IMS
Version 11

Release Planning

GC19-2442-05

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Note
Before using this information and the product that it supports, be sure to read the general information under "Notices" on page 231.

This edition applies to IMS Version 11 (program number 5635-A02) and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

About this information

These topics provide general information to help you evaluate and plan for IMS™ Version 11. The topics describe the new features and enhancements for IMS Version 11, the hardware and software requirements for these new features and enhancements, considerations for migration and coexistence for IMS Version 11, and an overview of the IMS Tools that are enhanced to work with IMS Version 11.

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 10. For complete information about these enhancements, see the *IMS Version 10: Release Planning Guide* (GC18-9717).

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

- *IMS Version 11 Installation*
- *IMS Version 11 System Definition*
- *IMS Version 11: Program Directory for Information Management System Transaction and Database Servers*

How to use the Release Planning information

Use the IMS Version 11 Release Planning information to learn about the new enhancements in IMS Version 11 and to plan your migration.

The Release Planning information is organized into the following parts:

- Part 1, "General planning information for IMS Version 11," 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 11
  - An overview of the hardware and software requirements
  - Migration considerations for IMS Version 11
  - Coexistence considerations between the supported versions of IMS
  - A summary of changes to the IMS library for IMS Version 11
  - A listing of the changed, new, and deleted messages and abends for IMS Version 11
  - A listing of the new and changed log records for IMS Version 11
- , which contains Part 2, "Planning for IMS Version 11 enhancements," on page 115 contains more detailed descriptions of the larger new functions and enhancements in IMS Version 11.
- Part 3, "IBM DB2 and IMS Tools support for IMS Version 11," on page 179, which describes IBM® IMS Tools and products that support IMS Version 11.
- Part 4, "Featured integration solutions for IMS Version 11," on page 219, which contains overviews of some of the new ways that you can further integrate IMS Version 11 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 11, unless otherwise indicated.

IMS provides an integrated IMS Connect function, which offers a functional replacement for the IMS Connect tool (program number 5655-K52). In this information, the term IMS Connect refers to the integrated IMS Connect function that is part of IMS Version 11, 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).

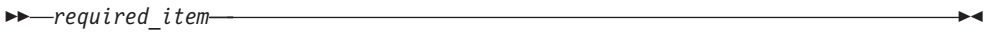
Revision markers do not necessarily indicate all the changes made to the information because deleted text and graphics cannot be marked with revision markers.

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).

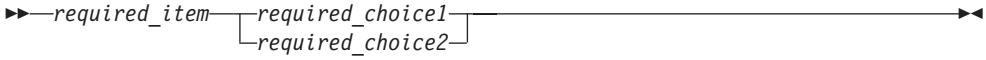


- Optional items appear below the main path.

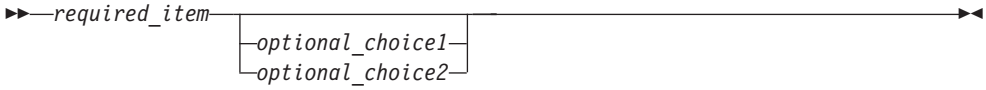
  If an optional item appears above the main path, that item has no effect on the execution of the syntax element and is used only for readability.

- If you can choose from two or more items, they appear vertically, in a stack.

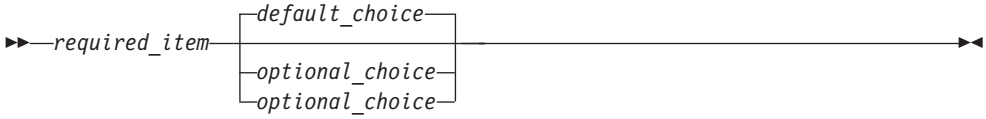
  If you *must* choose one of the items, one item of the stack appears on the main path.



  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 11

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 11. 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 11) 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 11 ISPF panel functions by using a keyboard or keyboard shortcut keys.

For information about navigating the IMS Version 11 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 11 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 11

In addition to the new functions and enhancements that are available, IMS Version 11 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 11 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 11 are also described.

Chapter 1. Overview of IMS Version 11 enhancements

The enhancements to IMS Version 11 cover all areas of the product: DB, TM, and system.

These topics introduce all the enhancements to IMS Version 11.

The larger enhancements are more fully discussed in their own topics in Part 2, "Planning for IMS Version 11 enhancements," on page 115. The smaller enhancements are discussed only in this topic.

IMS Database Manager enhancements

This section describes the enhancements for the IMS Version 11 Database Manager.

"IMS system enhancements" on page 13 describes additional enhancements for the IMS Database Manager.

Database quiesce enhancement overview

Database quiesce enables you to create a coordinated recovery point across an IMSplex for IMS Fast Path data entry databases (DEDBs), Fast Path areas, full-function databases, High Availability Large Databases (HALDBs), HALDB partitions, and database groups, without taking your resources offline or causing applications to encounter an unavailable database.

You can use database quiesce to establish a *point of consistency* for a DEDB or full-function database. The *point of consistency* is a time when no updates are pending for the database and the information that is stored on a direct access storage device (DASD) accurately reflects the current information that is stored in the database. When this point is reached, an image copy can be taken to provide a quick method of recovering the database, database group, or area to this point.

For more details about this enhancement, see Chapter 9, "Database quiesce enhancement," on page 121.

Database reliability, availability, and serviceability enhancements overview

There are three enhancements: GSAM XRST with an empty GSAM output data set, an improved SNAP dump (DFSERA20) header, and an update to IMS abend 0845.

The database reliability, availability, and serviceability enhancements are as follows:

GSAM XRST with an empty GSAM output data set
IMS Version 11 has been enhanced to take an appropriate action when an Extended Restart (XRST) command is accidentally pointed to an empty GSAM data set. Pointing to an empty GSAM data set on restart can result in an I/O error and possible data loss. GSAM XRST now checks to determine if the GSAM output data set to be repositioned is empty, and if the data set is empty, GSAM XRST issues an IMS abend 0102 with reason code X'C4C30001' to prevent I/O errors and possible data loss.

Improved SNAP dump (DFSERA20) header

The SNAP call facility (DFSERA20) dump header has been improved so that it now identifies known calling routines instead of listing them as unknown (UNK). Additionally, supervisor call (SVC) dumps are now generated, as intended, if an abend or status code has been specified or if a known calling routine calls without specifying an abend or status code.

Application analysts and programmers will no longer need to review large SVC dumps because the required information can be found in a SNAP dump.

Update to IMS abend 0845

ABEND U0845 has a new message DFS1058E, which includes a unique reason code and short explanation of the problem.

Using the information provided in message DFS1058E can shorten the time to resolve IMS abend 0845 problems, and shorten the time needed to find the exact location where the error was first recognized.

DBRC enhancements overview

DBRC in IMS Version 11 provides the ability to run on Base Primitive Environment (BPE) and also provides new serviceability options for the RECON data sets.

The following list describes the enhancements to the Database Recovery Control (DBRC) function for IMS Version 11:

- DBRC now has the option of running on BPE, which gives DBRC additional functionality.

  For more detailed information about this enhancement, see "BPE-based DBRC enhancement" on page 129.
- You can override the access security for non-production copies of the RECON data set.

  For more detailed information about this enhancement, see "RECON data set security override enhancement" on page 133.
- With the appropriate authorization, you can use the CLEANUP.RECON command to remove obsolete information from the RECON data set.

  For more detailed information about this enhancement, see "Unconditional deletion of information from the RECON data set" on page 134.
- New output data has been added to the DBRC API. Therefore, the output block version number is increased to 3.0.

Fast Path enhancements overview

The enhancements to Fast Path in IMS Version 11 introduce a 64-bit buffer manager, new options to open Fast Path areas, and new serviceability options.

The Fast Path 64-bit buffer manager autonomically controls the number and size of Fast Path buffer pools, which eliminates the need for system programmers to manually set buffer pool specifications during system definition. It also places the buffer pools for DEDB databases above the bar in 64-bit storage, which reduces the usage of extended common storage area (ESCA). For more information about this enhancement, see "Fast Path 64-bit buffer manager enhancement" on page 137.

Fast Path usability and serviceability enhancements provide IMS Fast Path users with new options to open Fast Path DEDB areas by using type-2 commands and provides serviceability enhancements that allow both Fast Path users and IMS

Service to more efficiently resolve problems that are related to IMS Fast Path. For more information about this enhancement, see "Fast Path usability and serviceability enhancements" on page 141.

HALDB enhancements overview

IMS Version 11 includes improvements to the High Availability Large Database (HALDB) Online Reorganization process and the improvements to the HD Reorganization Unload utility (DFSURGU0).

