS TCP/IP communications:

- For OTMA, use the new RMTIMSCON statement in the IMS Connect configuration member (HWSCFGxx) to specify the remote IMS Connect environment information. You must also describe the remote IMS to OTMA by using an OTMA destination descriptor in the DFSYDTx PROCLIB member.
- For MSC, in addition to the RMTIMSCON statement, use the new MSC statement in the IMS Connect configuration member (HWSCFGxx) to describe the MSC TCP/IP environment within IMS Connect. You must also specify all the appropriate parameters in the MSPLINK macro to each IMS.

A number of new IMS Connect events can be recorded using the IMS Connect Event Recorder exit routine (HWSTECL0).

As an alternative to specifying an OTMA destination descriptor, the OTMA User Data Formatting exit routine (DFSYDRU0) can be used to specify the RMTIMSCON, RMTIMS, RMTTRAN, and USERID values in the OTMA prefix for sending the ALTPCB output messages to the remote IMS.

New commands are introduced to control and monitor the IMS-to-IMS TCP/IP communications. These commands are described in “IMS Connect command enhancements” on page 141.

To secure IMS-to-IMS TCP/IP connections, IMS Connect can use RACF PassTickets to establish one instance of IMS Connect as a trusted user of another instance of IMS Connect.

Migration considerations

No impact.

Coexistence considerations

No impact.

Log record changes

No impact.

Requirements

No impact.

Restrictions

A maximum of 8 IMS Connect instances can participate in one super member group for OTMA remote ALTPCB output messages.

Impact to installing and defining IMS

The following new statements are added to the HWSCFGxx PROCLIB member:

MSC Defines the IMS Connect TCP/IP send path for an MSC physical link from the local IMS system to the remote IMS system. The following parameters are valid for the MSC statement:

LCLPLKID

Specifies the physical link name of this MSC statement. It is referenced in the LCLPLKID= parameter of the MSPLINK macro definition of the local IMS system.

RMTPLKID

Specifies the corresponding MSC statement physical link name in the remote IMS Connect. It is referenced in the LCLPLKID= parameter of the MSPLINK macro definition of the remote IMS system.

IMSPLEX

Specifies the IMSPLEX to which IMS Connect communicates through SCI for MSC messages.

LCLIMS

Specifies the IMS ID of the local IMS system as registered with SCI in the IMSplex.

RMTIMS

Specifies the IMS ID of the remote (target) IMS system as registered with SCI in the remote IMSplex.

RMTIMSCON

Specifies the remote IMS Connect connection to use for MSC messages. Use one of the values of the ID= parameter of one of the RMTIMSCON statements specified in the local IMS Connect configuration.

RMTIMSCON

Describes the remote IMS Connect TCP/IP environment information. The following parameters are valid for the RMTIMSCON statement:

ID Specifies the one- to eight-character alphanumeric name that identifies this remote IMS Connect connection.

IPADDR

Specifies the remote IMS Connect IP address. Either IPADDR or HOSTNAME must be specified, but not both.

HOSTNAME

Specifies the host name of the remote IMS Connect, such as www.ibm.com. Either IPADDR or HOSTNAME must be specified, but not both.

PORT Specifies the one- to five-character decimal port number of the remote IMS Connect. The port number must match one of the port numbers in the PORT or PORTID parameters in the TCPIP statement of the remote IMS Connect configuration member.

AUTOCONN

Specifies whether to automatically make socket connections to the remote IMS Connect when this instance of IMS Connect starts.

PERSISTENT

Specifies whether the connection to this remote IMS Connect is persistent.

IDLETO

Specifies the amount of time to keep this socket connection before terminating it because of inactivity.

RESVSOC

Specifies the number of sockets to reserve for use by this connection.

USERID

Specifies the user ID for generating a RACF PassTicket to be used by the remote IMS Connect for authenticating the user.

APPL Specifies the application name for generating a RACF PassTicket to be used by the remote IMS Connect for authenticating the user.

The following new parameters are added to the DFSYDTx PROCLIB member for OTMA destination descriptors:

RMTIMSCON

Specifies the name of the remote IMS Connect connection to be used by the local IMS Connect. This value is the same value specified in the ID parameter of the RMTIMSCON statement in the local IMS Connect.

RMTIMS

Specifies the name of the remote IMS to which the message is to be sent. This value is the same value specified in the ID parameter of the DATASTORE statement in configuration member of the remote IMS Connect.

RMTTRAN

Specifies the transaction name to use at the remote IMS.

USERID

Specifies the RACF user ID to use at the remote IMS for transaction authorization. If not specified, the user ID from the IMS application that performed the ISRT is used.

Impact to administering IMS

The following information is added to the communications and connections information:

- The concept of IMS-to-IMS TCP/IP communications.
- A description of verifying the security authorization of a remote IMS Connect instance by using a RACF PassTicket.
- New IMS Connect configuration information for IMS-to-IMS TCP/IP communications.
- New OTMA data fields, as mapped by the HWSOMPFX macro.

Impact to programming for IMS

This enhancement does not affect programming for IMS.

Impact to troubleshooting for IMS

The IMS Connect recorder log record is updated with new caller IDs.

The following new messages are added for this enhancement:

HWSX0920W

During the processing of the IMS Connect configuration member, a parameter value was detected to be invalid.

HWSE3110I

MSC communications to the named MSC physical link ID has started.

HWSE3115I

MSC communications to the named MSC physical link ID has terminated.

HWSE3130W

IMS Connect was unable to get storage for internal buffers. This error can occur when not enough storage is available to complete the process.

HWSE3135W

IMS Connect was unable to release storage for internal buffers.

HWSE3140W

IMS Connect was unable to register to the named MSC IMS member.

HWSE3155W

An MSC message was not sent to the IMS identified in the message because the communications to that IMS is unavailable due to the status of the MSC member.

HWSF3305I

MSC communications with IMS for the stated MSC physical link has stopped.

HWSF3310I

The logical link communications for the MSC physical link has terminated.

HWSF3315E

IMS Connect cannot open MSC communication to IMS because IMS Connect is not connected to an IMSplex or an instance of SCI is unavailable.

HWSF3330W

An IMS Connect MSC communications component was unable to get storage for internal buffers.

HWSF3335W

IMS Connect was unable to open MSC communication to IMS because the internal IMS Connect driver that opens communications failed.

HWSF3340W

IMS Connect received an MSC message from IMS on the local MSC physical link identified in the message, but was not able to send the message to the remote IMS Connect.

HWSF3345W

IMS Connect had an error while trying to receive an MSC message from IMS.

HWSF3350W

IMS Connect tried to notify the sender of an MSC message from the remote IMS Connect, but was unable to due to another error.

HWSF3355E

IMS Connect received an MSC shutdown directive message from IMS but was not able to find the MSC logical link associated with the named partner ID.

HWSF3360I

An MSC physical link transmit thread or receive thread has terminated.

HWSF3365E

IMS Connect was unable to send an MSC message to IMS on the MSC physical link identified in the message.

HWSF3370E

IMS Connect failed to send a notification to IMS indicating that the MSC physical link that is identified in the message has been stopped.

HWSF3375E

IMS Connect failed to send a notification to IMS indicating that the MSC logical link that is identified in the message has been stopped.

HWSF3385I

MSC communications with IMS on the MSC physical link that is identified in the message was closed.

HWSF3400E

An IMS Connect internal error has occurred.

HWSF3405E

IMS Connect failed to stop the MSC logical link or physical link because the MSC physical link is in a disconnected state.

HWSP1507E

IMS Connect failed to authenticate or authorize the security credentials on a connection identified by the client ID of the connection.

HWSS0777W

IMS Connect was unable to listen for an incoming connection on the port because no sockets were available for incoming connection requests.

HWST3500I

Remote IMS Connect communications to the named remote IMS Connect connection have started.

| **HWST3505I**

| Remote IMS Connect communications to the named remote IMS Connect
| connection have stopped.

| **HWST3510E**

| Communications with a remote IMS Connect instance on the connection
| identified in the message failed to start.

| **HWST3520E**

| IMS Connect had an error while trying to generate the PassTicket with the
| stated user ID and application name for connection security.

| **HWST3525I**

| The named send client of the remote IMS Connect connection has been
| terminated.

| **HWST3530W**

| While attempting to send a message, the communications component for a
| connection to a remote IMS Connect instance was unable to get storage for
| internal buffers.

| **HWST3540E**

| IMS Connect was unable to start the conversation thread for the TCP/IP
| connection to the remote IMS Connect.

| **HWST3545E**

| While processing a message request of the type identified in the message,
| IMS Connect tried to make a socket connection to the remote IMS Connect,
| but the specified remote IMS Connect does not support the message type.

| **HWST3550W**

| IMS Connect was unable to notify the local IMS system that an error
| occurred while trying to send an MSC message to the remote IMS system.

| **HWST3560W**

| IMS Connect has been trying to connect to the remote IMS Connect, but an
| error occurred that prevents IMS Connect from continuing to try to connect
| to the remote IMS Connect.

| **HWST3570E**

| An OTMA ALTPCB output message destined for a remote IMS system
| could not be delivered by IMS Connect.

| **HWST3575W**

| An OTMA ALTPCB output message destined for a remote IMS system was
| rejected by IMS Connect and queued to the front of the TPIPE queue
| identified in the message on the local IMS system identified in the
| message.

| **HWST3600E**

| The function work element (FWE) cannot be processed.

| **HWST3700E**

| The IMS Connect communications driver was unable to perform the
| specified socket function.

| **HWST3730W**

| The remote IMS Connect communications driver was unable to get storage
| for internal buffers.

| **HWST3735W**

| The remote IMS Connect communications driver was unable to release
| storage for internal buffers.

HWX0920W

During the processing of the IMS Connect configuration member, a parameter value was detected to be invalid or unsupported by the current IMS Connect configuration. IMS Connect changed the value of the parameter to the new value shown in the message text.

For a complete list of new, changed, and deleted messages, codes, and abends for IMS Version 12, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 113.

Impact to IMS reference information

Impact to commands

The following IMS commands are enhanced to support IMS-to-IMS TCP/IP communications:

- CREATE OTMADESC
- /DISPLAY TMEMBER
- QUERY OTMADESC
- UPDATE OTMADESC

Certain IMS Connect commands are enhanced and a number of new ones are added to support IMS-to-IMS TCP/IP communications. The details of these changes are described in “IMS Connect command enhancements” on page 141.

Impact to exit routines

The OTMA User Data Formatting exit routine (DFSYDRU0) can be used to specify the RMTIMSCON, RMTIMS, RMTTRAN, and USERID values in the OTMA prefix for sending out the ALTPCB output messages to the remote IMS. The sample exit routine shipped with IMS Version 12 is the same as the exit routine that is shipped with IMS Version 11.

The IMS Connect Event Recorder exit routine (HWSTECL0) is updated to be able to record the following events:

- Start of a session
- Connected to remote IMS Connect
- Disconnected from remote IMS Connect
- Communications thread started for a remote IMS Connect connection
- Message received from remote OTMA
- Message sent to remote IMS Connect over TCP/IP
- MSC message received from remote IMS Connect
- Message sent to remote OTMA
- MSC message received from MSC
- MSC message sent to remote IMS Connect
- MSC message received from remote IMS Connect
- MSC message sent to MSC
- Connection to remote IMS Connect timed out
- Trigger for the end of a session

Impact to utilities

This enhancement does not affect utilities.

Chapter 11. IMS repository function enhancements

The components of the IMS repository function provide a centralized storage and retrieval solution for resource definitions and descriptor definitions.

For IMS Version 12, the resource and descriptor definitions that are supported by dynamic resource definition (DRD) can be stored in the IMS resource definition (IMSRSC) repository. IMS can retrieve the stored definitions to dynamically generate runtime resources and descriptors. The resource and descriptor definitions that can be stored are:

- Application programs
- Databases
- Fast Path routing codes
- Transactions

In addition to the stored resource and descriptor definitions, an IMS resource list, which contains the resource names and resource types that can be processed by an IMS system, is kept in the IMSRSC repository.

There can be one or more resource lists for each resource type (DB, DBDESC, PGM, PGMDESC, RTC, RTCDESC, TRAN, and TRANDESC) owned by an IMS system. The IMS resource list is deleted when no resource definitions exist for the IMS for a given resource type.

The resource list for a particular IMS is deleted when a DELETE command is issued to remove all resources for that IMS in the repository.

If you use the DRD function for the first time when running on IMS Version 12, you can use the IMS repository function without ever using a resource definition data set (RDDS). Although support for RDDSs continues in IMS Version 12, the IMSRSC repository is a strategic alternative to the RDDS. An RDDS stores the resource and descriptor definitions for one local IMS only, and two or more system RDDS data sets must be defined for each local IMS. The IMSRSC repository provides the ability for an IMSplex to use a single shared repository to store resource and descriptor definitions for all the IMS systems in an IMSplex.