The HALDB Online Reorganization (OLR) enhancements added in IMS Version 11 improve performance by reducing:

- CPU usage
- Elapsed time
- Log volume
- Number of calls to IRLM

The HD Reorganization Unload utility (DFSURGU0) is enhanced to accept a range of keys during the MIGRATE=YES process. Using the KEYRANGE parameter, users can migrate portions of a large database in parallel.

Recommendation: To maximize migration performance, unload a key range of a single partition in one step followed by a migration reload of the corresponding HALDB partition. The migration reload must use DBRC=Y and requires allocating the RECON data sets containing the new HALDB partition definitions either with JCL or dynamically using DBRC RECON MDA members.

The enhancements to DFSURGU0 are delivered through the IMS Version 11 service process with APAR/PTF PM06639/UK60205. These same enhancements are delivered in IMS Version 10 with APAR/PTF PM06635/UK60206.

Integrated IMS Connect enhancements for IMS DB overview

The enhancements to IMS Connect for IMS DB include support for the new IMS DB Universal drivers, the new CSL Open Database Manager (ODBM), and the DRDA® communications protocol.

As of IMS Version 11, IMS Connect is the TCP/IP path into IMS DB, as well as IMS TM. IMS Connect clients can access IMS DB through using the open standard Distributed Relational Database Architecture™ (DRDA) specification, which supports distributed data management (DDM) Architecture commands.

As part of the new Open Database enhancements, IMS Version 11 provides new Java™ drivers, called the IMS Universal drivers, that you can use to access your IMS data. IMS Connect supports the IMS Universal drivers using the DRDA protocol. Independent software vendors can also use any of the IMS Universal drivers to build packages that access IMS data.

For more details about these enhancements to IMS Connect, see Chapter 13, "Open Database enhancements," on page 151.

ODBA enhancements overview

The ODBA interface has a new command for IMS Version 11: CIMS CONNECT. This command initializes the ODBA interface and connects to multiple IMS DB systems.

Prior to IMS Version 11, ODBA applications used the CIMS INIT command to initialize the ODBA interface and connect to a single IMS DB system. If the application wanted to connect to multiple IMS DB systems, it had to issue multiple CIMS INIT commands, one for each IMS DB system.

You can use the CIMS CONNECT command in IMS Version 9 and IMS Version 10 ODBA applications if you install the following APARs/PTFs:

- For IMS Version 9: PK66020/UK42176
- For IMS Version 10: PK66022/UK42410

Open Database enhancements overview

Distributed Java application programs in TCP/IP environments can use the new IMS Universal drivers to access any database that is managed by IMS DB on any logical partition (LPAR) in an IMSplex. Other enhancements also enable Open Database Access (ODBA) application programs, user-written IMS Connect client application programs, and user-written Open Database Manager (a new Common Service Layer address space) client application programs to access these databases.

Java application programs can access databases that are managed by IMS DB by using any of three new drivers (the IMS Universal drivers) delivered with IMS Version 11. These drivers are built on widely used open-standard technologies, so they can help speed application development.

ODBA application programs can use the new ODBM address space to manage the ODBA interface, which can improve availability of the IMS system.

User-written IMS Connect client application programs can access IMS data by using widely used open-standard technologies, which can help speed application development.

User-written ODBM client application programs can also access IMS data using widely used open-standard technologies.

For more detailed information about these enhancements, see Chapter 13, “Open Database enhancements,” on page 151.

XML data support enhancements overview

You can write applications to store XML data in IMS databases or retrieve XML data from IMS databases by using the IMS Universal JDBC driver. Both the type-4 and type-2 drivers offer this support.

You can use the IMS Universal JDBC driver support for XML to complete these operations:

- Retrieve XML data from an IMS database as a character large object (CLOB) through a SQL SELECT statement.
- Store XML data into an IMS database, through a SQL INSERT statement, by using either the PreparedStatement.setClob method or the PreparedStatement.setCharacterStream method.

The syntax for storing and retrieving XML data by using the IMS Universal JDBC driver is independent of how the XML data is physically stored in the IMS database. The interface is not sensitive to whether the data is stored in

decomposed storage mode, intact storage mode, or both or whether the data is stored in an existing or new IMS database.

IMS Transaction Manager enhancements

This section describes the enhancements for the IMS Version 11 Transaction Manager.

"IMS system enhancements" on page 13 describes additional enhancements for the IMS Transaction Manager.

APPC enhancement overview

If the LUMP or LUMC pools run out of storage, unpredictable results might occur. To address this situation, IMS Version 11 can automatically monitor LUMP or LUMC pool storage usage. If the either of the pools are about to run out of storage, IMS issues new messages (DFS1277W and DFS1278W) and tells APPC/MVS to reject all input for IMS. When an adequate amount of storage becomes available again, IMS issues message DFS1279I and tells APPC/MVS to resume input for IMS.

This enhancement automatically turns on LUMP and LUMC pool storage monitoring if the storage limit for both pools is specified as greater than 8 MB. If the limit is set to 2 GB (the maximum) or one of the pools is less than 8 MB, the monitoring is disabled.

IMS callout function enhancements

The enhancements to the IMS callout function for IMS Version 11 include the ability to use the new OTMA type-2 commands for OTMA descriptors and support for synchronous callout messages to use the new timeout functions.

As of IMS Version 11:

- You can create, update, query, and delete OTMA descriptors dynamically using type-2 commands. These OTMA descriptors can be used for both synchronous and asynchronous callout messages.

  For more information about the new OTMA type-2 commands, see Chapter 16, "IMS TM command enhancements," on page 169.
- IMS can detect an OTMA Tpipe hang situation (after waiting for a specified amount of time) for synchronous callout messages where the client application failed to respond with a positive or negative acknowledgment message (ACK or NAK). In this situation, IMS rejects the synchronous callout message (with no reroute) and issues a DFS3494E message to the system console. After the timeout processing has finished, the rest of the synchronous callout messages on the Tpipe can continue to flow.

The following functions are added with APAR/PTF PM12142/UK57873:

- OTMA issues a new NAK message with a sense code X'2B' when a late or invalid acknowledgment message is received.
- OTMA cleans up the unused tpipes for ICAL calls after 3 IMS checkpoints.
- The output of the /DISPLAY TMEMBER TPIPE SYNC command is changed to display the current number of ICAL messages that OTMA received for a particular tpipe. Also, the NO_RSP label is changed to NO_COT.

Integrated IMS Connect enhancements for IMS TM overview

The IMS Connect enhancements for IMS TM provide better connectivity, serviceability, security, and usability.

The IMS Connect enhancements for IMS TM provide:

- Expanded ACK Timeout support for commit-then-send (CM0) output.
- Improvements to connections.
- The ability to specify a connection-level super member.
- An improvement to the reliability of diagnostic information, through exploitation of the BPE External Trace facility.
- Additional information in the HWSP1410W message.
- Enforcement of the single port requirement for Secure Sockets Layer (SSL) sockets.
- An option for leaving a connection open after returning a user-defined message from an IMS Connect exit routine.
- The ability to modify input messages from TCP/IP before they are submitted to IMS Connect.
- Information listings are improved through optional summary versions of the VIEWHWS and QUERY MEMBER commands.
- An elimination of the requirement to use different IMS Connect ports for instances of distributed WebSphere® applications.
- A new IMS Request Message (IRM) flag, which enables a transaction expiration time to be passed in the OTMA message prefix.
- A new warning message when the number of sockets is approaching the maximum specified.
- Utilization of the new OTMA resource monitoring enhancement.

For detailed information about all the enhancements to IMS Connect for IMS TM, see Chapter 12, "IMS Connect enhancements for IMS TM," on page 143.

IMS Connect is also enhanced to support the IMS Universal drivers.

For more details about these enhancements, see Chapter 13, "Open Database enhancements," on page 151.

MSC enhancements overview

The maximum number of Multiple System Coupling (MSC) logical links (MSLINK) is increased from 676 to 936.

To allow for this increase, numeric values are now valid in the two character PARTNER= parameter on the MSLINK macro. For example, PARTNER=AA, PARTNER=A1, PARTNER=1A, and PARTNER=11 are all valid.

MTO and WTOR user ID enhancement

New keywords have been added to the DFSDCxxx PROCLIB member that enable you to specify a user ID to use if the MTO or WTOR did not sign on.

If the MTO and WTOR (system console) terminals do not sign on, IMS uses the control region user ID for transaction authorization checking. The control region

user ID is also used for any other terminal that has not signed on. This situation makes it difficult to authorize only the MTO (primary) and the WTOR (system console) for transactions.

Two new keywords have been added to the DFSDCxxx PROCLIB member (MTOUSID and WTORUSID) that enable you to specify a user ID to use if the MTO or WTOR did not sign on. In this case, IMS will not sign on the MTO or WTOR.

This function is added with APAR/PTF PK85571/UK49701.

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 enhancements to OTMA in IMS Version 11 give you more control over transactions and better monitoring capabilities.

The OTMA function in IMS Version 11 contains the following enhancements:

- CM0 ACK timeout support

  The CM0 ACK timeout support allows you to detect a hang condition in an OTMA transaction pipe and reroute commit mode 0 (commit-then-send) transactions to a timeout message queue so that the remainder of the I/O PCB output on the transaction pipe can continue to flow normally.

  For more information about this OTMA enhancement, see Chapter 14, “OTMA CM0 timeout enhancement,” on page 161.

- New OTMA type-2 commands

  The new OTMA type-2 commands:

  – Give you the ability to monitor the workload in OTMA, specifically the messages in the OTMA send-then-commit (CM1) message queue. By monitoring the OTMA CM1 message queue, you can anticipate potential problems that might arise and respond proactively to avoid or circumvent such problems.

  – Allow you to dynamically create, modify, and delete OTMA descriptor entries for ALT-PCB output messages, which eliminates the need to restart IMS if a destination routing definition is changed.

For more information about the new OTMA type-2 commands, see Chapter 16, “IMS TM command enhancements,” on page 169.

- 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 OTMA input has TMAMINPT flag set, the input transaction data instead of the DFS3688I message is sent back to the OTMA client for the transaction expiration.

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

- OTMA monitoring enhancement

  OTMA now monitors IMS system resources that are used to process OTMA transactions and notifies OTMA clients (such as IMS Connect) about how well the IMS system is processing OTMA transactions. If an OTMA client receives a notification that the IMS system is not processing OTMA message normally, the OTMA client can then take appropriate action, such as rerouting OTMA transaction messages to a different IMS system.

- 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.

- OTMA TPIPE management is enhanced by APAR/PTF PM14510/UK65904

  – 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.

- The OTMA TPIPE flood monitoring function is enhanced by APAR/PTF PM71035/UK91360 and UK91361
  - IMS OTMA TPIPE flood monitoring function is enhanced to avoid ABENDU0367 at a shared queues back-end IMS system when the maximum TPIPE limit that is specified on the MAXTP parameter of an OTMA client descriptor is reached for an OTMA transaction that is initiated in a front-end IMS system.
  - Also, a new system client descriptor, DFSOTMA, is introduced to specify a global TPIPE limit for all of the OTMA clients (MEMBERS). When the global total of tpipes for all OTMA clients reaches the global TPIPE limit, IMS prevents OTMA clients from creating new TPIPEs.
- Synchronous callout enhancements

  OTMA is enhanced to provide new and changed reason codes that help identify errors from OTMA or OTMA clients. For example, when IMS Connect detects an XML adapter error for the response message, IMS Connect informs OTMA so that the IMS application issuing the ICAL call gets the return code X'0108' with the reason code X'0588' or X'058C' instead of a timeout return code and reason code.

  Also, a new IMS message, DFS4688E, is introduced to report an ICAL processing error. When this error occurs, ICAL can be timed out with an extended reason code.

Shared queues scheduling enhancement

The shared queues scheduling enhancement might reduce the number of times an application is unnecessarily scheduled in certain shared-queues environments.

The scheduling algorithm is enhanced in IMS Version 11 to avoid posting an extra message region when the only message received for a transaction was enqueued locally to the front-end IMS. This enhancement might have the effect of reducing the number of *false schedules* in IMS shared-queues systems where most messages are queued local-first. A false schedule occurs when a message region is scheduled and IMS finds no more messages on the queue.

For more details about false schedules, see the description of the PARLIM keyword in the TRANSACT macro.

Static terminal signon enhancement

IMS Version 11 can automatically signon static terminals with the LTERM name as user ID without password check when the terminal logged on to IMS.

Two new OPTIONS keywords have been added to the TERMINAL and TYPE macro. The new keywords are AUTOSIGN/NOAUTSGN. If AUTOSIGN is specified, IMS signs on the terminal at logon time with the LTERM name as user ID. The user ID must be defined in RACF®. For ISC static terminals, the SUBPOOL name is used as the user ID instead of the LTERM name.

This function is added with APAR/PTF PK85571/UK49701.

TM and MSC Message Routine and Control User exit routine (DFSMSCE0) enhancements overview

The capability and usability of the Sysplex Manager Affinity support in the TM and MSC Message Routing and Control User exit routine (DFSMSCE0) is enhanced for IMS Version 11.

The affinity support in DFSMSCE0 is enhanced in the following ways:

- The DFSMSCE0 user exit can route APPC/OTMA synchronous messages to a back-end IMS when the z/OS Resource Recovery Services (RRS) or the APPC/OTMA Shared Queues support (AOS) are not active. This resolves the APPC/OTMA affinity restriction for some customers.
- The IMSID affinity field in DFSMSCEP user parameter list is increased from 4 to 8 bytes to support XRF.
- A new status display value is added to the QUERY TRAN command that displays if the transaction is registered for affinity (STATUS=LCLAFFIN). This makes affinity routing easier to manage.
- The DFSMSCEB and DFSMSCEP control block sizes are increased to provide more room for service and future enhancements to the DFSMSCE0 user exit.

A new program routing entry point is also added to DFSMSCE0. This entry point is called when an application program GU call is issued. The exit routine can retrieve or update a user prefix in the message prefix area. No routing of the input message is allowed.

IMS TM dynamic storage private buffer pool enhancement

A new IMS Transaction Manager (TM) dynamic storage private buffer pool, DYNP, for module dynamic storage is added to IMS Version 11. This new storage pool is used by OTMA and APPC for message processing.

IMS and DCC procedures are enhanced with the new DYNP parameter, which specifies a value for the upper expansion limit of the IMS TM dynamic storage private buffer pool. The value specified on the DYNP parameter can be in kilobytes, megabytes, or gigabytes.

The /DISPLAY POOL command is also enhanced (with the new DYNP parameter) to support the IMS TM dynamic storage private buffer pool.

Transaction expiration enhancements overview

IMS Version 11 can interrogate an expiration time associated with transactions and discard (not process) the transactions if the time specified has passed. By discarding transactions whose expiration time has passed, processing costs and CPU cycles are not spent for the unwanted transactions.

The expiration time is specified in the TRANSACT macro, type-2 commands, or the OTMA message prefix. OTMA, IMS Connect, and some type-2 commands are enhanced to support the transaction expiration function.

For more information about this enhancement, see Chapter 15, “Transaction expiration enhancements,” on page 165.

IMS system enhancements

This section describes the major enhancements for the overall IMS Version 11 system, including both the Database Manager and the Transaction Manager.

ACB library enhancements overview

The Application Control Blocks library (ACBLIB) usability enhancements enable you to load the ACB members into 64-bit storage and, separately, create DFSMDA members for the dynamic allocation of the ACBLIB data sets.

For more details about these enhancements, see Chapter 8, “Application Control Blocks library usability enhancements,” on page 117.

/DIAGNOSE command enhancements overview

IMS Version 11 includes two new /DIAGNOSE command keywords and one new option that can help you to streamline the problem determination process. As with all /DIAGNOSE command output, the captured information is written to the OLDS, or trace data set, as type X'6701' records.

Users need the ability to gather diagnostic information without impacting mission-critical business operations. For instance, gathering a console dump in a production environment is disruptive and can have a negative impact on revenue at many business sites. Users are forced to schedule dumps during off-peak hours or are prevented from gathering this sort of information at all.

The /DIAGNOSE command takes a snap shot of IMS system resources at any time without impacting availability. The output produced can be quickly transmitted to IBM Software Support, thus avoiding the overhead of capturing and transferring a memory dump.

The following keywords and options are added to the /DIAGNOSE command:

BLOCK(CSCD)
Captures storage information for the APPC/OTMA SMQ SCD Extension control block.

MODULE(*modname***)**
Identifies the entry point address and captures prolog information for the specified IMS module. The prolog information contains the current maintenance level for a module and can help you to determine if any maintenance is missing.

STRUCTURE(*structurename***)**
Captures storage information for the DFSSQS control block storage for the specified shared queues structure.

DFSPBxxx PROCLIB member change overview

IMSVersion 11 always uses the Data Entry Database Resource Name hash routine (DBFLHSH0) for the routine that generates the hash value used by IRLM. IMS ignores the value of the UHASH parameter of the DFSPBxxx PROCLIB member, even when the parameter is specified.

Dynamic abend dump formatting exit enhancement

IMS Version 11 dynamically installs its abend dump formatting exit routine; you do not need to install the DFSAFMD0 module as part of the IMS installation process. Registration of the abend dump formatting exit routine with the operating system is done automatically during IMS startup.