The following components provide the IMS repository function:

- IMS, with a Common Service Layer (CSL) consisting of an Operations Manager (OM), a Resource Manager (RM), and a Structured Call Interface (SCI)
- A Repository Server (RS) - a new BPE-based address space for IMS Version 12
- Two sets of repository data sets, that are composed of:

IMSRSC repository data set

Consisting of two or three pairs of VSAM key sequenced data sets (KSDSs):

- Primary repository data sets, consisting of a primary repository index data set, and a primary repository member data set
- Secondary repository data sets, consisting of a secondary duplex copy of the repository index data set, and a secondary duplex copy of the repository member data set

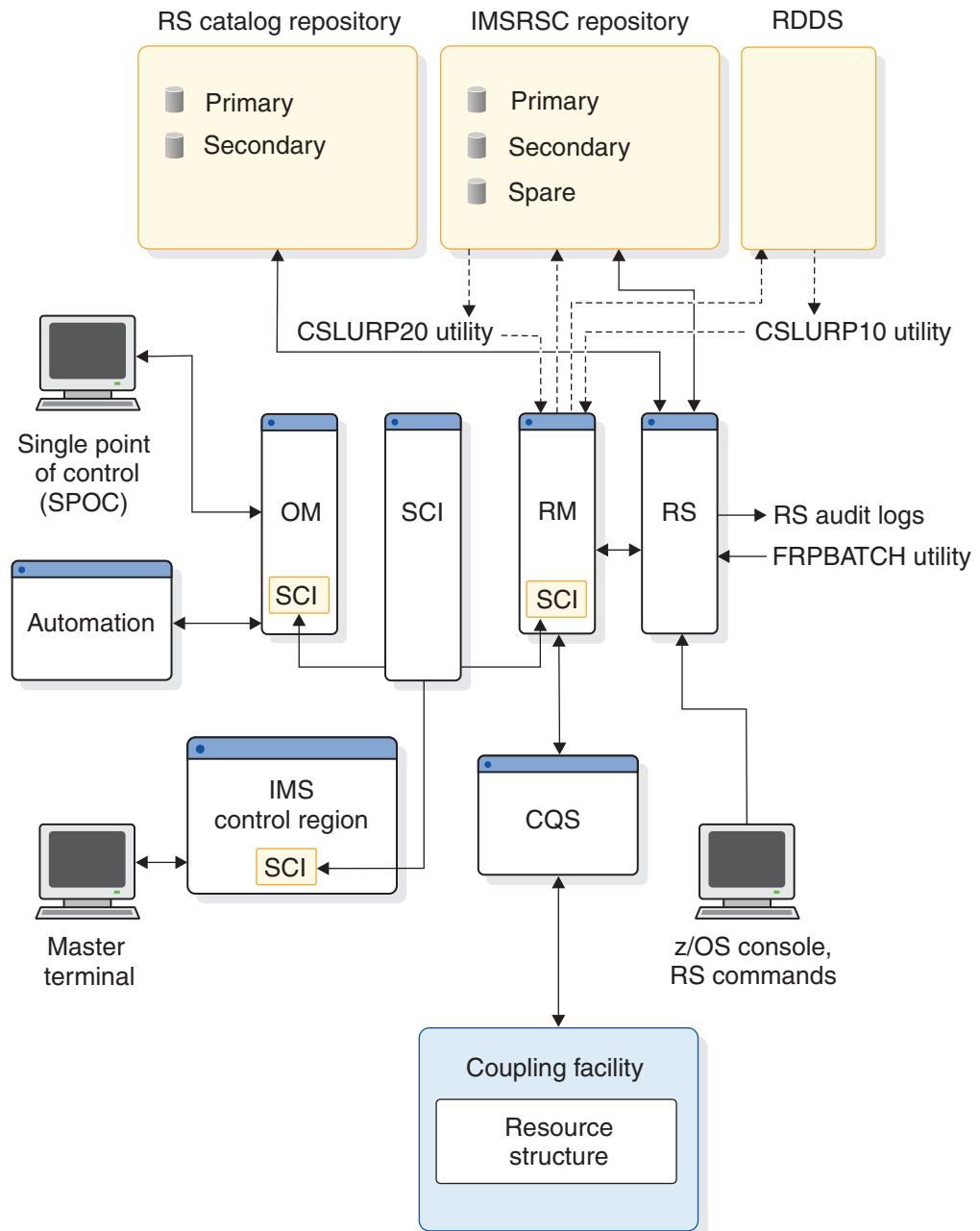
- Third (spare, optional) set of KSDSs, used if RS cannot write to either the primary or the secondary repository data sets

RS catalog repository data set

Used by the Repository Server. Like the IMSRSC repository data set, the RS catalog repository data set consist of two pairs of KSDSs: a primary pair of KSDSs and a secondary pair of KSDSs. The RS catalog does not support a third (spare) set of data sets.

- A single point of control (SPOC) or automation application program

The following figure shows the relationship between the IMS repository function components.



All requests for online work associated with the stored definitions flows from IMS to RS through RM. IMS Version 12 also provides batch utilities that can perform work and interact with RS directly or through RM address space without IMS being active.

The RS address space:

- Can run on any logical partition (LPAR) in the Parallel Sysplex where an RM is running. If the sysplex has multiple RS address spaces, one of them is considered the master and the others are subordinates. One master RS can manage all the repositories in the sysplex or there can be one master RS for each IMSplex.

Recommendation: Use one master RS per IMSplex for availability and storage considerations.

- Provides a batch administrative interface (FRPBATCH) and the z/OS MODIFY (F) command interface.
- Uses MVS system authorization facility (SAF) callable services to restrict access to the repositories. You can use an SAF-enabled external security manager, such as RACF, to administer RS security.
- Can write information about specified events to the MVS logger AUDIT log-stream name that is specified in the FRPCNFG member of the IMS PROCLIB data set.

The following tasks can be performed with the IMSRSC repository:

Populating the IMSRSC repository

- To store runtime DRD definitions in the IMSRSC repository, use an EXPORT DEFN TARGET(REPO) command or use the EXPORT DEFN panels in the TSO SPOC.
- To write the stored resource and descriptor definitions from an RDDS to the IMSRSC repository, run the offline batch RDDS to Repository utility (CSLURP10).

Reading from the IMSRSC repository

- To have IMS read the resource and descriptor definitions for a cold start or an emergency restart with the COLDSYS parameter, specify AUTOIMPORT=AUTO or AUTOIMPORT=REPO in the dynamic resource definition section of the DFSDFxxx PROCLIB member.
IMS rebuilds the runtime resources from information in the log records for warm starts or emergency restarts without the COLDSYS parameter.
- To manually create runtime resources or descriptors from the definitions in the IMSRSC repository, use the IMPORT DEFN SOURCE(REPO) command or use the IMPORT DEFN panels in the TSO SPOC.
- To display information about the definitions from the IMSRSC repository, use the QUERY commands with SHOW(DEFN), SHOW(DEFN,IMSID) or SHOW(IMSID) parameters, or use the QUERY panels in the TSO SPOC.
- To create an RDDS from the definitions in the IMSRSC repository, use the Repository to RDDS utility (CSLURP20).

Deleting definitions from the IMSRSC repository

To delete definitions from the IMSRSC repository, use the DELETE DEFN TARGET(REPO) command or the DELETE DEFN panels in the TSO SPOC.

The IMS Dump Formatter ISPF panels are updated to support the IMS repository function.

Migration considerations

Version-to-version migrations are not affected. DRD-enabled IMS systems that use an RDDS are supported in IMS Version 12.

Recommendations:

- Install the following RM coexistence APARs before migrating to IMS Version 12:
 - IMS Version 10 - PM19025/UK63960 and PM32951/UK68883
 - IMS Version 11 - PM19026/UK63964 and PM32766/UK68882
- Migrate from using an RDDS to an IMSRSC repository because the IMS repository function is a strategic direction for IMS.

To migrate a DRD-enabled IMS to use the IMSRSC repository instead of an RDDS:

1. Specify attributes of the repository in the FRPCNFG, BPECONFIG, CSLRIxxx, and DFSDFxxx PROCLIB members.
2. Create the RS catalog repository data set.
3. Create the IMSRSC repository data set.
4. Start the RS address space.
5. Define the IMSRSC repository data set to RS, which stores information about the IMSRSC repository in the RS catalog repository data set.
6. Specify the IMSRSC repository to RM in the repository section of the CSLRIxxx PROCLIB member.
7. Start RM with CSLRIxxx member using IMSRSC repository or use the UPDATE RM command to enable RM to use the repository
8. Populate the IMSRSC repository data sets with resource and descriptor definitions by running the batch RDDS to Repository utility (CSLURP10).
9. Start SCI on the LPAR where utility is being run and start SCI on the LPAR where RM is running.
10. Cold start IMS with AUTOIMPORT specified.
11. Optionally, start the coupling facility with a resource structure.

If AUTOEXPORT is enabled and RDDSs are defined, IMS continues to export resource definitions to the RDDSs after each system checkpoint, even if IMS is migrated to use the IMSRSC repository.

- To disable the AUTOEXPORT to RDDS function, issue the UPDATE IMS SET(LCLPARM(AUTOEXPORT(N))) command.
- To eliminate the RDDSs and their use by IMS, modify the DFSDFxxx PROCLIB member to remove the RDDS definitions and restart IMS.

Coexistence considerations

The following APARs/PTFs must be installed for an IMS Version 12 RM to coexist with either an IMS Version 10 or IMS Version 11 RM:

- IMS Version 10 - PM19025/UK63960 and PM32951/UK68883
- IMS Version 11 - PM19026/UK63964 and PM32766/UK68882

With the appropriate coexistence APARs/PTFs installed, an IMS Version 12 using DRD can coexist with either an IMS Version 10 or IMS Version 11 that have DRD enabled.

There are several ways to keep the stored resource definitions synchronized across multiversion IMSplexes. The following are 2 possible scenarios.

Scenario 1: All IMS systems on the same LPAR

In this scenario:

- IMSA is at version 10, is using DRD with an RDDS, and is using an IMS Version 12 CSL
- IMSB is at version 11, is using DRD with an RDDS, and is using an IMS Version 12 CSL
- IMSC is at version 12 and is using DRD with an IMSRSC repository
- All 3 IMS systems are in the same IMSplex and are participating in shared queues
-

The following steps illustrate changing an attribute of a transaction and storing its resource definition for scenario 1.

1. Check for work in progress by using a QRY TRAN SHOW(WORK) command. Either wait for the work to finish or address the work in progress.
2. When the transaction is not in use, an attribute of a transaction is changed on each IMS system using an UPDATE or CREATE command.
3. IMSA and IMSB store the changed resource definition into their respective RDDSs and IMSC stores the changed resource definition into its IMSRSC repository.
4. Work for the transaction is restarted.

Scenario 2: IMS systems on multiple LPARs

In this scenario:

- IMSA is at version 10, is using DRD with an RDDS, and is using an IMS Version 12 CSL
- IMSB is at version 11, is using DRD with an RDDS, and is using an IMS Version 12 CSL
- IMSC and IMSD are at version 12 and are using DRD with a single IMSRSC repository
- IMSA, IMSB, and IMSC are running on LPAR1
- IMSD is running on LPAR2
- All 4 IMS systems are participating in shared queues

The following steps illustrate changing an attribute of a transaction and storing its resource definition for scenario 2.

1. Check for work in progress by using a QRY TRAN SHOW(WORK) command. Either wait for the work to finish or address the work in progress.
2. When the transaction is not in use, an attribute of a transaction is changed on either IMSC or IMSD using an UPDATE or CREATE command.
3. The changed resource definition for the transaction is stored in the IMSRSC repository.
4. IMSC exports the stored resource definition from the IMSRSC repository to a non-system RDDS.
5. IMSA and IMSB import the stored resource definition from the non-system RDDS.

6. IMSA and IMSB store the changed resource definition into their respective system RDDSs.
7. Work for the transaction is restarted.

Log record changes

The X'22' log record is modified to support the IMPORT DEFN TYPE(REPO). The X'220E' log record is modified to support the changes made to the UPDATE IMS command for the IMS repository function.

Requirements

The IMS repository function uses the same hardware and software as IMS Version 12 and later. However, the following configuration requirements apply:

- IMS must be configured as an IMSplex, with the CSL OM, RM, and SCI address spaces.
- IMS must be configured and enabled to use DRD.
- The RS catalog repository data set must be created before the Repository Server is started.
- The RS address space must be started before IMS is started.

Restrictions

Only IMS Version 12 or later systems can use the IMS repository function.

The IMS repository function cannot be enabled if there are IMS Version 11 or lower RM address spaces active in the IMSplex.

Impact to installing and defining IMS

The IMS Installation Verification Program (IVP) is enhanced to verify the installation and demonstrate the use of the IMS repository function.

The system definition information is enhanced in the following ways:

- The DRD information is enhanced to describe how to use an IMSRSC repository instead of an RDDS.
- The BPECFG PROCLIB member information is enhanced to include the new REPO type of trace table.
- The new repository configuration PROCLIB member (FRPCNFG) information is added.
- The CSLRIxxx PROCLIB member information is enhanced to include a new repository section for specifying the IMSRSC repository to RM and, optionally, specify repository audit access level for the specified repository.
- The DFSDFxxx PROCLIB member information is enhanced to include the new repository section. Also, new parameters are added to the dynamic resource definition section.
- Information about allocating the repository data sets is added.

The Syntax Checker is enhanced to support the FRPCFG, CSLRIxxx and DFSDFxxx member changes for the IMS repository function.

Impact to administering IMS

The IMS communications and configuration information is enhanced with information about using MSC with the IMSRSC repository.

The IMS database administration information is enhanced with information about using an IMSRSC repository instead of an RDDS.

The DRD topics in the operations and automation information are enhanced with information about using an IMSRSC repository instead of an RDDS. Also, the TSO SPOC topics are updated with information about managing resource definitions that are stored in an IMSRSC repository.

The system administration information is enhanced with the following information:

- An overview of the new RS address space, along with possible IMSplex configurations that use the IMS repository function
- A set of new topics that describe:
 - Administrative tasks for RS and an overview of the commands used to complete these tasks
 - The interactions of RM and RS (with and without a resource structure)
 - Security

Impact to programming for IMS

The system programming information is updated to document the FRPBATCH interface to RS. The following commands can be issued from a batch JCL job to FRPBATCH interface:

ADD Adds a repository to the RS catalog

DELETE

Deletes a repository from the RS catalog

DSCHANGE

Changes the status of a repository data set pair to either SPARE or DISCARD

LIST Lists all the repositories and their statuses or the details about a specific repository

RENAME

Changes the name of a repository in the RS catalog

START

Starts the specified repository

STOP Stops the specified repository

UPDATE

Changes specified repository attributes in the RS catalog

Impact to troubleshooting for IMS

The diagnostic information is updated to discuss the new Repository Server audit log records.

The following new messages are added:

CSL2500I

RM successfully connected to repository name obtained from either the CSLRIxxx member or the repository name obtained from the resource structure.

CSL2501I

RM successfully initialized the repository with the key and index values. This message indicates that the repository was empty when RM connected to the repository.

CSL2510E

A REGISTER or Deregister request to the RS address space failed to complete.

CSL2511E

A CONNECT or DISCONNECT request to the RS address space failed to complete.

CSL2512W

The repository name specified in the CSLRIxxx member is different from the repository name in the resource structure. IMS is using the repository name that is listed in the resource structure.

CSL2513E

RM was not able to process the CSLRIxxx member as the repository section because there were duplicate statements for the same repository type.

CSL2514E

RM was not able to process the CSLRIxxx member as the repository section because there were invalid characters for a parameter.

CSL2515E

RM was not able to connect to the repository due to a CQS error reading or writing to the resource structure. RM is not connected to the repository.

CSL2516E

RM was not able to connect to the repository because the repository name specified in the CSLRIxxx member is invalid.

CSL2517E

RM was not able to register to the RS address space because the XCFGRP name value specified in the CSLRIxxx member did not match the XCFGRP name in the resource structure.

CSL2518E

Initialization of the IMSRSC repository failed.

DFS3406I

A DELETE, EXPORT, or IMPORT command completed successfully.

DFS3407E

A DELETE, EXPORT, or IMPORT command did not complete successfully.

DFS3409I

AUTOIMPORT=AUTO was specified in the DFSDFxxx PROCLIB member, but at this point in the initialization process, IMS cannot determine where the stored resource definitions are to be read from if a cold start is needed. IMS defers the setting of the AUTOIMPORT source until the next cold start, where message DFS3399I identifies the AUTOIMPORT source.

DFS4400E

IMS is defined with AUTOIMPORT=REPO and the repository section is

defined in the DFSDFxxx PROCLIB member, but RM is not enabled for the repository for the returned repository type.

DFS4401E

An error was encountered processing a CSLRM request of the type specified in the message.