The abend dump formatting exit routine is registered dynamically only for IMS Version 11 or later. If you use earlier IMS releases, or use both IMS Version 11 and earlier IMS releases, you must still install the DFSAFMD0 module as part of the IMS installation if you want IMS online dump formatting. The DFSAFMD0 module must be the highest version prior to IMS Version 11. When all IMS systems (control region and batch regions) are IMS Version 11 or later, you can remove DFSAFMD0 from SYS1.LPALIB and from the IEAVADFM CSECT of z/OS module IGC0805A.

For more information about the IMS abend dump formatting exit routine, see Binding the abend formatting module (DFSAFMD0).

Extended Recovery Facility (XRF) enhancement overview

IMS no longer uses the DFSMS MULTACC parameter when opening an OLDS for an XRF-capable IMS.

The MULTACC specification was originally used to reduce contention for the read/write heads on the OLDS DASD between the active and alternate IMS systems. Current DASD devices use cached RAID subsystems, which negate the original advantages of using MULTACC for XRF. If your XRF system writes its log files onto physical (not emulated) 3380 or 3390 devices, you will see an increase in head contention.

IMS dependent region enhancements

IMS Version 11 can now manage the Java Virtual Machine (JVM) used in dependent regions.

Before these enhancements, the JVM used in BMP, IFP, and MPP regions was always managed by IBM Enterprise COBOL for z/OS. The JVM was created each time a Java application was called from a COBOL application and was destroyed when the Java call returned to the COBOL application.

IMS can now manage the JVM for these regions. IMS creates the JVM when the dependent region is initialized and destroys the JVM only when the region terminates. This function is delivered with APAR/PTF PM00360/UK58285.

To have IMS create and manage the JVM in the region, use the new ENVIRON and JVMOPMAS parameters in the DFSMPR, IMSFP, or IMSBATCH procedures. These JCL parameters are the same parameters as those supported for JMP and JBP regions.

DB2 for z/OS is enhanced to support Java applications (which are started from the COBOL or equivalent application in the MPP, BMP, or IFP region) to issue DB2 for z/OS JDBC calls using the IMS ESAF interface.

The IMS dependent region enhancements have the following software requirements:

- Language Environment® for z/OS APAR/PTF PK99010/UK52873
- If running z/OS V1R11 or later, Language Environment for z/OS APAR/PTF PM00482/UK53437 is also required
- If issuing DB2 for z/OS JDBC calls from the Java application, DB2 for z/OS APAR/PTF PK93123/UK52961 is also required

IMS Dump Formatter enhancements overview

IMS Dump Formatter is enhanced in IMS Version 11 to re-create the final part of an IMS log from the information that is available in an IMS dump, thus eliminating the need to request the final system log data set (SLDS) for diagnostic purposes.

When an IMS customer is working with an IBM Software Support representative, frequently the customer creates a memory dump and the service representative needs IMS log data. To get this log data, the customer requests the final SLDS, compresses (terses) it, and transfers the file to IBM by using FTP. The Service person decompresses (unterses) the data set and then analyzes it.

The enhancements enable the IMS Version 11 Dump Formatter to build a log data set from the log records that reside in the dump's log buffers, thus avoiding the requests for the SLDS and the extra work associated with these requests.

For the complete details of the IMS Dump Formatter, see *IMS Version 11 Diagnosis*.

IMS Log Archive utility (DFSUARC0) enhancement overview

In IMS Version 12, the Log Archive utility (DFSUARC0) is enhanced with a 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.

Installation Verification Program (IVP) enhancements overview

For IMS Version 11, the IVP is enhanced to support the Open Database enhancements. This support, along with support for the IMS callout function (which was introduced in IMS Version 10), is provided through the IMS service process.

In IMS Version 10 and later, the Variable Export utility can be directly accessed as an option from the IVP Phase Selection panel, which makes it easier to import the IVP variables from a prior release of IMS.

The IVP dialogs are completely replaced when a new release of IMS is installed.

Integrated IMS Connect enhancements overview

The integrated IMS Connect is enhanced to support new functions for IMS TM and IMS DB.

The enhancements to the integrated IMS Connect function (also known as IMS Connect) for IMS Version 11 are in both the IMS TM and IMS DB areas.

For more information, see:

- "Integrated IMS Connect enhancements for IMS DB overview" on page 5
- "Integrated IMS Connect enhancements for IMS TM overview" on page 8

KBLA enhancements overview

When you upgrade the Knowledge-based Log Analysis (KBLA) utilities to support IMS Version 11, the following functions are added: data entry panel scrolling and multi-volume KBLA output data set allocation.

IMS Version 11 provides two small enhancements to the KBLA utilities. The first enhancement provides support for scrolling the KBLA ISPF panels, which facilitates access to all of the data entry fields, regardless of the screen size. The second enhancement can minimize the potential risk for exceeding the space allocated for an output data set, which might result in an abend.

IMS Version 11 is the last version of IMS that supports the KBLA facility. Customers using this function should migrate to use other IBM analysis utilities and reports, such as the:

- Fast Path Log Analysis utility (DBFULTA0)
- File Select and Formatting Print utility (DFSERA10)
- IMS Monitor Report Print utility (DFSUTR20)
- Log Transaction Analysis utility (DFSILTA0)
- Offline Dump Formatter utility (DFSOFMD0)
- Statistical Analysis utility(DFSISTS0)
- Other complementary products, such as IMS Problem Investigator, IMS Performance Analyzer, or similar products

PARDLI parameter support extended to all IMS dependent regions

In IMS Version 11, 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 11 APAR/PTF PM91914/UK96228, 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.

IMS security enhancements

IMS Version 11 includes enhancements to security initialization parameters and RACF support.

RACF mixed-case password enhancement overview

IMS and IMS Connect are enhanced to be able to rely on the specification in Resource Access Control Facility (RACF) that pertains to mixed-case passwords and handle passwords in the same manner. As of IMS Version 11, this behavior is the default for IMS and IMS Connect.

IMS Version 9 is not capable of processing mixed-case passwords. IMS Version 10, as originally delivered, can process mixed-case passwords, but to enable this function, you must specify PSWDC=M for IMS and PSWDMC=Y for IMS Connect. The default values for the original IMS Version 10 are PSWDC=U (uppercase) and PSWDMC=N (not mixed-case).

The PSWDC and PSWDMC parameters are enhanced in IMS Version 11 (and IMS Version 10 with APAR/PTF PK80037/UK45982) with the 'R' specification, which means that IMS and IMS Connect should handle passwords in the same manner as is specified in RACF.

The default values for PSWDC and PSWDMC are different for IMS Version 11 than they were originally in IMS Version 10. The default values for IMS Version 11 (and IMS Version 10 with APAR/PTF PK80037/UK45982 installed) are PSWDC=R and PSWDMC=R (use the RACF specification).

Recommendation: If you do not use RACF for IMS or IMS Connect, set PSWDC and PSWDMC to a value that is appropriate for your installation.

The following items are updated in IMS Version 11 to support this enhancement:

DBC, DCC, and IMS procedures
: The PSWDC parameter is enhanced with a third option, R, that directs IMS to handle mixed-case passwords in the same manner as is specified in RACF. PSWDC=R is the default for IMS Version 11. If the PSWDC parameter is not specified, IMS will handle mixed-case passwords in the same manner as is specified in RACF.

HWS configuration statement
: The PSWDMC parameter is enhanced with a third option, R, that directs IMS Connect to handle mixed-case passwords in the same manner as is specified in RACF. PSWDMC=R is the default for IMS Version 11. If the PSWDMC parameter is not specified, IMS Connect will handle mixed-case passwords in the same manner as is specified in RACF.

The IMS Connect SETPWMC **command**
: The SETPWMC command is enhanced with a third option, RCF, that directs IMS Connect to handle mixed-case passwords in the same manner as is specified in RACF.

IMS Connect z/OS UPDATE MEMBER TYPE(IMSCON) SET(PSWDMC) **command**
: The PSWDMC parameter is enhanced with a third option, RCF, that directs IMS Connect to handle mixed-case passwords in the same manner as is specified in RACF.

These enhancements do not alter how IMS or IMS Connect process the existing options for these procedures, commands, and the configuration statement.

Security initialization parameters enhancement

IMS Version 11 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 11, the initialization parameters for the RCLASS and SECCNT keywords are delivered by APAR/PTF PM48203/UK74050.

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

Syntax Checker enhancements overview

The IMS Version 11 Syntax Checker supports the new and changed IMS PROCLIB members, and delivers other enhancements and changes.

The Syntax Checker is updated for IMS Version 11 in the following ways:

- Support is added for the new IMS PROCLIB members that are delivered in IMS Version 11, such as CSLDCxxx and CSLDIxxx (for the new Open Database Manager (ODBM) address space), and DSPBIxxx (for the BPE-based DBRC initialization member).
- The ability to insert a keyword at a user specified line is added.
- A new **Edit** pull down option is added.
- The IMS PROCLIB members parameters that were supported in IMS Version 10 are updated to reflect the changes in IMS Version 11.
- IMS Version 8 PROCLIB members can not be used as input to the IMS Version 11 Syntax Checker. IMS Version 9, IMS Version 10 and IMS Version 11 PROCLIB members are supported.

The complete information about the Syntax Checker is in *IMS Version 11 System Definition*.

Command enhancements overview

IMS Version 11 provides enhancements to existing commands and introduces new commands. Most of the enhancements are provided in type-2 commands, which support the IMS strategy of enhancing the capability of a single point of control (SPOC) applications that issue type-2 commands through the Operations Manager (OM) API or REXX single point of control (SPOC) API.

Database quiesce command enhancements

The following IMS commands are changed to support the database quiesce function:

- DISPLAY AREA
- DISPLAY DB
- QUERY AREA
- QUERY DB
- /RMCHANGE
- /RMGENJCL
- /RMLIST

- /RMNOTIFY
- UPDATE DATAGRP
- UPDATE AREA
- UPDATE DB

The following DBRC commands are changed to support the database quiesce function:

- CHANGE.DB
- CHANGE.DBDS
- GENJCL.IC
- LIST.DB
- LIST.DBDS
- NOTIFY.ALLOC

For more details about these enhancements, see Chapter 9, "Database quiesce enhancement," on page 121.

Fast Path command enhancements

The following IMS commands are added to support the Fast Path enhancements:

- QUERY POOL TYPE(FPBP64) SHOW(ALL)
- UPDATE POOL TYPE(FPBP64) SET(LIMIT(xxxxx))

The following IMS commands are changed to support the Fast Path enhancements:

- QUERY IMS
- UPDATE AREA
- UPDATE DB
- UPDATE IMS

For more details about these enhancements, see Chapter 11, "Fast Path enhancements," on page 137.

IMS TM command enhancements

The following IMS commands are added to support IMS TM in general:

- QUERY LTERM
- QUERY NODE
- QUERY USER
- QUERY USERID

The following IMS commands are added to support OTMA:

- QUERY OTMATI
- CREATE OTMADESC
- UPDATE OTMADESC
- DELETE OTMADESC
- QUERY OTMADESC

For more details about these enhancements, see Chapter 16, "IMS TM command enhancements," on page 169.

Open Database command enhancements

The following IMS commands are added to support the Open Database function:

- QUERY ODBM TYPE(*option*)
- UPDATE ODBM NAME(odbmname) START(COMM)
- UPDATE ODBM NAME(odbmname) STOP(COMM)
- UPDATE ODBM START(TRACE)
- UPDATE ODBM STOP(TRACE)
- UPDATE ODBM START(CONNECTION)
- UPDATE ODBM STOP(CONNECTION)
- UPDATE ODBM TYPE(CONFIG)

The following commands are added to IMS Connect for the Open Database function;

- QUERY ALIAS NAME() ODBMNAME
- SETOAUTO
- STARTOD *odbmname*
- STOPOD *odbmname*
- STOPOD *odbmname*
- STOPIA *aliasname odbmname*
- UPDATE ALIAS NAME() ODBMNAME() START(ROUTE)
- UPDATE ALIAS NAME() ODBMNAME() STOP(ROUTE)
- UPDATE MEMBER TYPE(IMSCON) SET(OAUTO(ON|OFF))
- VIEWIA *aliasname odbmname*

The following IMS Connect commands are changed to support the Open Database function:

- VIEWDS *odbmname*
- VIEWHWS
- VIEWPORT *portname*

For more details about these enhancements, see Chapter 13, “Open Database enhancements,” on page 151.

User exit command enhancements

The following IMS commands are added (through the service process) to support the user exit enhancements:

- QUERY USEREXIT
- REFRESH USEREXIT

For more details about these enhancements, see Chapter 17, “User exit enhancements,” on page 173.

User exit enhancements overview

Prior to IMS Version 11, when exit routines needed to be modified or brought online, IMS had to be stopped and restarted to recognize the changed or new exit routines. The user exit enhancements solves this problem with a new REFRESH USEREXIT command. IMS Version 11 also introduces the new QUERY USEREXIT

command (to query information about exit routines) and introduces three new exit types (with sample exit routines). These enhancements are delivered through the IMS Version 11 service process.

The user exit enhancements introduce the following new functions in IMS Version 11:

- A way to refresh certain exit routines online by using the new REFRESH USEREXIT command
- A way to query information about certain exit routines by using the new QUERY USEREXIT command
- Three new exit types:

  Initialization/Termination exit type
  The Initialization/Termination exit type is called early in IMS initialization, during normal and abnormal IMS termination, and after the successful refresh of a user exit type. This exit type is available for the following IMS control region types: DB/DC, DBCTL, DCCTL, and FDBR.

  IMS CQS Event exit type
  The IMS CQS Event exit type is called when IMS processes a CQS event. This exit type is available to an IMS control region that registers with CQS, which can be in either a DB/DC or DCCTL configuration.

  IMS CQS Structure Event exit type
  The IMS CQS Structure Event exit type is called when IMS processes a CQS structure event after IMS is notified about the event from a CQS-driven Structure Event exit routine. This exit type is available to an IMS control region that registers with CQS, which can be in either a DB/DC or DCCTL configuration.
- The ability to define multiple exit routines for the three new exit types above, as well as the Restart Exit type that was introduced in IMS Version 10.
- Enhancements to the Standard User Exit Parameter List (SXPL).
- A new X'17' subcode that contains relevant data about the new exit routines is added to the X'45' statistics log record.

For more information about these enhancements, see Chapter 17, “User exit enhancements,” on page 173.

Virtual Storage Constraint Relief enhancements overview

The IMS internal storage managing service is updated to use 64-bit private storage, instead of 24-bit private, for certain IMS functions. This enhancement should reduce the occurrences of end-of-memory (EOM) type system abends that require an IPL of the z/OS system to resolve. As part of this enhancement, IMS no longer creates contents directory entries (CDEs). IMS Version 11 also provides virtual storage constraint relief (VSCR) as part of the Fast Path 64-bit buffer manager enhancement.

For more information, see “Fast Path 64-bit buffer manager enhancement” on page 137.

Chapter 2. Hardware and software requirements

IMS Version 11 has base hardware and software requirements. Some individual functions have additional requirements.

These topics describe the requirements for installing and activating IMS Version 11.

Hardware requirements

IMS Version 11 has base hardware requirements. Some individual functions have additional hardware requirements.

Processor requirements

The processor that IMS Version 11 runs on must meet certain requirements.

The processor that IMS Version 11 runs on must meet the following requirements:

- An IBM zSeries machine running in z/Architecture® mode (ESA mode is not supported by IMS Version 11)
- Capable of running z/OS Version 1 Release 9 or later
- A 64-bit processor, such as those described in the following table

Table 1. IBM 64-bit processors

Machine name	Machine type
IBM eServer™ zSeries 900 (z900)	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

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 9 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 11 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).

VSAM 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.

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 V11.0*:

- SMP/E system entries
- SMP/E data sets
- Target libraries
- Distribution libraries

- Install process
- Optional machine-readable material

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 (DFSMStvs). Therefore, parallel RECON access requires Coupling Facility (CF) hardware in the System z sysplex.

Terminals and equipment supported by IMS Version 11

IMS Version 11 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 11.

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 11

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

Table 2. Terminals that are supported by IMS Version 11 (continued)

Compatible product	SNA	Notes
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 11, 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 11

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 11 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 11 has base software requirements. Some individual functions have additional software requirements.

Operating software requirements

IMS Version 11 and its various functions have specific operating software requirements.

Before you install IMS Version 11, 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 11 is IMS1100.

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 V11.0*.

IMS Version 11 base software requirements

The base IMS Version 11 system runs on z/OS Version 1 Release 9 or later. Certain features and functions have additional software requirements.

IMS Version 11 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 9 (5694-A01) or later.
  - IBM High-Level Assembler Toolkit (5696-234) Version 1 Release 5, a separately orderable feature of z/OS.
  - z/OS V1R9.0 Security Server RACF V1R9.0 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).
- IRLM Version 2.2 or later (5635-A02), if data sharing is used. IRLM Version 2.2 is delivered with IMS Version 11.