DFS4402W

The repository section of the DFSDFxxx PROCLIB member was ignored because either MODBLKS-OLC or RMENV=NO was specified.

DFS4403E

IMS determined during initialization that a REPOSITORY= statement was not coded in the repository section of the DFSDFxxx PROCLIB member.

DFS4404I

IMS successfully connected to RM.

DFS4405W

IMS connected successfully to the repository name and type indicated in the message. However, RM indicated the repository is empty. No resources are imported from the repository.

The following messages are added for the RDDS to Repository utility (CSLURP10) and the Repository to RDDS utility (CSLURP20):

CSL2600I

A write request to the repository was successful.

CSL2601E

The utility specified in the message failed to start the BPE Limited Function Services (LFS).

CSL2602E

The utility specified in the message failed to open one of the required data sets.

CSL2603I

The utility specified in the message is using the RDDS data set name specified in the message.

CSL2604E

The utility specified in the message encountered an error while trying to obtain 64-bit storage for an internal buffer.

CSL2605E

The utility specified in the message encountered an error trying to obtain storage for the indicated component.

CSL2606E

The utility specified in the message encountered an error while trying to read the input parameters in the SYSIN data set.

CSL2607E

The utility specified in the message encountered an error while trying to parse the data in the SYSIN data set.

CSL2608E

The utility specified in the message encountered an error while trying to read the RDDS that was specified on the RDDSDSN DD statement.

CSL2609E

The utility specified in the message has detected that the RDDS specified on the RDDSDSN DD statement is not an RDDS or it does not contain data from a successful export.

CSL2610E

The utility specified in the message encountered an error while trying to process the RDDSDSN DD statement.

CSL2611E

The utility specified in the message encountered an IMSID parameter that contains invalid characters.

CSL2612E

The utility specified in the message has specified an invalid value for the PLEXNAME parameter.

CSL2613E

The utility specified in the message failed the CSLSCREG request to register with SCI.

CSL2614E

The utility specified in the message failed to register with the RM system that is named in the message.

CSL2615E

The utility specified in the message has more than one IMSPLEX name parameters specified on the IMSPLEX(NAME=) parameter.

CSL2616E

A CSLRPUPD request in the utility specified in the message failed to update resource definitions in the IMSRSC repository.

CSL2617E

A CSLSCQRY request in the utility specified in the message has failed to identify active RM systems in the IMSplex.

CSL2618I

The utility specified in the message is processing the PlexName and IMS ID.

CSL2619E

The utility specified in the message has registered to an RM that is not enabled or not defined with the repository type specified in the message.

CSL2620I

The utility specified in the message has successfully registered to the RM specified in the message.

CSL2621E

The utility identified in the message failed to load.

CSL2622E

The RDDS to Repository utility (CSLURP10) could not register to any RM in the IMSplex.

CSL2625I

The Repository to RDDS utility (CSLURP20) successfully wrote resource definitions from the specified repository to the specified RDDS.

Many new messages with a prefix of FRP are added. These messages contain information about the RS address space.

The following messages are modified: CSL0001E, DFS2930I, DFS3395I, DFS3399I, and DFS3999W.

The following abend is added:

0400 IMS initialization encountered an error while processing the repository section. Refer to the DFS4400E or DFS4401E message that was issued before the abend to determine the error.

New subcodes are added to existing RM abend 0010.

For a complete list of new, changed, and deleted messages, and abend codes for IMS Version 12, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 113.

Impact to IMS reference information

Impact to commands

The IMS command information is enhanced as follows:

- The /ERESTART command information is enhanced to include repository usage ramifications for the COLDBASE, COLDSYS, and COLDCOMM keywords.
- The new type-2 DELETE DEFN, QUERY RM, and UPDATE RM commands are added.
- The following IMS commands are enhanced to support the repository:
 - /CHECKPOINT FREEZE | DUMPQ | PURGE LEAVEPLEX (delivered through the IMS service process)
 - EXPORT DEFN
 - IMPORT DEFN
 - QUERY DB
 - QUERY DBDESC
 - QUERY IMS
 - QUERY IMSPLEX
 - QUERY PGM
 - QUERY PGMDESC
 - QUERY RTC
 - QUERY RTCDESC
 - QUERY STRUCTURE
 - QUERY TRAN
 - QUERY TRANDESC
 - UPDATE IMS
- The BPE DISPLAY TRACETABLE and UPDATE TRACETABLE commands are enhanced to display information about the trace tables for the Repository Server address space and the new Repository Server DIAG trace table.
- The following z/OS MODIFY (F), SHUTDOWN, or STOP (P) commands are added for the RS address space:

F *reposerver_name*, **ADMIN** *action*

Performs one of the following actions:

- DSCHANGE - Changes the status of a repository data set pair to either SPARE or DISCARD

- DISPLAY - Displays all the repositories and their statuses or the details about a specific repository
- START - Starts the specified repository
- STOP - Stops the specified repository

F *reposerver_name*, **AUDIT** *action*

Performs one of the following actions:

- LEVEL - Specifies whether audit records are written to the log
- RESTART - Resumes audit logging after logging was suspended

F *reposerver_name*, **SECURITY REFRESH**

Dynamically refreshes the RS online security information in response to changes to RACF (or equivalent) security profiles

F *reposerver_name*, **SHUTDOWN**

Shuts down the specified RS that is running on the z/OS where the command was issued. If a master RS is shut down, the ALL parameter is not specified on the command, and there are subordinate RS address spaces, one of the subordinate RS address spaces becomes the master RS. If the ALL parameter is specified, all the RS address spaces that use the same z/OS cross-system coupling facility are shut down.

P *reposerver_name*

Stops and shuts down the specified RS that is running on the z/OS where the command was issued. If a master RS is shut down and there are subordinate RS address spaces, one of the subordinate RS address spaces becomes the master RS.

Impact to exit routines

The Destination Creation exit routine (DFSINSX0) is enhanced to be able to export resources to an IMSRSC repository.

Impact to utilities

The following new utilities are added:

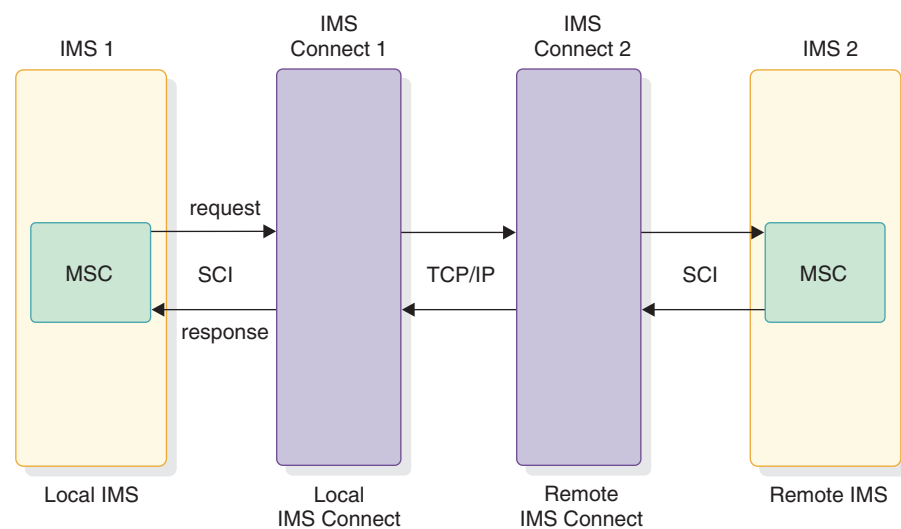
- RDDS to Repository utility (CSLURP10)
- Repository to RDDS utility (CSLURP20)

Chapter 12. MSC TCP/IP enhancement

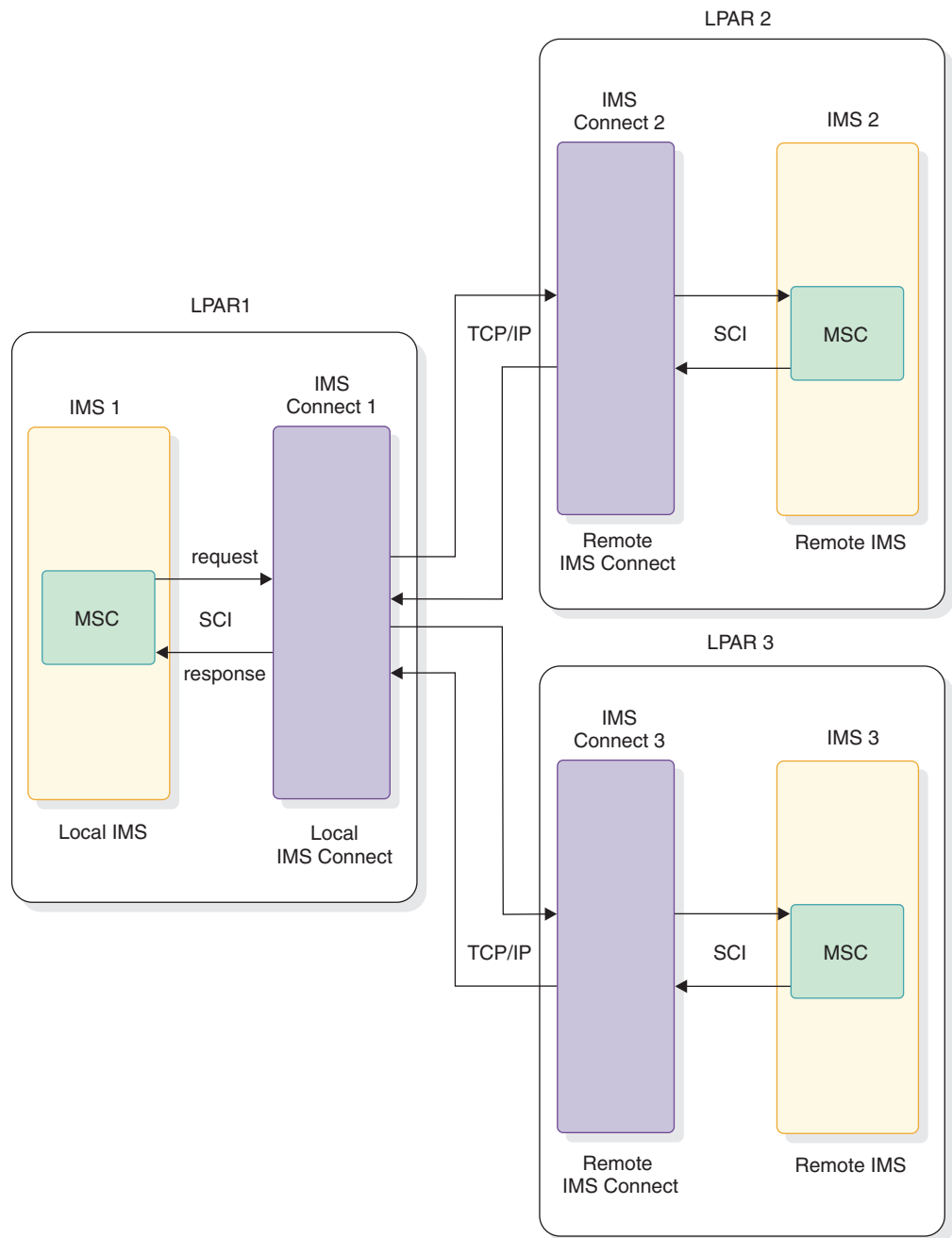
In IMS Version 12, IMS Multiple Systems Coupling (MSC) supports a new communications path between systems: TCP/IP. This new functionality is built on the IMS-to-IMS TCP/IP communications enhancement that is part of IMS Connect.

In addition to the VTAM, channel-to-channel (CTC) adapter, and memory-to-memory (MTM) communication paths, MSC now supports TCP/IP.

The following figure illustrates two IMS systems that use MSC to communicate through two instances of IMS Connect.



One MSC can also send messages to multiple MSC instances, as illustrated in the following figure.



To assign an existing MSC VTAM configuration to TCP/IP:

1. Configure the local and remote IMS systems as IMSplexes, each with at least an Operations Manager (OM) and a Structured Call Interface (SCI).
2. Specify a new physical link (TYPE=TCPIP) in the MSPLINK macro to each IMS system.
3. Enable IMS Connect-to-IMS Connect communications between the IMSplexes.
4. Restart the local and remote IMS systems.
5. Reassign the VTAM logical links to the new TCP/IP physical link on both IMS systems.
6. Start the TCP/IP links from either IMS system.

IMS Version 12 also provides a generic IMSID support for MSC TCP/IP links, similar to the VTAM generic resource (VGR) support for MSC VTAM links. This function supports the shared queue and XRF environments.

Migration considerations

No impact.

Coexistence considerations

Although MSC TCP/IP does not impose any coexistence issues with previous versions of IMS, all systems that use this function must be IMS Version 12 or later systems.

Log record changes

No impact.

Requirements

MSC TCP/IP has the same hardware and software requirements as the base IMS Version 12 product. However, IMS must be configured with an SCI and OM, and IMS-to-IMS TCP/IP communications must be established. Also, a single point of control (SPOC) program, such as the IMS TSO SPOC, must be used to issue type-2 commands to the OM API or REXX SPOC API.

Restrictions

No impact.

Impact to installing and defining IMS

Information about configuring IMS Connect as the communications vehicle for MSC is added.

Examples of MSC TCP/IP configurations are added.

The following parameters of the MSPLINK macro are changed:

BUFSIZE=

TCP/IP buffer information is added.

NAME=

Support for the remote IMS ID is added.

SESSION=

This parameter now supports the number of parallel sessions for TCP/IP.

TYPE=

The TCPIP type is added.

The following two new parameters of the MSPLINK macro are added:

LCLICON=

Local IMS Connect member name

LCLPLKID=

ID of the MSC configuration statement in the local IMS Connect

The following keyword is added to the DFSDCxxx member of the IMS PROCLIB data set:

GENIMSID=

Specifies a 1- to 8-character alphanumeric shared IMS ID that identifies a TCP/IP generic resources group in an IMSplex.

Impact to administering IMS

New topics are added and existing topics revised in the communications and connections information about using a TCP/IP physical link for MSC and using IMS Connect as the MSC communications vehicle.

A new topic is added to the operations and automation information that describes how to switch from VTAM to TCP/IP for MSC connections, and vice versa. Existing operations and automation topics that discuss MSC links are updated to include TCP/IP information.

Many topics are updated in the system administration information to include MSC TCP/IP information.

Impact to programming for IMS

Although programming is not directly affected by the MSC TCP/IP function, the appropriate type-2 commands must be issued through a SPOC program using the OM API.

Impact to troubleshooting for IMS

TCP/IP information is added to the MSS1 and MSS2 fields in MSC diagnostic traces. New MSS3 and MSS4 fields are added to the MSC diagnostic traces.

The following new messages are added:

DFS3175E

An MSC CSLSCMSG request failed.