  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 11 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 11 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 11 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 11. 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 11 can coexist with IMS Version 9 and IMS Version 10 with the appropriate coexistence APARs applied.

See “Overview of coexistence APARs” on page 87 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 11 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', 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'.

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 11. 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 11, 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) and an Operations Manager (OM).
- 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) where the resource definitions that support DRD are stored. These RDDSs 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.

Fast Path software requirements

The Fast Path 64-bit buffer manager requires a minimum of 2.1 gigabytes of 64-bit 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.

When running IMS Version 11 on z/OS V1R9, the Fast Path 64-bit buffer manager uses 64-bit private storage. When running IMS Version 11 on z/OS V1R10 or later, the Fast Path 64-bit buffer manager uses 64-bit common storage.

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 Control Center software requirements

The IMS Control Center has several software requirements.

The software requirements for using the IMS Control Center are listed in the Information Management Software for z/OS Solutions Information Center on the Web at ../com.ibm.imscc.doc.cc/ccoverview.htm. The IMS Control Center is included in the DB2 9 Client of IBM DB2 V9.1 for Linux, UNIX, and Windows.

The IMS Control Center also supports IMS Version 9 and IMS Version 10.

Integrated 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 V1R9.0 Communications Server IP Version 4 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 the IMS Connect IMSplex support for connecting an IMS Control Center to an IMSplex, see IMS Control Center.
- 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.

Integrated IMS Connect XML Adapter support

The Integrated IMS Connect XML Adapter support in IMS Version 11, used with the IMS Enterprise Suite SOAP Gateway, requires Rational® Developer for System z Version 7.6. 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 11.

Java application program support in IMS Version 11

The following sections describe the software requirements for Java applications that run in or access IMS Version 11.

Software requirements for Java applications that access IMS databases

IMS Version 11 requires software to support Java application programs that access IMS databases.

IMS Version 11 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 11 requires IBM 31-bit SDK for z/OS, Java Technology Edition, Version 5 (JDK 5.0).

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)
- 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 5 (JDK 5.0) or later
- One or more of the following conditional requirements:
  - For CICS® applications, IBM CICS Transaction Server for z/OS Version 3.1 (5655-M15) 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 6.1 (program number 5655-I35) 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 , except that Java programs that run in JMP and JBP regions must use Java Development Kit (JDK) 6.0 or later.

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	
IBM IMS Universal JDBC driver	
IBM IMS Universal Database resource adapter	For use within WebSphere Application Server (both z/OS and distributed platforms): for JCA/JDBC local transaction processing only for JCA/JDBC two-phase (XA) commit processing or local transaction processing for CCI local transaction support 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	
IMS Universal JDBC driver	
IMS Universal Database resource adapter	For use within WebSphere Application Server (both z/OS and distributed platforms): for CCI programming interface to perform SQL or DL/I data operations for JDBC programming interface to perform SQL data operations

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.

The SDFSJIOG data set, ADFSJIOG data set, and /usr/lpp/ims/ims11/iog/IBM/ path are no longer used after incorporating the type-2 drivers into IMS Version 11. You can delete these obsolete data sets and path from your system.

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	• `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 6.1 (program number 5655-I35) or later
- WebSphere Application Server for z/OS Version 6.1.04 (program number 5655-I35) for 64-bit runtime support
- 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	• imsDBJCA.jar • imsDBJCA.rar
JDBC only	• imsJDBC.jar • imsXQuery.jar (for XQuery support)

For information about configuring this environment, see *IMS Version 11 Communications and Connections*.

To access IMS databases from WebSphere Application Server from a non-z/OS environment, you must:

- Install WebSphere Application Server for z/OS Version 6.1 or later on the same logical partition (LPAR) as IMS.
- Configure WebSphere Application Server for z/OS Version 6.1 or later, as well as WebSphere Application Server on the non-z/OS environment. For information about setting up both of these servers, see *IMS Version 11 Communications and Connections*.
- Download the IMS distributed database resource adapter from the IMS JDBC Connector web site. These downloaded files are required, in addition to the files that are installed as part of the SMP/E installation of the IMS JDBC Connector on demand Java features. Go to the IMS website at www.ibm.com/ims and link to the IMS JDBC Connector Web page for more information.

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 29.

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

Environment	JAR file
All	imsjavaBase.jar
JDBC only	• 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 1.4.2 or later for DB2 UDB for z/OS Version 8 (5625-DB2) prior to applying APAR/PTF PK14609/UK10979
- JDK 5.0 or later for DB2 UDB for z/OS Version 8 (5625-DB2) after applying APAR/PTF PK14609/UK10979 (recommended)
- 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	• `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)

The software requirements for application programs that use the IMS Universal drivers and the other IMS solutions for Java development are discussed in "Java application program support in IMS Version 11" on page 31.

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 (DFSMStvs), a separately orderable feature of z/OS.

Replacing SMU security

IMS Version 9 is the last release that supports the Security Maintenance Utility (SMU). If you used SMU security, you must migrate to RACF or an equivalent product.

RACF (or equivalent product) must include the following four RACF security classes as default classes:

- IIMS - Program Specification Block (PSB)
- JIMS - Grouping class for PSB
- LIMS - Logical terminal (LTERM)
- MIMS - Grouping class for LTERM

If these RACF resource classes are not already included in the default list of classes for RACF, or if you want to use class names that are different from the default names, you need to define them in the resource class descriptor table (CDT).

For more information about replacing SMU security, see "RACF enhancements to replace SMU" on page 73.

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, 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 11 System Administration*.

For information about configuring IMS, see *IMS Version 11 Installation* or *IMS Version 11 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. These enhancements are delivered through the IMS Version 11 service process.

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 61.

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 V11 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
- IMS Enterprise Suite V1.1

Related information:

IMS Enterprise Suite V3.1 overview

IMS Enterprise Suite V2.2 overview

IMS Enterprise Suite V2.1 overview

IMS Enterprise Suite V1.1 overview

CICS subsystems supported

IBM CICS Transaction Server for z/OS can connect to IMS if minimum version requirements are met. Certain IMS Version 11 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 11 Database Manager (DB) or, using the appropriate TM interface, the IMS Version 11 Transaction Manager.

Requirement: When IMS Version 11 DBCTL is used with IBM CICS Transaction Server for z/OS Version 4.2, APAR/PTF PM31730/UK67279 must be installed.

DB2 for z/OS subsystems supported

IMS Version 11 Transaction Manager can connect with DB2 for z/OS.

The IMS Version 11 Transaction Manager can be connected to any of the following DB2 products:

- DB2 for z/OS Version 9.1 (5635-DB2) or later
- 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 11 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 11 Transaction Manager can be connected to IMS Version 11 and earlier systems, to IBM CICS Transaction Server for z/OS, and to user-written software.

The IMS Version 11 Transaction Manager can be connected to the following products by using ISC:

- IMS Version 11 (5635-A02)
- IMS Version 10 (5635-A01)
- IMS Version 9 (5655-J38)
- 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 11 Transaction Manager can be connected to the supported versions of IMS by using Multiple Systems Coupling (MSC).

The IMS Version 11 Transaction Manager can be connected to the following versions of IMS by using MSC:

- IMS Version 11 (5635-A02)
- IMS Version 10 (5635-A01)
- IMS Version 9 (5655-J38)

Programming languages used to write IMS Version 11

IMS Version 11 is written in High Level Assembler Release 5, PL/X, C, C++, and JDK Version 5.

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
- High Level Assembler for MVS & VM & VSE Version 1 Release 4.0 or higher
- Java, using the IBM 31-bit SDK for z/OS, Java 2 Technology Edition, V5

  Java applications that run in JMP and JBP regions require 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 11 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 11 supports application programs that are supported by IMS Version 9 and IMS Version 10.

All application programs that are supported under IMS Version 9 and IMS Version 10 are still supported under IMS Version 11. In general, you should not have to recompile, reassemble, or rebind an IMS application program to run under IMS Version 11.

Packaging for IMS Version 11

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 V11.0* for installation instructions.

Table 7. FMID requirements in IMS Version 11.

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
HMK1100 ([2])	System Services component IVP component Database Recovery Control Logging component IMS Connect	R	R	R	R	R
JMK1101	Database Manager function	R	R	R	R	N
JMK1102	Transaction Manager function LU manager for IMS APPC	N	N	R	R	R
JMK1103	Extended Terminal Option feature	N	N	O	O	O
JMK1104	RSR Recovery-Level Tracking feature	O	O	O	O	O
JMK1105s	RSR Database-Level Tracking feature	O	O	O	O	O

Table 7. FMID requirements in IMS Version 11 (continued).

FMID	Description	DB batch	DBCTL	DB/DC	DB/DC with XRF (1)	DCCTL
JMK1106	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 11 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 11 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 11.

Table 8. Sample installation jobs that are shipped with IMS Version 11

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
DFSJSMKD	MKDIR	Sample job to invoke the supplied DFSJMKDR EXEC to allocate HFS paths
DFSDDEF1	DDDEF	Sample job to define SMP/E DDDEFs for IMS
DFSDDEF2	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 11.

Chapter 3. Migration to IMS Version 11

The objective of migration support is to enable an orderly migration from your current release of IMS to IMS Version 11.

These topics describe general migration considerations for IMS Version 11 and migration considerations for specific new features and functions of IMS Version 11.

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 V11.0* for the most current hardware requirements, software requirements, prerequisites, and installation information. For general installation information, see *IMS Version 11 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 11.
- 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 82 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 87.

- 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 11 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 11 system.
- Cold start your IMS Version 11 system.
- Test your IMS Version 11 system.

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

Migrating to IMS Version 11 from IMS Version 9 or earlier

If you are migrating to IMS Version 11 from IMS Version 9 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 11 from IMS Version 9, in addition to the requirements and enhancements of IMS Version 11, your migration plan must also account for the requirements and enhancements that are introduced into IMS in IMS Version 10.

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 (DFSCTRN0) 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.

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 Version 9 is the last version of IMS that supports:

- Security Maintenance utility (SMU). Customers using SMU must migrate to the Resource Access Control Facility (RACF), or an equivalent product. For more information about how to migrate from SMU security, see "RACF enhancements to replace SMU" on page 73.
- Basic Telecommunications Access Method (BTAM). Customers using BTAM should migrate to use Virtual Telecommunications Access Method (VTAM) or Transmission Control Protocol/Internet Protocol (TCP/IP). User code or tools that are dependent on BTAM should be migrated to VTAM or TCP/IP.

  VTAM Generic Resources (VGR) customers that are migrating Master Terminal Option (MTO) terminals from BTAM to VTAM might want to define the VTAM generic name on the EXEC parm instead of using the /START VGRS command. MTO terminals are normally acquired automatically during IMS initialization when the VTAM ACB is opened. A /START VGRS command that specifies the GRSNAME parameter would fail because VTAM requires that no session be active when IMS joins the VGR group. This is not a problem when the generic name is specified on the EXEC statement because IMS coordinates with VTAM before the MTO terminals are acquired.
- The Terminal Routing exit (DFSCMTR0), the Input Message Routing exit (DFSNPRT0), the Link Receive exit (DFSCMLR0), and the Program Routing exit (DFSCMPR0).

  These exits have been removed from system definition processes and the online IMS code. You must use the IMS TM and MSC Message Routing and Control user exit (DFSMSCE0) as a replacement for the exits that are no longer supported.
- IMS Connect User Message Exit (HWSIMSO0 and HWSIMSO1).

  Customers using HWSIMSO0 and HWSIMSO1 should migrate to use the sample user message exits HWSSMPL0 and HWSSMPL1. IMS issues a warning message and ignores HWSIMSO0 and HWSIMSO1 if they are specified in the HWSCFG configuration member.

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 9 or IMS Version 10 to IMS Version 11.

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 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 11: DB

Specific migration considerations apply when you are migrating from the IMS Version 9 or IMS Version 10 Database Manager to the IMS Version 11 Database Manager.

These topics describe the IMS considerations for migrating to the IMS Version 11 Database Manager.

Database quiesce migration considerations

To use the database quiesce function, all IMS systems must be at the IMS Version 11 level 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 11 Database Recovery (DFSURDB0) and Database Change Accumulation (DFSUCUM0) utilities accept as input log, image copy, and change accumulation data sets created by IMS Version 9 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 enabling Fast Path in IMS Version 10 or later, making changes for the Expedited Message Handler (EMH), for the Fast Path 64-bit buffer manager, and other changes.

Fast Path 64-bit buffer manager

If your IMS installation did not use 64-bit storage before IMS Version 11, you will need to make 64-bit storage available to use the Fast Path 64-bit buffer manager.

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.

Enabling Fast Path in IMS Version 10 or later

As of IMS Version 10, the FPCTRL macro, used with system definition, no longer enables Fast Path. This macro is tolerated for compatibility purposes. The values on the FPCTRL macro are ignored, but the Fast Path default values remain the same.

To include Fast Path in the IMS system, define FP=Y (the default value is FP=N) in the DFSPBxxx member of the IMS PROCLIB data set and define the FPCTRL macro values as execution parameters. If you specify FP=N (or do not specify anything), the Fast Path execution parameters are ignored and Fast Path is not enabled.

The FP= parameter can be changed only across a cold start.

Use the following execution parameters as replacements for the FPCTRL macro keyword parameters:

- DBFX=,DBBF=,BSIZ= (for BFALLOC=*dbfx*,*dbbf*,*bsize*)
- OTHR= (for OTHREAD=*n*)

Recommendation: Leave the FPCTRL macro defined when you migrate to IMS Version 10 or IMS Version 11, as the IMS code ignores it. Then, if you must fall back to a previous version, the FPCTL macro is in place for use in the previous release. The previous release ignores the FP= execution parameter in the DFSPBxxx member of the IMS PROCLIB data set.

For details about the DFSPBxxx member of the IMS PROCLIB data set, see the *IMS Version 11 System Definition*.

Data Entry Database Sequential Dependent Scan Utility exit routine (DBFUMSE1)

The DEDB SDEP Scan Utility exit routine is called using AMODE 31, regardless of which binder AMODE specification you set, because the routine must be able to run in 31-bit addressing mode. See the *IMS Version 11 Exit Routines* for more information about this routine.

Expedited Message Handler (EMH)

When migrating to IMS Version 11 from IMS Version 9, you must modify existing automation programs and procedures that monitor static nodes or ETO dynamic users for input response mode to recognize a Fast Path input response mode status indicator, RESP-INP-FP. Additionally, users might want to modify any existing automated or manual responses to the existing input response mode indicator RESP-INP to tailor it specifically for full-function mode users.

Main storage database (MSDB) terminals

Verify that none of your MSDBs are connected to Basic Telecommunications Access Method (BTAM) terminals because IMS Version 10 and later versions do not support BTAM terminals.

HALDB online change

IMS Version 9 and later versions have restrictions for HALDB online change.

IMS Version 9 and later versions have the following restrictions for IMS online change with HALDB partitions:

- During an ALL or MODBLKS system definition, you cannot redefine a database that is currently defined as a HALDB partition without performing a cold start of IMS. A cold start is required even if you delete the database online. That is, if you delete a HALDB partition, you cannot reuse that database name for any database that you plan to add during an ALL or MODBLKS online change without an IMS cold start.
- You cannot convert a database that is defined during an ALL or MODBLKS system definition into a HALDB partition without performing a cold start of IMS. A cold start is required even if you delete the database online. After the IMS cold start, you must redefine the database as a HALDB partition.

These restrictions do not apply for a HALDB master database.

Image copy enhancements migration considerations

If you do not want to use the fast replication enhancements introduced in IMS Version 10, and column 63 and column 64 on the control statements are blank, you do not need to change existing JCL and the existing skeletal JCL member.

As of IMS Version 10, the image copy type field in the IMAGE record in the RECON data set has moved and is expanded. Change any user or vendor processes that interrogate the IMAGE record to accommodate the moved and expanded image copy type field.

IRLM 2.2

Execution parameters have changed for IRLM 2.2.

If you are using Internal Resource Lock Manager (IRLM) 2.1, you can run IRLM 2.2 with the same procedure that you use for IRLM 2.1 by changing the procedure to use the IRLM 2.2 RESLIB. None of the IRLM 2.1 parameters are rejected. However, the following execution parameters have changed for IRLM 2.2:

- PC=NO is ignored because IRLM 2.2 uses PC=YES exclusively.
- The MAXCSA value is ignored because it applies only to the PC=NO environment.
- The z/OS EXEC parameter MEMLIMIT has been added to the IRLM 2.2 startup procedure. The value for MEMLIMIT is less than 2 GB. IRLM sets MEMLIMIT to 2 GB because IRLM 2.2 only accepts values of 2 GB or higher.
- The default for DEADLOK is (1,1).

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 DFS*xxxx*0 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 69.

Migrating to IMS Version 11: TM

IMS considerations for migrating from IMS Version 9 or IMS Version 10 Transaction Manager to IMS Version 11 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 9 or IMS Version 10 Transaction Manager to IMS Version 11 Transaction Manager.

APPC enhancements

Recommendation: Even though the APPC local LU functions (introduced in IMS Version 10) do not have any explicit migration considerations for IMS Version 11, you should migrate all IMS systems that participate in a particular shared-queues environment to IMS Version 11 before attempting to use these APPC enhancements.