DFS3176E

An error message was received from IMS Connect.

DFS3177E

One of the modules in the MSC device-dependent module (DDM) has detected an error while processing.

DFS3178E

MSC detected an internal logic error.

For a complete list of new, changed, and deleted messages, and abend codes for IMS Version 12, see Chapter 6, "New, changed, and deleted messages and abend codes," on page 113.

Impact to IMS reference information

Impact to commands

MSC TCP/IP information is added to the following commands:

- /CHANGE LINK
- CREATE TRAN

- | • /DISPLAY ACTIVE
- | • /DISPLAY AFFIN
- | • /DISPLAY ASMT
- | • /DISPLAY LINK
- | • /DISPLAY MSPLINK
- | • /PSTOP LINK
- | • QUERY IMS
- | • QUERY MSPLINK
- | • /RSTART
- | • /TRACE UNITYPE
- | • UPDATE MSLINK
- | • UPDATE MSPLINK
- | • UPDATE TRAN
- | • UPDATE TRANDESC

Impact to exit routines

This enhancement does not affect exit routines.

Impact to utilities

This enhancement does not affect utilities.

Part 3. IBM DB2 and IMS Tools support for IMS Version 12

The IBM IMS Tools products are designed to enhance the performance and operation of IMS, and are upgraded and enhanced to work with IMS Version 12.

The IMS Tools products are categorized by function. The information describes the minimum version and release levels of the IBM IMS Tools products that support IMS Version 12.

For more information about these tools, go to www.ibm.com/software/data/db2imstools.

For a list of current PTFs for these tools, go to IBM DB2 and IMS Tools PTF Listing.

Chapter 13. IBM IMS Tools Solution Packs for z/OS

The IBM portfolio of IMS tools and utilities improve systems and data management, enhance performance, and support increased availability.

IBM IMS Database Solution Pack for z/OS, V1.2

The IBM IMS Database Solution Pack for z/OS tool combines the features, functions, and processes your database administrator can use to more effectively analyze, maintain, and tune IMS full-function databases, including High Availability Large Databases (HALDBs). It provides a comprehensive set of high-performance utilities to unload, load, index build, reorganize, backup, verify, and report on full-function databases.

The IBM IMS Database Solution Pack for z/OS includes the following tools:

- “IBM IMS Database Reorganization Expert for z/OS, V4.1” on page 208
- “IBM IMS High Performance Image Copy for z/OS, V4.2” on page 185
- “IBM IMS High Performance Load for z/OS, V2.1” on page 208
- “IBM IMS High Performance Pointer Checker for z/OS, V3.1” on page 209
- “IBM IMS High Performance Prefix Resolution for z/OS, V3.1” on page 209
- “IBM IMS High Performance Unload for z/OS, V1.2” on page 209
- “IBM IMS Index Builder for z/OS, V3.1” on page 185
- “IBM IMS Library Integrity Utilities for z/OS, V2.1” on page 210

Program number: 5655-S77

IBM IMS Fast Path Solution Pack for z/OS, V1.2

The IBM IMS Fast Path Solution Pack for z/OS delivers extensive utilities that include functions a database administrator can use to analyze, maintain, and tune IMS Fast Path databases. Included are features that can help boost system availability by enabling the operations of a variety of key functions without taking the IMS database offline.

The IBM IMS Fast Path Solution Pack for z/OS includes:

- IMS Database Repair Facility
- IMS Fast Path Advanced Tool
- IMS Fast Path Basic Tools
- IMS Fast Path Online Tools
- “IBM IMS High Performance Image Copy for z/OS, V4.2” on page 185
- “IBM IMS Library Integrity Utilities for z/OS, V2.1” on page 210

Program number: 5655-W14

IBM IMS Performance Solution Pack for z/OS, V1.2

The IBM IMS Performance Solution Pack for z/OS delivers a more affordable, comprehensive portfolio of IBM database management tools. The product combines the features and functions several separate tools. The products are tightly integrated, making the end-to-end analysis of IMS transactions faster and easier than ever, supporting improved productivity for problem analysts, improved IMS application performance, more efficient IMS resource utilization, and higher system availability.

The IBM IMS Performance Solution Pack for z/OS includes the following tools:

- “IBM IMS Connect Extensions for z/OS, V2.3” on page 195
- “IBM IMS Performance Analyzer for z/OS, V4.3” on page 196
- “IMS Problem Investigator for z/OS, V2.3” on page 196

Program number: 5655-S42

IBM IMS Recovery Solution Pack for z/OS, V1.1

IMS Recovery Solution Pack for z/OS, V1.1 combines all the features, functions, and processes to support efforts to implement best practices backup and recovery scenarios. It also allows for the simultaneous backup and recovery of multiple data sets and Fast Path areas. This solution can help reduce the operational complexity and the impact of database backup and recovery on system resources.

The IBM IMS Recovery Solution Pack for z/OS includes the following tools:

- IMS Database Recovery Facility
- IMS Database Recovery Facility: Extended Functions
- IMS High Performance Change Accumulation Utility
- “IBM IMS High Performance Image Copy for z/OS, V4.2” on page 185
- “IBM IMS Index Builder for z/OS, V3.1” on page 185

Program number: 5655-V86

IBM Tools Base for z/OS, V1.3 and V1.4

Both V1.3 and V1.4 of IBM Tools Base for z/OS support IMS. Only V1.4 includes the IBM IMS Explorer for Administration.

The IMS Explorer for Administration, which is added as an extension to the Administration Console component of IBM Tools Base v1.4 by APAR PM94292, can query, start, and stop IMS resources from an easy-to-use browser interface.

The Administration Console component of IBM Tools Base provides the single consolidated browser interface through which a DBA can gather information to gain added insight into the health and availability of IMS databases. The Administration Console can communicate with various IBM IMS Tools to gather information about and administer IMS transactions, databases, application programs, Fast Path routing codes, and IMSplex members.

IMS Explorer for Administration, a replacement for IMS Control Center, connects to the IMS Operations Manager through IMS Connect. If you are using the IMS Control Center function, use IMS Explorer for Administration in the Administration Console component of IBM Tools Base for z/OS, V1.4 instead.

IBM Tools Base, which was previously known as IBM IMS Tools Base for z/OS, contains common infrastructure components that are used by the IMS Tools solution packs and DB2 Tools. Tools Base provides common functions that are required in all IMS Tools solution pack environments. Tools Base must either already be installed or installed at the same time as a Solution Pack.

Tools Base is a no-charge PID that you must order from ShopZ when you order other IMS Tools solution packs. Tools Base requires a license and must be installed before installing the first IMS Tools solution pack.

For a list of current PTFs for IBM Tools Base, go to IBM DB2 and IMS Tools PTF Listing.

Tools Base components provide the infrastructure that supports key solution strategies for IMS Tools.

The Tools Base V1.4 includes the following categories and components:

Modernization (GUI)

The Modernization GUI provides your tools with a modern graphical user interface, in addition to the standard ISPF interface. The Modernization component includes the following IMS Tools:

- IBM Tools Base Administration Console for z/OS

The Administration Console provides a centralized, browser-based view of data and activities that are gathered by IMS Tools operating in an IMS database environment. Data is consolidated from installed IMS Tools solution pack components and displayed in an intuitive and interactive graphical web interface.

- IMS Batch Terminal Simulator GUI plug-in

The BTS GUI plug-in provides a graphical user interface that allows distributed Eclipse-based clients to access IMS Batch Terminal Simulator in an Eclipse integrated development environment.

- IMS Batch Terminal Simulator Resource Adapter

The BTS Resource Adapter allows you to use IMS Batch Terminal Simulator to test J2C applications that drive IMS Transactions from the WebSphere Application Server environment. Customers use the BTS Resource Adapter to allow their J2C applications to be tested as an inexpensive alternative to testing on a real IMS system.

Autonomics

The Autonomics component tools simplify common database maintenance tasks by collecting database state information, analyzing this data, and providing passive or active responses to conditions that exceed specified threshold values. The tools that come in the Autonomics component are:

- IBM Tools Base Autonomics Director for z/OS

Autonomics Director is a core solution for scheduling and automating common database maintenance tasks. Sensor-enabled IMS Tools products capture the state of specific database conditions and store this data in a centralized repository. Autonomics Director uses Policy Services to evaluate this data and then makes recommendations, such as indicating a need to reorganize a database.

- IBM Tools Base Policy Services for z/OS

Policy Services use policies and rules to evaluate the sensor data that is collected by IMS Tools products, and then provides a response to any condition that exceeds the specified threshold values.

- IBM Tools Base IMS Tools Knowledge Base for z/OS

IMS Tools Knowledge Base manages centralized repositories that are created to store and view a variety of data including reports, policies, rules, notification lists, database state (sensor) data, exceptions, recommendations, and evaluation schedules.

Common Services

The Common Services provide functions that facilitate the interactions among tools, and between tools and IMS. The tools that come in the Common Services component are:

- IBM Tools Base IMS Tools Common Services for z/OS

IMS Tools Common Services includes the Generic Exits for calling multiple exit routines from a single exit point, and the Tools Online System Interface that provides a command interface between IMS and IMS Tools.

- IBM Tools Base Distributed Access Infrastructure for z/OS

Distributed Access Infrastructure enables distributed clients to access IMS Tools through TCP/IP socket communication.

- IBM Tools Base Connection Server for z/OS

Connection Server extends ISPF functions for specific IMS Tools to Eclipse-based applications.

Supplementary tools

The Tools Base includes the following Supplementary tools:

- IBM Tools Base IMS Hardware Data Compression Extended for z/OS

IMS Hardware Data Compression Extended provides functions for compressing IMS data by using the z/OS hardware data compression (HDC) that is available on IBM processors.

- IBM Tools Customizer for z/OS

IBM Tools Customizer simplifies and consolidates many of the post SMP/E configuration processes that are required to customize IBM Tools.

Program number: 5655-V93

Chapter 14. IMS Application Management tools

IBM tools provide the reliability and affordability you need to maximize the value of your IMS application management.

IMS Batch Backout Manager for z/OS, V1.1

The IBM IMS Batch Backout Manager for z/OS tool:

- Uses global or inclusion controls.
- Automates batch backout process:
 - Helps automate the normally manual task of backing out database updates after an IMS batch application failure.
 - Reduces the downtime associated with an application failure and improves database availability.
 - Provides automation of the batch backout process after specific application abends.
 - Dynamically handles log close and allocation.
- Performs automatic logging:
 - Forces allocation of batch SLDSs for jobs with no logs allocated (either by specific or by generic job name).
 - Forces DBRC=Y or DBRC=N by specific or generic jobname.
 - Enforces log standards and override JCL logs.
- Bypasses logging:
 - In a DBRC=FORCE environment, avoids the overhead of logging.

Program number: 5697-H75

IBM IMS Batch Terminal Simulator for z/OS, V4.1

The IBM IMS Batch Terminal Simulator for z/OS tool:

- Provides a comprehensive way to test and check IMS application program logic, IMS application interfaces, teleprocessing activity, 3270 format control blocks, and database activity.
- Simulates the operation of IMS applications in TSO and batch environments.
- Operates transparently to the applications, requiring no changes to IMS code, control blocks, libraries, or application load modules.
- Provides a trace of all DL/I calls, SQL calls and WebSphere MQ calls with related details.
- Provides a stable online system in test and production environments to execute applications properly before they are put online.
- Provides Java language application support under JBP regions.
- Provides a Playback function which creates a file of screen images that correspond to the transaction activities captured in an IMS OLDS or SLDS.
- Can include or exclude by LTERM, transaction, and MODname.
- Include by user ID and time range.

- Output listings include a list of the transaction codes that have been executed, user IDs, transaction code/user ID mapping, listing of the MFS MODnames used, and the transaction screen images.

Program number: 5655-J57

IBM IMS Program Restart Facility for OS/390, V2.1

The IBM IMS Program Restart Facility for OS/390:

- Automatically assigns the most recent checkpoint ID to jobs that are restarted because of an earlier abnormal termination.
- Forces an extended restart to occur for all jobs that require restart.
- Helps prevent corruption resulting from restarting an abended job without specifying a restart checkpoint ID.
- Used to restart programs that do notabend but end in a non-zero return code.
- Enables restart on any system in a Sysplex without JCL changes.
- Enables JCL parameter changes in a data sharing environment, for example, IRLM= and IMSGROUP=, without requiring JCL changes.
- Saves costly and time-consuming database recoveries caused by manual restart errors.
- Reduces the risk of data being unavailable or becoming corrupt.
- Integrates with other IMS Tools to enable BMP handling.

Program number: 5655-E14

Chapter 15. IMS Backup and Recovery Management tools

The following sections describe the IBM IMS backup and recovery management tools.

IBM IMS DEDB Fast Recovery for z/OS, V2.2

The IBM IMS DEDB Fast Recovery for z/OS tool:

- Assists in the operation and maintenance of data integrity of IMS databases.
- Is designed as a fast alternative to emergency restart (ERE) failure recovery.
- Corrects online log data sets (OLDSs) by invalidating logging for transactions that did not reach the synch point.
- Significantly reduces the amount of time needed to recover DEDBs after an IMS failure.
- Generates the JCL for the MSDB Dump Recovery utility to be processed before an IMS cold start for MSDB (main storage database) recovery.
- Shortens the recovery time of an unscheduled IMS cold start while maintaining the integrity of the IMS databases.
- Supports multiple IMS releases from a single Load Library.

Program number: 5655-E32

IBM IMS High Performance Image Copy for z/OS, V4.2

The IBM IMS High Performance Image Copy for z/OS tool functions are:

- Running an image copy function with the hash checking of IMS HP Pointer Checker V2.
- Performing accuracy checking of an image copy.
- Allocating all input and output data sets dynamically.
- Optionally compressing output image copies.
- Creating image copies.
- Providing advanced copy services; concurrent copy, FlashCopy and SnapShot copies.
- Reducing image copy and recovery time. Reduces elapsed time and CPU utilization.
- Providing automatic checkpoint and restart.
- Stopping and starting databases automatically.
- Integrating with other IMS Tools utilities.

Program number: 5655-N45

IBM IMS Index Builder for z/OS, V3.1

The IBM IMS Index Builder for z/OS:

- Offers several features that improve overall performance and enhance ease of use.
- Builds or rebuilds primary and secondary indexes quickly.

- Allows the user to specify an optional output file where records that are needed for prefix resolution can be split off and written as they are read in.
- Eliminates the need to image copy indexes.
- Recognizes index records that have duplicate keys and writes the duplicate keys to a SYSOUT data set.
- Supports building IMS HALDB primary indexes.
- Integrates with the Database Recovery Facility, which enables the building of primary and secondary indexes during a database recovery.

Program number: 5655-R01

IBM IMS Recovery Expert for z/OS, V2.1

The IBM IMS Recovery Expert for z/OS is a storage-aware backup and recovery solution that integrates storage processor fast-replication facilities with IMS backup and recovery operations to allow instantaneous backups with no application downtime and to help reduce recovery time, and simplify disaster recovery procedures while using fewer processor I/O and storage resources. The IMS Recovery Expert V2.1 product belongs to the family of IMS Tools that provides backup and recovery solutions.

Program number: 5655-S98

IBM IMS Recovery Solution Pack for z/OS, V1.1

IMS Recovery Solution Pack for z/OS, V1.1 combines all the features, functions, and processes to support efforts to implement best practices backup and recovery scenarios. It also allows for the simultaneous backup and recovery of multiple data sets and Fast Path areas. This solution can help reduce the operational complexity and the impact of database backup and recovery on system resources.

The IBM IMS Recovery Solution Pack for z/OS includes the following tools:

- IMS Database Recovery Facility
- IMS Database Recovery Facility: Extended Functions
- IMS High Performance Change Accumulation Utility
- “IBM IMS High Performance Image Copy for z/OS, V4.2” on page 185
- “IBM IMS Index Builder for z/OS, V3.1” on page 185

Program number: 5655-V86

Chapter 16. IMS Database Administration tools

The following sections describe the IBM IMS database administration tools.

IBM IMS High Availability Large Database (HALDB) Toolkit for z/OS, V3.2

The IBM IMS High Availability Large Database (HALDB) Toolkit for z/OS provides:

- Application support
 - Dynamic DFSHALDB statement build
 - Partition selection API
- HALDB maintenance:
 - Consolidate or split partitions
 - Heal index pointer
 - Load a single partition
 - Delete a single partition
 - Merge HALDBs
 - Add empty partition to end of HALDB
- DBRC handling:
 - Cloning DBRC Definitions
 - Copy HALDB definitions to different RECONs
 - Backup DBRC definitions
- HALDB analyzer:
 - Analyze HALDB Constructs
 - Extract Root Keys
- System utilities:
 - Split Unload File
 - ILK Rebuild
 - ACBLIB report
 - Create DBD source
- Conversion to HALDBs:
 - ISPF interface
 - Single step batch
 - Integration with the IBM IMS Online Reorganization for z/OS tool allows for near online conversion
 - Testing of partition selection exits

Program number: 5655-N46

IBM IMS Sequential Randomizer Generator for OS/390, V1.1

The IBM IMS Sequential Randomizer Generator for OS/390 tool:

- Creates a randomizer that enables the user to access HDAM and DEDB database segments either directly or sequentially.

- Allows access to HDAM and DEDB databases in logical key sequence without sacrificing their efficient direct access capabilities.
- Optimizes the distribution of database records by adjusting the randomizing module if the number of synonyms or the control interval (CI) or block utilization exceeds the user-specified value.

Program number: 5655-E11

IBM Tools Base for z/OS, V1.3 and V1.4

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The IMS Explorer for Administration, which is added as an extension to the Administration Console component of IBM Tools Base v1.4 by APAR PM94292, can query, start, and stop IMS resources from an easy-to-use browser interface.

The Administration Console component of IBM Tools Base provides the single consolidated browser interface through which a DBA can gather information to gain added insight into the health and availability of IMS databases. The Administration Console can communicate with various IBM IMS Tools to gather information about and administer IMS transactions, databases, application programs, Fast Path routing codes, and IMSplex members.

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Tools Base is a no-charge PID that you must order from ShopZ when you order other IMS Tools solution packs. Tools Base requires a license and must be installed before installing the first IMS Tools solution pack.

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database environment. Data is consolidated from installed IMS Tools solution pack components and displayed in an intuitive and interactive graphical web interface.

- IMS Batch Terminal Simulator GUI plug-in

The BTS GUI plug-in provides a graphical user interface that allows distributed Eclipse-based clients to access IMS Batch Terminal Simulator in an Eclipse integrated development environment.

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The BTS Resource Adapter allows you to use IMS Batch Terminal Simulator to test J2C applications that drive IMS Transactions from the WebSphere Application Server environment. Customers use the BTS Resource Adapter to allow their J2C applications to be tested as an inexpensive alternative to testing on a real IMS system.

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Autonomics Director is a core solution for scheduling and automating common database maintenance tasks. Sensor-enabled IMS Tools products capture the state of specific database conditions and store this data in a centralized repository. Autonomics Director uses Policy Services to evaluate this data and then makes recommendations, such as indicating a need to reorganize a database.

- IBM Tools Base Policy Services for z/OS

Policy Services use policies and rules to evaluate the sensor data that is collected by IMS Tools products, and then provides a response to any condition that exceeds the specified threshold values.

- IBM Tools Base IMS Tools Knowledge Base for z/OS

IMS Tools Knowledge Base manages centralized repositories that are created to store and view a variety of data including reports, policies, rules, notification lists, database state (sensor) data, exceptions, recommendations, and evaluation schedules.

Common Services

The Common Services provide functions that facilitate the interactions among tools, and between tools and IMS. The tools that come in the Common Services component are:

- IBM Tools Base IMS Tools Common Services for z/OS

IMS Tools Common Services includes the Generic Exits for calling multiple exit routines from a single exit point, and the Tools Online System Interface that provides a command interface between IMS and IMS Tools.

- IBM Tools Base Distributed Access Infrastructure for z/OS

Distributed Access Infrastructure enables distributed clients to access IMS Tools through TCP/IP socket communication.

- IBM Tools Base Connection Server for z/OS

Connection Server extends ISPF functions for specific IMS Tools to Eclipse-based applications.

Supplementary tools

The Tools Base includes the following Supplementary tools:

- IBM Tools Base IMS Hardware Data Compression Extended for z/OS
IMS Hardware Data Compression Extended provides functions for compressing IMS data by using the z/OS hardware data compression (HDC) that is available on IBM processors.
- IBM Tools Customizer for z/OS
IBM Tools Customizer simplifies and consolidates many of the post SMP/E configuration processes that are required to customize IBM Tools.

Program number: 5655-V93

Chapter 17. IMS Data Replication tools

The following sections describe the IBM IMS data replication tools.

IMS Cloning Tool for z/OS, V1.1

The IMS Cloning Tool for z/OS provides a faster, simpler cloning solution that can help improve productivity and supports efforts to reduce total cost. It automates the cloning process to provide usable IMS clones within minutes, helping to boost efficiency and to free up DBA time.

Program number: 5655-U91

InfoSphere IMS Replication for z/OS, V10.1

IBM InfoSphere® IMS Replication for z/OS helps increase the availability of IMS data whether it is for a continuous availability strategy or ensuring the timely distribution of critical enterprise information.

This tool:

- Helps eliminate geographic limitations
- Helps achieve minimal recovery time objectives (RTOs)
- Provides support for mixed IMS workloads
- Provides flexible, unified monitoring
- Can import or export metadata
- Provides high scalability and performance
- Supports the IBM Change Data Capture Solutions

For details about this tool, see InfoSphere IMS Replication for z/OS .

Program number: 5655-W28

Chapter 18. InfoSphere IMS tools

The following sections describe the IBM InfoSphere IMS tools.

IBM InfoSphere Classic Change Data Capture for z/OS

IBM InfoSphere Classic Change Data Capture for z/OS (InfoSphere Classic CDC for z/OS) is a replication solution that captures changes to non-relational mainframe data and delivers them to relational databases, producing an accurate relational replica of your mainframe data on supported target databases in near-real time.

This tool:

- Helps eliminate geographic limitations
- Helps achieve minimal recovery time objectives (RTOs)
- Provides support for mixed IMS workloads
- Provides flexible, unified monitoring
- Can import or export metadata
- Provides high scalability and performance
- Supports the IBM Change Data Capture Solutions

Program number: 5655-W29

IBM InfoSphere Classic Data Event Publisher for z/OS, V9.5

The IBM InfoSphere Classic Data Event Publisher for z/OS tool:

- Provides easy linking of data events with business processes.
- Supports the capturing of changes made to IMS, VSAM, CA-IDMS, and Adabas data and the publishing of these changes to WebSphere MQ queues.
- Automatically reformats captured data into a consistent relational format before packaging into either XML or delimited values format for publishing.

Program number: 5655-R54

IBM InfoSphere Classic Replication Server for z/OS, V9.5

The IBM InfoSphere Classic Replication Server for z/OS tool:

- Supports SQL-driven and near-real time changed-data feeds over WebSphere MQ from VSAM files and IMS, and CA-IDMS, and Adabas.
- Automatically reformats System z data into relational constructs before delivering it to WebSphere MQ.
- Maintains transactional integrity and is fully recoverable.
- Leverages a common infrastructure with InfoSphere Classic Federation Server for z/OS, and InfoSphere Classic Data Event Publisher for z/OS, including the Classic Data Architect GUI metadata management tool.

Program number: 5655-R53

IBM InfoSphere Classic Federation Server for z/OS, V10.1 or higher

The IBM InfoSphere Classic Federation Server for z/OS tool:

- Provides SQL access to mainframe databases and files with transactional speed and enterprise scale without mainframe programming.
- Allows applications and tools to issue SQL SELECT, INSERT, UPDATE, and DELETE commands using ODBC, JDBC, or a CLI (Command Level Interface) to access System z data.
- Stores System z accessed data in VSAM, IAM, and sequential files, as well as DB2 for z/OS, IMS, Software AG Adabas, and CA-Datcom and CA-IDMS databases all without mainframe programming.

Program number 5655-W33

IBM InfoSphere Optim Test Data Management Solution for z/OS, V6.11

The IBM InfoSphere Optim™ Test Data Management Solution for z/OS tool:

- Creates test databases that are relationally intact subsets of an existing production database.
- Migrates subsets of data that require data transformations as part of the migration. This feature is especially useful for masking data used in testing applications or to introduce altered data to the production database.
- Provides for aging all types of date columns, regardless of initial format, and adjusting the resulting dates to suit site-specific business rules. An extensive set of sample definitions to handle these business rules is distributed with Move. Definitions can be customized to accommodate organization-specific business rules.

Program number: 5655-V1100

InfoSphere IMS Replication for z/OS, V10.1

IBM InfoSphere IMS Replication for z/OS helps increase the availability of IMS data whether it is for a continuous availability strategy or ensuring the timely distribution of critical enterprise information.

This tool:

- Helps eliminate geographic limitations
- Helps achieve minimal recovery time objectives (RTOs)
- Provides support for mixed IMS workloads
- Provides flexible, unified monitoring
- Can import or export metadata
- Provides high scalability and performance
- Supports the IBM Change Data Capture Solutions

For details about this tool, see InfoSphere IMS Replication for z/OS .

Program number: 5655-W28

Chapter 19. IMS Performance Management tools

The following sections describe the IBM IMS performance management tools.

IBM IMS Buffer Pool Analyzer for z/OS, V1.3

The IBM IMS Buffer Pool Analyzer for z/OS tool:

- Provides modeling facilities to assist with making informed decisions about the addition of buffers to an existing pool, or sizing requirements for a new buffer pool.
- Helps you determine the impact of buffer pool changes before they are made to take the guess work out of the process.
- Analyzes IMS database buffer pools (OSAM and VSAM) to provide statistical analysis of the impact of changes that affect the buffer pools.
- Provides I/O rates and buffering requirements for a specific database.
- Allows for better allocation of real memory resources.
- Identifies databases that most heavily use each database subpool.
- Performs “what if” scenario analysis, such as identifying the impact of splitting a specific database into a new buffer pool.
- Determines the performance effects for a given buffer pool when you add or reduce the number of buffer pools.

Program number: 5697-H77

IBM IMS Connect Extensions for z/OS, V2.3

The IBM IMS Connect Extensions for z/OS tool:

- Enhances the basic capabilities of the IMS Connect.
- Provides IMS Connect resource and state data in real time.
- Analyzes problems and optimizes performance by recording key IMS Connect events.
Events are recorded on active journals and these journals are archived when full.
- Provides an API that allows captured data to be published to an external monitor.
- Enhances IMS Connect availability with dynamic workload management.
- Transaction routing redirects transactions from the original data store.
- Workload Balancing redirects transactions based on capabilities of the individual data stores.
- Transaction pacing protects data stores from surges.
- Improves system security with flexible access control.
- Improved reporting in IMS Performance Analyzer for z/OS and IMS Problem Investigator for z/OS tools.

Program number: 5655-K48

IBM IMS Network Compression Facility for z/OS, V1.1

The IBM IMS Network Compression Facility for z/OS:

- Provides several new options for compression of 3270 data streams:
 - Compresses all repeated characters, not just spaces, nulls, asterisks, and dashes
 - Allows 3270 Field Merge, blank elimination, and elimination of non-display fields
 - Eliminates redundant 3270 Set Buffer Address (SBA) commands
- Makes installation easier by eliminating the need for the XCM address space and subsystem, and for SYS1.PARMLIB updates, except APF authorization of one data set.
- Includes a utility to convert current options to the new PROCLIB member format.
- Improves flexibility by allowing cross-MVS system inquiries and updates to Network Compression Facility information and options.

Program number: 5655-E41

IBM IMS Performance Analyzer for z/OS, V4.3

The IBM IMS Performance Analyzer for z/OS tool:

- Provides comprehensive reporting for the IMS Log and IMS Monitor, IMS Connect Extensions for z/OS, and OMEGAMON[®] TRF records.
- End-to-end transit analysis for all transaction workloads, including shared queues.
- End-to-end IMS Connect and IMS log reporting, revealing a transaction's lifecycle through Connect and IMS.
- Report forms allow you to design your own transit reports.
- Provides a wide variety of reports that can help shorten transaction response times and increase resource availability.
- DBRC Log selection for quick and easy log report requests.
- Produces IMS Log and Monitor reports to “health check” your system.
- Comprehensive specialized reporting of DBCTL and Fast Path.

Program number: 5655-R03

IMS Problem Investigator for z/OS, V2.3

The IBM IMS Problem Investigator for z/OS tool:

- Provides an enhanced level of problem-determination services for IMS TM and IMS DB systems.
- Includes navigation aids, formatted and personalized reporting, and investigative procedures for IMS log, monitor, user log, CQS, and IMS Connect records.
- Offers powerful automated features to help reduce the amount of time required to identify and analyze defects or other events of interest in the IMS log, monitor, user log, CQS, IMS Connect records, and DB2.
- Gain an end-to-end picture of transactions in an IMS Sysplex.
- The TX line action will connect records associated with the same transaction across all logs.

- The action “tracks” all records associated with the transaction and hides (potentially) thousands of records not related to the transaction.
- IMS Problem Investigator complements IMS Performance Analyzer for enhanced log analysis and reporting.

Program number: 5655-R02

IBM Transaction Analysis Workbench, V1.1

The IBM Transaction Analysis Workbench allows you to analyze transaction performance and behavioral problems and simplifies problem analysis.

The Transaction Analysis Workbench extends the scope of traditional analysis techniques, enabling you to identify problems more easily. This tool:

- Saves a history of each problem session via its Session Manager feature.
- Locates the required logs and other historical data and attaches them to your problem session using its Automated File Selection feature.
- Supports analysis for IMS, CICS, DB2, IBM WebSphere, and IBM z/OS.
- Supports tracking for CICS or IMS with DB2, IMS with DB2 or WebSphere MQ, DB2, and IMS Connect.

Program number: 5697-P37

IBM IMS Performance Solution Pack for z/OS, V1.2

The IBM IMS Performance Solution Pack for z/OS delivers a more affordable, comprehensive portfolio of IBM database management tools. The product combines the features and functions several separate tools. The products are tightly integrated, making the end-to-end analysis of IMS transactions faster and easier than ever, supporting improved productivity for problem analysts, improved IMS application performance, more efficient IMS resource utilization, and higher system availability.

The IBM IMS Performance Solution Pack for z/OS includes the following tools:

- “IBM IMS Connect Extensions for z/OS, V2.3” on page 195
- “IBM IMS Performance Analyzer for z/OS, V4.3” on page 196
- “IMS Problem Investigator for z/OS, V2.3” on page 196

Program number: 5655-S42

Chapter 20. IMS Regulatory Compliance tools

The following sections describe the IBM IMS regulatory compliance tools.

IBM InfoSphere Guardium Data Encryption for DB2 and IMS Databases

Formerly known as IBM Data Encryption for IMS and DB2 Databases, InfoSphere Guardium® Data Encryption leverages the System z Crypto Hardware to efficiently secure sensitive and private data at the DB2 row level and the IMS segment level.

The IBM InfoSphere Guardium Data Encryption for DB2 and IMS Databases tool:

- Provides DB2 Edit routines and IMS Exit routines that invoke the z/OS Integrated Cryptographic Service Facility (ICSF) which exploits the Crypto Hardware for data encryption and decryption.
- Contains sample implementation jobs.
- Includes an ISPF front end to build implementation jobs.
- Provides the capability to specify unique encryption keys.

Program number: 5655-P03

IBM InfoSphere Guardium S-TAP for IMS, V8.2

The IBM InfoSphere Guardium S-TAP® for IMS tool (formally known as IMS Audit Management Expert for z/OS) includes support for:

- Capture of database and segment reads and changes (insert, update, delete)
- Capture of segment concatenated key and segment data on request to provide before and after images of updated segments
- Capture of access to IMS data sets outside the control of IMS services (database data sets, image copy data sets, IMS log data sets, RECON data sets)
- Direct streaming of audit data from z/OS process to a networked Guardium appliance to support near real-time reporting
- System STOP and START activity as recorded in the IMS log

Program number: 5655-STM

Chapter 21. IMS System management tools

The following sections describe the IBM IMS System management tools.

IBM IMS Command Control Facility for z/OS, V2.1

The IBM IMS Command Control Facility for z/OS:

- Issues commands for DBCTL, DCCTL, or DB/DC regions.
- Issues IMS commands from a batch utility or from a TSO session via an ISPF Interface, or from a Callable Application Program Interface (API).
- Ensures successful processing of database START, STOP, DBR, and DBD commands.
- Synchronizes online change and database commands across all regions in a sysplex using the batch interface or callable API.
- Keeps members of an IMSplex synchronized by storing commands that failed due to an IMS being unavailable, and issuing the stored commands at IMS startup.
- Enhanced CCF Message Log improved problem determination and system operation whether running a single IMS or multi-IMSplex.
- Contains added IMS Operations Manager command support that provides more flexibility by enabling users that do not want to use APPC to be able to use the tool.
- Contains message disposition determination which enables users to improve or eliminate user written code.

Program number: 5655-R58

IBM IMS Extended Terminal Option Support for z/OS, V3.1

The IBM IMS Extended Terminal Option Support for z/OS tool:

- Provides a front-end to the IMS Extended Terminal Option (ETO) feature.
- Offers capabilities to help manage, implement, customize, and exploit the benefits of ETO in your systems environment to manage resources effectively.
- Supports tailoring of all parts of ETO, including sign-on processing.
- Lets you set global options for the entire user community and override options for specific terminals or user IDs.
- Allows LTERM names that start with a numeric value.
- Extends shared queues support to issue SYSTEMS level ENQ for all LTERM names that are associated with a user at sign-on.
- Offers SLU type P support and SLU 1 console support that allow you to supply a variety of options on an LU-by-LU basis (for example, Logmode, Logon Description, ASOT, ALOT).

Program number: 5655-L61

IBM IMS High Performance System Generation (SYSGEN) Tools for z/OS, V2.2

The IBM IMS High Performance System Generation (SYSGEN) Tools for z/OS:

- Offers an integrated solution that helps reduce the requirement for IMS SYSGENs.
- Provides DBAs and System Programmers with a reliable, easy-to-use IMS management tools to make application resource changes faster using fewer resources.
- Includes IMSplex support which provides the capability to simultaneously update multiple IMS control regions when executing a resource update list.
- Provides additional options for reverse sysgen, including the capability to select either in-core control blocks or MODBLKS data set resource definitions.
- Contains IMS storage display and zap which provides the capability to display and alter IMS control blocks and storage. A storage map provides z/OS virtual storage boundaries and percent utilization for common storage areas.
- Reloads ACBLIB definitions for database descriptions (DBDs) and program specifications blocks (PSBs) without using online change for ACBLIB.
- Generates a resource update list that will make IMS control blocks match IMS sysgen source macros.
- Manages your IMS SYSGEN definitions using ISPF panels (database, program, transaction, and route code definitions).
- Enables changes, additions, or deletions of resource definitions.
- Updates IMS security definitions, reload ACBs, and issue IMS commands.
- Dynamically makes changes to definitions.
- One user can define what changes are required, and have another user implement the change at a later time, via ISPF or batch.
- Back out changes installed by HP Sysgen Tools.

Program number: 5655-P43

IBM IMS Workload Router for z/OS, V2.6 and V2.7

The IBM IMS Workload Router for z/OS tool:

- Works with IMS TM to provide transparent routing or balancing of a transaction workload among two or more IBM systems.
- Uses IMS Multiple Systems Coupling (MSC).
- Is adaptable to a variety of system configurations.

Program number: 5697-B87

Chapter 22. Tivoli IMS tools

The following sections describe the IBM Tivoli IMS tools.

Tivoli Decision Support for z/OS V1.8

IBM Tivoli Decision Support for z/OS is designed to help you understand your performance challenges by collecting raw systems metrics data, consolidating them in a repository, providing tools to help you improve operational planning, cost management, responsiveness, and decision making.

Program number: 5698-B06

Tivoli Monitoring

IBM Tivoli Monitoring can monitor and manage system and network applications on a variety of operating systems, track the availability and performance of your enterprise system, and get reports to track trends and troubleshoot problems.

Program number: 5724-C04

OMEGACENTER Gateway on z/OS V341, AF/OPERATOR on z/OS V341, and AF/Integrated Resource Manager, V500

IBM Tivoli OMEGACENTER Gateway on z/OS

IBM Tivoli OMEGACENTER Gateway on z/OS is a system automation tool for z/OS environments. It integrates your console automation solutions, availability monitors and Tivoli OMEGAMON solutions to provide automated responses to system events.

Program number: 5608-C04

IBM Tivoli AF/OPERATOR on z/OS

IBM Tivoli AF/OPERATOR on z/OS is a robust console automation solution for z/OS environments. Use it to streamline common tasks, optimize system performance and reduce avoidable errors, so that your staff only focuses on events or tasks that require human intervention.

Program number: 5608-C03

IBM Tivoli AF/Integrated Resource Manager

IBM Tivoli AF/Integrated Resource Manager (AF/IRM) simplifies system automation and resource management through an intuitive console-driven interface that provides comprehensive subsystem management without additional coding. AF/IRM represents a streamlined paradigm in automation implementation and management that leverages packaged automation objects based on IBM Tivoli best practices. AF/IRM eases automation implementation and maintenance for z/OS and Parallel Sysplex environments, applications and network resources.

Program number: 5608-AFI

Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS, V4.2 and V5.1

IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS combines the sophisticated reporting, monitoring and buffer pool analysis features of the IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS and IBM DB2 Buffer Pool Analyzer products. It also adds expert database analysis functions to help you maximize performance and enhance productivity.

Program number: 5655-Q07 and 5655-W37

Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS, V4.2 and V5.1

Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS enables you to monitor, analyze and optimize the performance of DB2 Universal Database™ and DB2 on z/OS applications online in real time and in batch reports.

Program number: 5698-Q08 and 5655-W38

Tivoli OMEGAMON XE for IMS on z/OS, V4.2 and V5.1

IBM Tivoli OMEGAMON XE for IMS on z/OS monitors and manages the availability, performance, and resource utilization of your IMS systems, either at a system level or within an IMSplex.

Program number: 5698-A34 and 5698-T02

Tivoli System Automation for z/OS, V3.3 or later

IBM Tivoli System Automation for z/OS is an IBM Tivoli NetView® for z/OS base software product that provides a single point of control for a various range of systems management functionality. It is a policy-based, self-healing, high-availability solution to maximize efficiency and availability of critical systems and applications. IBM Tivoli System Automation for z/OS plays a key role in supplying high end-to-end automation solutions.

Program number: 5698-SA3

Chapter 23. IMS TM management tools

The following sections describe the IBM IMS TM management tools.

IBM IMS Configuration Manager for z/OS, V2.1

The IMS Configuration Manager for z/OS tool:

- Provides an easy-to-use approach for creating and maintaining IMS system parameters and using DRD functions
- Provides support to transition to DRD
- Validates settings helping prevent errors in definitions
- Logs changes and provides backout facility
- Upgrades parameters automatically easing migration from one IMS version to the next
- Provides for deployment of changes to dozens of global sites from a single location

Program number: 5655-L69

IBM IMS Queue Control Facility for z/OS, V2.1 and V3.1

The IBM IMS Queue Control Facility (QCF) for z/OS tool:

- Manages IMS message queues in both shared and non-shared queue environments.
- Defines up to ten areas of the total queue space to monitor for small or large messages, using the new Queue Space Utilization Notification mechanism.
- Detects (automatically) an IMS cold start and initiates the requeue of messages that were in the queue before the cold start.
- Detects (automatically) an IMS warm start and initiates the requeue of messages (or offloads the messages) that were in the dead letter queue before warm start.
- Offloads (automatically) any messages that were on the queue during message overflow.
- Select messages based on a data string for faster problem determination.
- Contains a new filter for the dead letter queue.
- Contains multiple new console commands to display the top number of destinations that are using the message queues. These commands can display the destinations using the message queues over last number minutes and initiate the requeue or offload of the messages that were in the queue.

Program number: 5697-I08 for V2.1 and 5697-N50 for V3.1

IBM IMS Sysplex Manager for z/OS, V1.3

The IBM IMS Sysplex Manager for z/OS tool provides:

- Real-time management of the IMS sysplex Environment.
- Single point of control.
- Single system image through local and aggregate view of data.
- Simplified user interface (TSO/ISPF).

- Structured displays of IMS resources and CF structures.
- Global support of type-1 commands, OM type-2 commands and the IMS TSO SPOC.
- Basic z/OS performance information and SVC dump capture.
- Statistics for CSL (OM, RM and SCI), IRLM, and CQS.
- Dashboard with key system indicators and threshold monitoring.
- Management functions.
- Intercept of system exceptions and generates console alerts.
- Real-time IRLM Long Lock Report.
- Automatic real-time recognition when IRLM detects long locks.
- Consolidated and analyzed information for the top blocker, which is recorded in an exceptions file and sent to the z/OS console for automated operations.
- Browse, delete, and recover capability for messages on shared queues.
- Delete capability for RM resource structure entries.
- Assign affinity capability for transactions in shared-queues environment.
- Support for IMS DB/TM, DBCTL, and DCCTL for IMS Version 8 and later.

Program number: 5655-P01

Chapter 24. IMS Utilities Management tools

The following sections describe the IBM IMS utilities management tools.

IMS Cloning Tool for z/OS, V1.1

The IMS Cloning Tool for z/OS provides a faster, simpler cloning solution that can help improve productivity and supports efforts to reduce total cost. It automates the cloning process to provide usable IMS clones within minutes, helping to boost efficiency and to free up DBA time.

Program number: 5655-U91

IBM IMS Database Control Suite for z/OS, V3.2

The IBM IMS Database Control Suite for z/OS:

- Provides a day-to-day IMS database environment management tool for DBAs, system programmers, and application support specialists.
- Enables you to collect and build on the data that is required to generate job control language (JCL) for database backup/recovery/reorganization management using IMS Base Utilities and IBM High Performance Tools.
- Significant improvements to DBDSGRPs that include:
 - Loading pre-existing DBDSGRPs into IMS DBCS from the RECON.
 - Using your naming conventions rather than generated names.
 - Creating DBDSGRPs with a mix of HALDB and full-function databases.
- Has a powerful batch collection function that enables you to enter a database description library (DBDLIB), which then triggers the tool to build the jobs for all logically related members in just one pass, saving time and steps and avoiding data redundancy errors.
- Integrates IBM IMS tools and utilities that automate database backup, recovery, reorganization and monitoring.
- Facilitates database maintenance efficiency with single-step job control language (JCL) conversion.
- Improves DBA productivity with an intuitive interface and ease-of-use enhancements.
- Provides an ISPF interface for the IMS Library Integrity Utilities.
- Includes a simplified user interface; reduction and consolidation of the number of data sets, ISPF panels, and process steps; and more flexibility for local standards.
- Automates tedious manual IMS maintenance functions to make database management easier.
- Is a functional replacement for the IMS DBICF (Database Integrity Control Facility) tool.
- Provides improved usability and productivity because the build process, during which JCL skeletons for utilities are built, is no longer required.
- Provides improved product panels and panel navigation; field level help for all help panels; and fuller integration with DBRC terminology.

Program number: 5655-L08

IBM IMS Database Reorganization Expert for z/OS, V4.1

The IBM IMS Database Reorganization Expert for z/OS tool:

- Supports the creation, customization, and centralized storage of policies on database exception detection and conditional reorganization.
- Provides a Smart Reorganization utility with the capabilities of the exception notification and conditional reorganization based on policies stored in a centralized policy repository.
- Collects statistical data about databases and determines the reorganization needs of the databases based on the reorganization policy selected for the database.
- Detects database exceptions and notifies the TSO users or z/OS operators that are specified in the relevant policy of the exceptional state.

This tool is included in the “IBM Tools Base for z/OS, V1.3 and V1.4” on page 180 (5655-V93).

Program number: 5655-S35

IBM IMS High Performance Image Copy for z/OS, V4.2

The IBM IMS High Performance Image Copy for z/OS tool functions are:

- Running an image copy function with the hash checking of IMS HP Pointer Checker V2.
- Performing accuracy checking of an image copy.
- Allocating all input and output data sets dynamically.
- Optionally compressing output image copies.
- Creating image copies.
- Providing advanced copy services; concurrent copy, FlashCopy and SnapShot copies.
- Reducing image copy and recovery time. Reduces elapsed time and CPU utilization.
- Providing automatic checkpoint and restart.
- Stopping and starting databases automatically.
- Integrating with other IMS Tools utilities.

Program number: 5655-N45

IBM IMS High Performance Load for z/OS, V2.1

The IBM IMS High Performance Load for z/OS tool:

- Provides a high performance database reloading capability for IMS full-function databases.
- Initializes empty HDAM and HIDAM databases.
- Supports IMS Parallel Reorganization for z/OS V3 capabilities, such as image copy creation during database reorganization.
- Supports reorganization reload of HALDB partitions, including online-reorganization-capable HALDB partitions of IMS Version 9 and later.
- Automatically initializes HALDB partition data set before reload.
- Provides a performance replacement for IMS Partition Initialization utility.
- Creates ILDSs.

- Supports various formats of the unloaded data sets.
- Includes the Physical Sequence Sort for Reload (PSSR) utility.
- Includes the Bitmap Resetter utility.
- Gives you the option to load compressed data that was previously unloaded by IBM IMS High Performance Unload for OS/390 in a compressed format.

Program number: 5655-M26

IBM IMS High Performance Unload for z/OS, V1.2

The IBM IMS High Performance Unload for z/OS tool:

- Unloads HALDB, HDAM, HIDAM, HISAM, and SHISAM databases.
- Allows you to unload broken data sets.
- Gives you the option to unload compressed data without decompression overhead.
- Provides multiple standard formats for unload data sets.
- Includes a variety of statistical reports for improved tuning.
- Provides an API that enables application programs to leverage the tool's high performance retrieval techniques efficiently.
- Provides a user exit facility for additional processing of each segment.
- Provides a Sequential Subset Randomizer utility,

Program number: 5655-E06

IBM IMS High Performance Prefix Resolution for z/OS, V3.1

The IBM IMS High Performance Prefix Resolution for z/OS tool:

- Enables you to resolve and update prefixes of IMS databases involved in logical relationships as a single job step.
- Eliminates the intermediate Work File 2 (WF2) and Work File 3 (WF3) data sets.
- Helps you avoid much of the I/O, tape handling, and DASD requirements that are often associated with prefix resolution and prefix update.
- Executes the prefix resolution and prefix update functions as replacements for the IMS Prefix Resolution and IMS Prefix Update utilities.
- Supports IMS Parallel Reorganization for z/OS, V3 single job step execution of database reorganization, prefix resolution, and prefix update tasks.

Program number: 5655-M27

IBM IMS High Performance Pointer Checker for z/OS, V3.1

The IBM IMS High Performance Pointer Checker for z/OS:

- Enables you to analyze corrupt databases quickly and reduce the amount of time spent to diagnose and repair them.
- Generates reports that facilitate system tuning, report space utilization, and detect and report problems in primary and secondary indexes.
- Provides the ability to set several new thresholds, including available extents, CA and CI splits, and database and data set last extents.
- Has significant improvements in performance to Full Checking capabilities: improved usability with simplified setup and operation; parallel processing of databases; and improved reporting.

- Provide ease of use and fast, easy detection of database status.
- Interactively and in batch mode repairs VSAM- and OSAM-organized IMS databases that contain pointer or data errors.
- Performs repairs quickly, thereby reducing the amount of time that the affected database is taken offline.
- Features VSAM and OSAM pointer repair, pointer navigation, a backout safety feature, and an ISPF front end.
- Runs in interactive mode, in which you can view entire blocks of data or individual IMS segments and you can navigate to other segments. Any changes made are tracked and can be undone.
- Runs in batch mode, in which you can dump blocks from the data set or submit changes to the block data.
- Integrates with IMS Parallel Reorg and HP Image Copy.

Program number: 5655-U09

IBM IMS Index Builder for z/OS, V3.1

The IBM IMS Index Builder for z/OS:

- Offers several features that improve overall performance and enhance ease of use.
- Builds or rebuilds primary and secondary indexes quickly.
- Allows the user to specify an optional output file where records that are needed for prefix resolution can be split off and written as they are read in.
- Eliminates the need to image copy indexes.
- Recognizes index records that have duplicate keys and writes the duplicate keys to a SYSOUT data set.
- Supports building IMS HALDB primary indexes.
- Integrates with the Database Recovery Facility, which enables the building of primary and secondary indexes during a database recovery.

Program number: 5655-R01

IBM IMS Library Integrity Utilities for z/OS, V2.1

The IBM IMS Library Integrity Utilities for z/OS:

- Manages IMS ACB, PSB, and DBD libraries:
 - DBD/PSB/ACB Compare, DBD/PSB/ACB Reversal, and DBD/PSB/ACB Mapper
 - Reporting information in a tabular form
 - Checking results from your desktop and ensuring that all PSBs and DBDs were processed as expected
 - Advanced ACBGen
 - Providing a high-speed generation process that greatly reduces the time needed to process large volumes of IMS ACBs
- Includes an Integrity Checker to help prevent system outages caused by databases corrupted by using the wrong DBD.
- Includes a Consistency Checker function to ensure that all the necessary definitions have been created for a database.
- Includes the MFS Reversal and MFS Compare utilities.

- Converts Message Format Services MID, MOD, DIF, and DOF control blocks back into Message Format Services utility control statements.
- Helps you recover the source and compare deltas if you lose your MFS source library or suspect a difference between the generated control blocks and the source.
- Provides useful summary reports of the IMS FORMAT library that show the relationships among the members.
- Cross tool integration provides LIU reporting in IMS Tools utilities and a LIU ISPF available in DB Control Suite.

Program number: 5655-U08

IBM IMS Online Reorganization Facility for z/OS, V1.2

The IBM IMS Online Reorganization Facility for z/OS tool:

- Enables reorganization of IMS full-function and HALDB databases with a short outage in seconds rather than minutes or hours (a short period of time called *takeover time*).
- Reorganizes databases to shadow data sets, captures the changes during this period, and applies them to the reorganized shadow data sets.
- Requires databases and their data sets to be registered with DBRC.
- Reorganizes HISAM, HIDAM, HDAM, and SHISAM databases, and recreates their associated index data sets.
- Supports internal logical relationships.
- Reorganizes PHIDAM and PHDAM databases as single partitions while making selected DBD changes during the process.
- Supports the reorganization of all HALDB partitions in a single job step.
- Supports batch message processing programs (BMPs) that allow you to pause BMPs during /DBRECOVERY commands.
- Allows predefining the online reorganization “window” to schedule when you want your online databases reorganized.
- Supports CICS and OTMA applications that quiesce database access during /DBRECOVERY commands.
- Allows DBD changes to be implemented without manual intervention after reorganization.
- Additional functions include:
 - Reorganizing only an index.
 - Near-online unload.
 - Integration with HALDB Conversion and Maintenance Aid to provide online conversion to HALDB.

Program number: 5655-H97

IBM IMS Database Solution Pack for z/OS, V1.2

The IBM IMS Database Solution Pack for z/OS tool combines the features, functions, and processes your database administrator can use to more effectively analyze, maintain, and tune IMS full-function databases, including High Availability Large Databases (HALDBs). It provides a comprehensive set of high-performance utilities to unload, load, index build, reorganize, backup, verify, and report on full-function databases.

The IBM IMS Database Solution Pack for z/OS includes the following tools:

- “IBM IMS Database Reorganization Expert for z/OS, V4.1” on page 208
- “IBM IMS High Performance Image Copy for z/OS, V4.2” on page 185
- “IBM IMS High Performance Load for z/OS, V2.1” on page 208
- “IBM IMS High Performance Pointer Checker for z/OS, V3.1” on page 209
- “IBM IMS High Performance Prefix Resolution for z/OS, V3.1” on page 209
- “IBM IMS High Performance Unload for z/OS, V1.2” on page 209
- “IBM IMS Index Builder for z/OS, V3.1” on page 185
- “IBM IMS Library Integrity Utilities for z/OS, V2.1” on page 210

Program number: 5655-S77

IBM IMS Fast Path Solution Pack for z/OS, V1.2

The IBM IMS Fast Path Solution Pack for z/OS delivers extensive utilities that include functions a database administrator can use to analyze, maintain, and tune IMS Fast Path databases. Included are features that can help boost system availability by enabling the operations of a variety of key functions without taking the IMS database offline.

The IBM IMS Fast Path Solution Pack for z/OS includes:

- IMS Database Repair Facility
- IMS Fast Path Advanced Tool
- IMS Fast Path Basic Tools
- IMS Fast Path Online Tools
- “IBM IMS High Performance Image Copy for z/OS, V4.2” on page 185
- “IBM IMS Library Integrity Utilities for z/OS, V2.1” on page 210

Program number: 5655-W14

Chapter 25. Miscellaneous IBM tools that support IMS

Miscellaneous IBM tools that support IMS

The following IMS tools also support IMS Version 12:

IMS Application Development Facility (ADF), V2.2

IMS Application Development Facility is an architectural framework within which IMS application development and processing is accomplished.

IBM Application Performance Analyzer for z/OS, V11.1

The IBM Application Performance Analyzer for z/OS measures and reports how your applications use resources. The tool:

- Helps your business maximize the performance of your existing applications and improve the response time of your online transactions and batch turnaround times.
- Gives you the information you need to isolate performance problems in applications and test the effect of increased workloads on your systems.
- Monitors, analyzes and reports the performance of CICS, Assembler, COBOL, PL/I, C/C++, DB2, IMS and WebSphere MQ applications.
- Collects samples from the monitored address space and analyzes the system or resource application usage of CPU, DASD, I/O or the total address space.
- Features online analysis and reports that can be created as PDF or XML files, so that you can view them on workstations or transfer easily to other applications.
- Integrates with Fault Analyzer for z/OS and Debug Tool for z/OS.

Program number: 5697-Q03

IBM Application Recovery Tool for IMS and DB2 Databases

The IBM Application Recovery Tool for IMS and DB2 Databases minimizes recovery time, cost, and errors by creating a common point-in-time for data recovery and by synchronizing IMS and DB2 logs. The tool:

- Enables a range of database recovery functions in e-business transaction environments.
- Simplifies and coordinates batch application recovery of IBM IMS and IBM DB2 data to a common point, reducing the time and cost of data recovery.
- Recovers IMS and DB2 applications individually.
- Eases log, utility and process management for database recovery.
- Supports IMS High Availability Large Databases (HALDBs) and IMS SYSPLEX data sharing.
- Supports the latest versions of IMS and DB2.

Program number: 5697-F56

IBM DataRefresher™, Version 1.1

IBM DataRefresher provides you with facilities for copying, refining, and manipulating data from a source database or file on one system, and formatting it for a target database or file on the same, or another, system.

Program number: 5696-703

IBM IMS DataPropagator for z/OS, V3.1

The IBM IMS DataPropagator for z/OS® tool:

- Supports WebSphere MQ-based, asynchronous near real-time propagation that allows:
 - The Capture Component to capture IMS database changes performed by IMS Batch, IMS BMP, and IMS TM application programs
 - The Apply Component to transform the IMS database changes into relational format and apply them to DB2 tables on the same or on different systems from the IMS databases
 - IMS-to-IMS propagation
 - The transmission of the database changes from the Capture to the Target Component through the recoverable, buffered, and queued asynchronous messaging services of WebSphere MQ
- Reduces elapsed time between the IMS database updates and the DB2 for z/OS table updates to as little as a few seconds.
- Supports point-in-time propagation, allowing the content of the DB2 for z/OS target tables to reflect clearly identified logical points in time of the IMS source databases, for example, the logical end of a business day.
- Exploits the well established, high-performance, reliable queued messaging services of WebSphere MQ and allows enterprises to leverage their WebSphere MQ administration and operations skills.
- Improves performance by transmitting multiple IMS database changes within the same WebSphere MQ message, by compressing WebSphere MQ message data, and by exploiting the caching services of the Virtual Lookaside Facility (VLF) of z/OS.

Program number: 5655-E52

IBM Debug Tool for z/OS

IBM Debug Tool for z/OS is an interactive source-level debugging tool for compiled applications in a variety of environments. The tool can:

- Debug an application interactively as it runs
- Perform seamless debugging of mixed-language applications
- Adjust an application while debugging
- Display, monitor, and alter program variables

IBM Fault Analyzer for z/OS

The IBM Fault Analyzer for z/OS assists developers in analyzing and fixing application and system failures. It offers developers information to help determine the cause of failure and assist in resolving the problem.

IBM File Manager for z/OS for IMS Data, V12.1 or later

The IMS component of File Manager (FM/IMS) is an ISPF application with which you can display, edit, update, create, copy, compare, print and erase your data files. This tool is a member of the IBM Problem Determination Tools suite.

Program Number: 5655-Q12.

IBM Hourglass, V6.1, Program Number: 5655-P29

HourGlass is a z/OS system application, allowing sites to alter the Date/Time returned to a z/OS application when a time request is made (SVC 11 or PC Time Requests). The tool:

- Patterns or specific applications, transactions, users, and address space names can be specified to limit the scope at which HourGlass will alter returned date/time information.
- Accurately simulates date and time processing for thorough application testing.
- Coordinates reporting and data transfers across time zones.
- Identifies applications that request the system date and time, and resolve potential problems before they occur.

IMS Checkpoint Wrapper, V1.1, Program Number: 5799-GLT

The IMS Checkpoint Wrapper is a tool for converting IMS application programs that run in batch regions to programs that run in BMP dependent regions; the conversion is done with very little change to the application.

WebSphere MQ for z/OS V7.0.1 and V7.1.0, Program Number 5655-R36

WebSphere MQ for z/OS V7.0.1 and V7.1.0 offers a messaging powerhouse for the IBM System z platform as part of the universal messaging backbone. It delivers robust connectivity for flexible, reliable messaging for applications including Web services and Web 2.0. It includes market-leading JMS and now also offers publish and subscribe messaging.

IBM DB/DC Data Dictionary, Version 1.6

Part 4. Featured integration solutions for IMS Version 12

IMS provides a wide variety of options for other software, middleware, and hardware products to connect to and integrate with both IMS transactions and data. Many of these products provide integrated connectivity features specific to IMS. A select few of the integration solutions provided by these products in coordination with IMS are featured here.

Chapter 26. IBM IMS Enterprise Suite

The IMS Enterprise Suite features independent components that facilitate application development and extends access to IMS transactions and data through use of industry standard tools, programming interfaces, and data protocols.

The components of the IMS Enterprise Suite enhance connectivity, expand application development, and extend standards and tools to facilitate integration with existing assets or other IBM solutions. The latest version is V3.1.

IMS Enterprise Suite Connect APIs

Provide programming control of connections to IMS Connect, of interactions with IMS, and of the data that is sent to IMS for those interactions in the Java and C programming languages. These APIs provide a simple way to describe TCP/IP socket connections, interaction protocols, message headers, and data through the concepts of reusable profiles. More granular, lower-level calls are provided for more granular controls. The APIs can be used to develop custom IMS Connect TCP/IP client applications in Windows and z/OS environments.

IBM IMS Data Provider for Microsoft .NET

New in IMS Enterprise Suite V3.1, the IMS Data Provider for Microsoft .NET is based on the ADO.NET specifications and provides the solution for Microsoft .NET-based applications to access and manipulate IMS data. .NET application developers can use their preferred development environment, such as Microsoft Visual Studio, to call the provided APIs.

The IMS Data Provider for Microsoft .NET will be provided through the IMS Enterprise Suite V3.1 service process, and the support is for IMS 13 only.

IMS Enterprise Suite Explorer for Development

Simplifies IMS application development tasks by displaying and enabling editing of IMS databases, segments, fields, and more, from an industry-standard IDE.

The IMS Enterprise Suite Explorer for Development is an Eclipse-based graphical tool that enables IMS application developers and database architects and developers to:

- Perform common and essential tasks in an end-to-end application development lifecycle
- Simplify the development and visualization of database description (DBD) and program specification block (PSB) resource definitions
- Import COBOL and PL/I data structures to an IMS database by using the importers of, and shell-sharing with, IBM Rational Developer for System z, to generate PSB source, and to import and export DBD and PSB source from or to a z/OS remote system
- Leverage the IMS Universal drivers, thus offering a relational view of IMS data and offering new function, such as graphical assistance to build SQL statements
- Populate the IMS catalog

The enhancements for V3.1 include:

- Ability to import large numbers of DBDs and PSBs.

- Automatic imports of referenced DBDs when DBDs and PSBs from the IMS catalog or the host are imported.
- Ability to import COBOL and PL/I data structures from the host.
- Support for unit testing.
- Support for IMS catalog navigation.
- A Problems View for troubleshooting information

IMS Explorer for Development provides enhancements to most functions provided by the IMS Enterprise Suite DLIModel utility plug-in, which is no longer provided in the IMS Enterprise Suite as of Version 2.2.

If you use the IMS Enterprise Suite DLIModel utility plug-in, migrate to the IMS Enterprise Suite Explorer for Development instead.

Although IMS Explorer for Development includes enhancements to most IMS Enterprise Suite DLIModel utility plug-in functions, it does not provide support for IMS database web services or IMS XML DB. Instead:

- For IMS database web services, you can generate web-enabled IMS database queries by shell-sharing IMS Explorer for Development with IBM Data Studio.
- For IMS XML DB, you can continue to use the IMS Enterprise Suite Version 2.1 DLIModel utility plug-in.

IMS Enterprise Suite SOAP Gateway

Enables IMS applications to interoperate outside of the IMS environment through the SOAP protocol to provide and request services that are independent of platform, environment, application language, or programming model. IMS applications can become web services or send callout requests to external web services.

The enhancements for V3.1 include:

- Support for 64-bit z/OS, allowing organizations to take advantage of their 64-bit operating environment for extended memory usage.
- Support for the send-only with acknowledgement protocol for synchronous callout, providing SOAP Gateway users more information about whether a callout response message was sent to IMS and whether the original IMS application received the message.
- Ability to run the SOAP Gateway management utility commands in batch mode in one JVM instance, facilitating web service deployment and server management tasks with better performance.

Java Message Service (JMS) API

Enables IMS applications that run in Java message processing (JMP) or Java batch processing (JBP) regions to issue synchronous callout requests to external services. To use the JMP and JBP support for synchronous callout, the JMS version 1.1 interface classes are required.

Some of the IMS Enterprise Suite components include the requisite open source code.

All of the IMS Enterprise Suite components support standard installation processes. The components that run on z/OS support SMP/E and the components that run on distributed platforms support or use the IBM Installation Manager.

For more information about the versions of IMS Enterprise Suite that works with IMS V12, see the IMS Enterprise Suite software requirement topic.

Related reference:

“IMS Enterprise Suite software requirements” on page 53

Chapter 27. IBM Cognos Business Intelligence solution

You can connect an IBM Cognos® Business Intelligence server directly to IMS operational data to create drill-to-detail reports with online access to your critical business data.

An IMS database typically contains operational data for high-volume transactional workloads. These workloads include finance, insurance, and retail applications that contain a wealth of valuable data about customers, interactions, and business trends. In a typical business intelligence scenario, the operational data must be warehoused and pre-processed before it is accessible to the IBM Cognos Business Intelligence (BI) report author. However, relying only on warehoused data adds constraints to the flexibility of a business reporting application. Because the report author has access only to the warehoused data and not the online transactional system, the most up-to-date detail information is not available. IBM Cognos BI 10.2 offers a data connection type for direct connections to IMS databases.

This solution requires the following IMS components:

- IMS Catalog
- IMS Common Service Layer (CSL)
- IMS Open Database Manager (ODBM)
- IMS Connect

Related information:

 [IBM Business Analytics Proven Practices: Best Practices for Using IMS Data in IBM Cognos BI Reports](#)

Chapter 28. IBM WebSphere DataPower appliances

The IBM WebSphere DataPower® appliances provide integrated support for IMS Version 12. The DataPower appliances support both access to IMS databases and transactions from web-based clients, and synchronous callout requests to web services from IMS application programs.

The WebSphere DataPower Appliances provide a single point of control to simplify, govern, and optimize the delivery of services and applications and enhance the security of XML and IT services. They extend and strengthen the capabilities of an infrastructure by providing a multitude of functions that can be managed through a web browser interface.

The IBM WebSphere DataPower Integration Appliance provides three types of support for IMS: Access to databases in IMS DB.

- Access to IMS DB allows an external application to issue SQL calls against IMS databases by using the integrated IMS Universal JDBC driver that is delivered with DataPower.
- Access to IMS transactions that are running in IMS TM. Access to IMS TM through DataPower allows an external application to initiate a transaction request to an application program that is running in an IMS dependent region and fetch data back.
- Support for synchronous callout requests from application programs that are running in IMS to data or service providers that are running on the DataPower backend.

DataPower provides plug-in usability with little to no changes to an existing network or application software. No proprietary schemas, coding, or APIs are required to install or manage the device. DataPower supports XML integrated development environments to help reduce the number of hours that are spent in developing and debugging XML applications.

Related information:

 [DataPower for IMS Implementation Guide](#)

 [IBM WebSphere DataPower Version 6.0 Information Center](#)

 [WebSphere DataPower SOA Appliances product page](#)

Chapter 29. IMS solutions for Java development

The IMS solutions for Java development allow you to write Java application programs that work with IMS. IMS Version 12 delivers enhancements to this support.

The IMS solutions for Java development include the IMS Universal drivers, the IMS Java dependent region resource adapter, and the classic Java APIs for IMS. The IMS Universal drivers are recommended over the classic Java APIs for IMS.

IMS Universal drivers

The IMS Universal drivers are a set of SMP/E-installable Java drivers and resource adapters that enable access to IMS from z/OS and distributed (non-z/OS) platforms. The IMS Universal drivers are built on industry standards and open specifications.

Two types of connectivity are supported by the IMS Universal drivers: local connectivity to IMS databases on the same LPAR (*type-2 connectivity*), and distributed connectivity through TCP/IP (*type-4 connectivity*).

Java applications that use the type-2 IMS Universal drivers must reside on the same logical partition (LPAR) as the IMS subsystem.

Java applications that use the type-4 IMS Universal drivers can reside on the same logical partition (LPAR) or on a different LPAR from the IMS subsystem.

The IMS Universal drivers enable access to IMS from multiple environments, including:

- WebSphere Application Server for z/OS
- DB2 for z/OS stored procedures
- CICS Transaction Server for z/OS
- IMS on the host in JMP and JBP regions

The IMS Universal drivers include:

- IMS Universal Database resource adapter: a Java EE Connector Architecture (JCA) 1.5-compliant resource adapter
- IMS Universal JDBC driver: a Java Database Connectivity (JDBC) driver that implements the JDBC 3.0 API specification
- IMS Universal DL/I driver: a Java API for making calls with traditional DL/I programming semantics

For information about how the IMS Universal drivers are enhanced for IMS Version 12, see “IMS Universal drivers enhancements overview” on page 13.

IMS Java dependent region resource adapter

The IMS Java dependent region resource adapter is a set of Java classes and interfaces that support IMS database access and IMS message queue processing in Java batch processing (JBP) and Java message processing (JMP) regions.

The IMS Java dependent region resource adapter provides Java application programs running in JMP or JBP regions with similar DL/I functionality to that provided in message processing program (MPP) and non-message driven BMP regions, such as:

- Accessing IMS message queues to read and write messages
- Performing program switches
- Commit and rollback processing
- Accessing GSAM databases
- Database recovery (CHKP/XRST)

Classic Java APIs for IMS

The classic Java APIs for IMS are a set of SMP/E-installable Java classes and interfaces to access IMS from multiple runtime environments.

Recommendation: Replace the classic Java APIs for IMS with the IMS Universal drivers. IMS Version 13 is the last release to support the classic Java APIs for IMS.

The classic Java APIs for IMS includes JCA 1.0 support, and a IMS classic JDBC driver based on the JDBC 2.1 standard for issuing SQL queries to IMS databases.

The classic Java APIs for IMS and the IMS Universal drivers for type-2 connectivity are built on top of existing assembler interfaces to IMS. For the IMS environment, the CEETDLI interface is used. DB2 for z/OS and WebSphere Application Server use the AERTDLI interface. CICS uses the AIBTDLI interface. The classic Java APIs for IMS and the IMS Universal drivers for type-2 connectivity detect which environment is used, which enables the APIs to use the appropriate assembler interface to IMS at run time. The ability for the APIs to detect environment is transparent to the application.

IMS DB resource adapter

IMS provides a JCA resource adaptor that is built on the classic Java APIs for IMS for deployment on WebSphere Application Server: the IMS DB resource adapter. This resource adapter is installed using SMP/E with IMS and provides a set of Java class libraries that you can use to write Java EE application programs that access IMS databases from WebSphere Application Server for z/OS.

Recommendation: Because the IMS Universal Database resource adapter is built on industry standards and open specifications, and provides more flexibility and improved support for connectivity, data access methods, and transaction processing options, use the IMS Universal Database resource adapter to develop Java EE applications that access IMS from WebSphere Application Server.

Chapter 30. IMS TM Resource Adapter overview

You can use the IMS TM resource adapter (previously known as IMS Connector for Java) to create Java Platform, Enterprise Edition (Java EE, previously known as J2EE) applications to access IMS transactions over the Internet, as well as to make callout requests to external Java EE applications from IMS applications that run in IMS dependent regions.

Using this resource adapter within a WebSphere or Rational development environment, you can:

- Develop components of business processes in support of service-oriented architecture
- Create Java EE applications from JavaBeans
- Develop service-based applications

The applications can then be deployed on application servers such as WebSphere Application Server, WebSphere Process Server, WebSphere Transformation Extender, or WebSphere Message Broker.

The enhancements to IMS TM resource adapter in IMS Version 12 include:

- Support for WebSphere Application Server V8 and its Resource Workload Routing function, which enables applications to more easily recover from resource outages without requiring the application to embed alternate resource and configuration information
- Requesting DFS2082 messages for CM0 interactions that do not receive a response
- Pulling callout messages from multiple IMS datastores from a message-driven bean (or per IMSActivationspec instance)
- Enhanced connection retry capability for callout messages
- Support for WebSphere Application Server Community Edition (CE) - delivered through the IMS service process
- Limited non-IBM Java Enterprise Edition (EE) Application server use - delivered through the IMS service process
- Support for RACROUTE VERIFY return code for RACF security failures - delivered through the IMS service process

Part 5. Appendixes

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Bibliography

This bibliography lists all of the publications in the IMS Version 12 library, supplemental publications, publication collections, and accessibility titles cited in the IMS Version 12 library.

For information about the locally installable version of the Information Management Software for z/OS Solutions Information Center, see <http://pic.dhe.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.dzic.doc/installabledzic.htm>.

IMS Version 12 library

Title	Acronym	Order number
<i>IMS Version 12 Application Programming</i>	APG	SC19-3007
<i>IMS Version 12 Application Programming APIs</i>	APR	SC19-3008
<i>IMS Version 12 Commands, Volume 1: IMS Commands A-M</i>	CR1	SC19-3009
<i>IMS Version 12 Commands, Volume 2: IMS Commands N-V</i>	CR2	SC19-3010
<i>IMS Version 12 Commands, Volume 3: IMS Component and z/OS Commands</i>	CR3	SC19-3011
<i>IMS Version 12 Communications and Connections</i>	CCG	SC19-3012
<i>IMS Version 12 Database Administration</i>	DAG	SC19-3013
<i>IMS Version 12 Database Utilities</i>	DUR	SC19-3014
<i>IMS Version 12 Diagnosis</i>	DGR	GC19-3015
<i>IMS Version 12 Exit Routines</i>	ERR	SC19-3016
<i>IMS Version 12 Installation</i>	INS	GC19-3017
<i>IMS Version 12 Licensed Program Specifications</i>	LPS	GC19-3024
<i>IMS Messages and Codes, Volume 1: DFS Messages</i>	MC1	GC18-9712
<i>IMS Messages and Codes, Volume 2: Non-DFS Messages</i>	MC2	GC18-9713
<i>IMS Messages and Codes, Volume 3: IMS Abend Codes</i>	MC3	GC18-9714
<i>IMS Messages and Codes, Volume 4: IMS Component Codes</i>	MC4	GC18-9715
<i>IMS Version 12 Operations and Automation</i>	OAG	SC19-3018
<i>IMS Version 12 Release Planning</i>	RPG	GC19-3019
<i>IMS Version 12 System Administration</i>	SAG	SC19-3020
<i>IMS Version 12 System Definition</i>	SDG	GC19-3021
<i>IMS Version 12 System Programming APIs</i>	SPR	SC19-3022
<i>IMS Version 12 System Utilities</i>	SUR	SC19-3023

Supplementary publications

Title	Order number
<i>Program Directory for Information Management System Transaction and Database Servers V12.0</i>	GI10-8843
<i>Program Directory for Information Management System Transaction and Database Servers V12.0 Database Value Unit Edition</i>	GI10-8943
<i>IRLM Messages and Codes</i>	GC19-2666

Publication collections

Title	Format	Order number
IMS Version 12 Product Kit	CD	SK5T-7394

Accessibility titles cited in the IMS Version 12 library

Title	Order number
<i>z/OS TSO/E Primer</i>	SA22-7787
<i>z/OS TSO/E User's Guide</i>	SA22-7794
<i>z/OS ISPF User's Guide Volume 1</i>	SC34-4822

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