IMS messages

If you use the IBM IMS Queue Control Facility for z/OS (5697-I08), apply APAR PK29667 for IMS Version 9 before you migrate to IMS Version 11.

MSC enhancements to the QUERY and UPDATE commands

To use the MSC type-2 QUERY and UPDATE command parameters (introduced in IMS Version 10) with logical links, an MSLINK name is needed.

You can define an MSLINK name in the new label field of the MSLINK system definition macro. If you do not specify an MSLINK name, IMS generates a default name of DFSL*xxxx* ,where *xxxx* is the logical link number generated by the system definition process.

MSC exit routines migration considerations

Four Multiple Systems Coupling (MSC) exit routines will not work with an IMS Version 10 or later system, and therefore must be converted to use another exit routine.

The following exit routines will work with an IMS Version 9 system, but will not work with an IMS Version 10 or later system:

- Terminal Routing exit routine (DFSCMTR0)
- Input Message Routing exit routine (DFSNPRT0)
- Link Receive Routing exit routine (DFSCMLR0/DFSCMLR1)
- Program Routing exit routine (DFSCMPR0)

These exit routines must be converted to use the TM and MSC Message Routing and Control User exit routine (DFSMSCE0). After the conversion, you must reassemble the DFSMSCE0 exit routine in IMS Version 11.

See *IMS Version 11 Exit Routines* for information about the TM and MSC Message Routing and Control User exit routine (DFSMSCE0).

OTMA migration considerations

In IMS Version 11, there are a number of migration considerations for OTMA.

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 11. 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.

The new OTMA type-2 commands will coexist with the IMS Version 10 destination routing descriptors. The descriptors are defined in the DFSYDT*x* PROCLIB member data set in the table of descriptors that is created when IMS is initialized. The IMS Version 10 requirement that descriptor identifiers be defined in a specific order no longer applies.

Migration considerations introduced in IMS Version 10

The message flood control function in IMS Version 10 and higher is automatically enabled with a default limit of 5000 messages. To provide compatibility with previous releases and deactivate the support, either specify an INPUT value of 0 in a descriptor or issue the command /STA TMEMBER INPUT.

A timeout value of 120 seconds is enabled automatically when IMS is started for CM1 transactions in IMS Version 10 and later. To change this value, use one of the following techniques:

- Issue a /STA TMEMBER TIMEOUT command
- Specify a timeout value in an OTMA descriptor that is defined in the DFSYDTx PROCLIB member
- Specify a timeout value in a client bid request

XRF and 3745 controllers migration considerations

If you used the 3745 controller for IMS XRF tracking of VTAM terminals before migrating to IMS Version 11, 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 11: System

IMS considerations for migrating from IMS Version 9 or IMS Version 10 systems to IMS Version 11 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 9 or IMS Version 10 systems to IMS Version 11 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 90 for information about CQS coexistence rules.

DBRC migration considerations

Migrating DBRC to IMS Version 11 includes several tasks, including upgrading the RECON data set.

These topics describe the considerations and tasks for migrating DBRC to IMS Version 11.

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 11 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 9 and IMS Version 10.

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

In IMS Version 10, the following RECON records have new or changed fields:

- RECON header - DSPRCNRC
- RECON header extension - DSPRCR1
- Image copy - DSPIMGRC
- Tracking subsystem - DSPSSRC

For a detailed information about the RECON record types, see *IMS Version 11 Diagnosis*.

Parallel RECON access migration considerations:

If you are migrating to IMS Version 11 from IMS Version 9, you must apply the DBRC migration/coexistence APARs. You must also evaluate your RECON I/O exit routine (DSPCEXT0) if you use one, because it might need to be modified to work correctly with the extended exit interface that was introduced in IMS Version 10.

If you are migrating to IMS Version 11 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.

For the details about the RECON I/O exit routine (DSPCEXT0), see *IMS Version 11 Exit Routines*.

Time-stamp precision migration considerations:

Change accumulation JCL and time-stamp recovery operations might need to be changed due to the increased time-stamp precision introduced in IMS Version 10.

Pre-IMS Version 10 JCL for change accumulation and time-stamp recovery operations might need to be changed due to the DBRC time-stamp enhancements

that were introduced in IMS Version 10. Setting the MINVERS value from '9.1' to '10.1' or '11.1' changes time-stamp precision from tenths of a second to microsecond format.

Because time-stamp precision to the microsecond is activated if the MINVERS value is set to 10.1 or later, set the MINVERS value only after you are sure that you will not need to fall back to IMS Version 9. When MINVERS '10.1' or '11.1' is set, log records are created with the full precision time stamps.

If you fall back to MINVERS '9.1', the log records created with full precision time stamps must be deleted before you issue the CHANGE.RECON MINVERS command. The records that must be deleted include PRILOG, PRISLD, PRIOLD, ALLOC, and other records associated with these log records.

For more information about fallback considerations for the time-stamp precision issue (and other DBRC issues), see "DBRC fallback considerations" on page 82.

After the MINVERS value is set to 10.1 or later, certain DBRC commands require the use of the increased precision time stamp. For a list of the DBRC commands that are affected by this enhancement, see "DBRC time stamps" in *IMS Version 11 Commands, Volume 3: IMS Component and z/OS Commands*.

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.

If you are using this function for the first time in IMS Version 11, 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 9 or IMS Version 10 format to an IMS Version 11 format. You are not required to change the MINVERS value to '11.1' when you migrate to IMS Version 11. 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 '11.1'.

When the RECON data set is upgraded to the IMS Version 11 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 11 CHANGE.RECON.UPGRADE command to upgrade the RECON data sets until all IMS Version 9, IMS Version 10, and IMS Version 11 systems that access the RECON data sets have the correct supporting products in place and have been tested for IMS Version 11 support.

To upgrade an IMS Version 9 or IMS Version 10 RECON data set:

1. Apply the IMS Version 11 coexistence Small Programming Enhancements (SPEs) to all IMS Version 9 and IMS Version 10 systems before you upgrade the RECON data set. The coexistence SPEs (APARs/PTFs) are:
   - PK61582/UK42649 for IMS Version 9
   - PK61583/UK42503 for IMS Version 10
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.
4. Issue the CHANGE.RECON UPGRADE command by using either the IMS Version 11 DBRC Recovery Control utility (DSPURX00) or the IMS Version 11 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 '9.1' if the value was less than '9.1'. 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 11 Commands, Volume 3: IMS Component and z/OS Commands*. For details about the Query request, see *IMS Version 11 System Programming APIs*.
5. 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 11 level, you can update the MINVERS value. Before you issue the CHANGE.RECON MINVERS('11.1') command, read "Minimum version value in the RECON data set" on page 83 to understand the ramifications involved in falling back to a previous version.

   Note: The IMS Version 10 and IMS Version 11 format for the MINVERS keyword includes a period. DBRC considers this a special character and requires it to be enclosed in single quotes. The format from earlier versions (91) is accepted for compatibility.

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.

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 to IMS Version 11 and DRD is enabled, there are no migration considerations. If you are migrating from IMS Version 9 or from IMS Version 10 without DRD enabled to a DRD-enabled IMS Version 11 system, you must complete several tasks to enable DRD.

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.

Related reading: For more information, see "Enabling dynamic resource definition" in the *IMS Version 11 System Definition*.

Exit routine migration considerations

There are migration considerations for some exit routines when migrating to IMS Version 11.

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 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). IMS Version 9 uses SXPLVER4 and IMS Version 10 uses SXPLVER5.

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 (DFSPPUE0)
- 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 (DFSAOE00)

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.

IMS availability enhancements from IMS Version 9

You might need to make changes to your IMS Version 11 system due to IMS Version 9 availability enhancements.

IMS Version 9 and higher versions use a dynamic resource cleanup module (DFSMRC20). You do not need to install the static resource cleanup module (DFSMRCL0) on the host z/OS system. IMS Version 8 and earlier versions use the static resource cleanup module (DFSMRCL0).

The DFSMRCL0 module is still shipped in IMS Version 9, IMS Version 10, and IMS Version 11 as a safety precaution (in case you still have the DFSMRCL0 zap installed in IEAVTRML and 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, IMS Version 10, or IMS Version 11. 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 your migration to IMS Version 9 or later is complete, and there is no possibility that you will run an earlier versions of IMS. DFSMRCL0 and the dynamic resource cleanup module (DFSMRC20) can coexist on the same system.

The IMS type-2 Supervisor Call instruction (SVC) and the DBRC type-4 SVC must be defined to z/OS before IMS starts. After adding the SVC definitions to z/OS and restarting z/OS, you can use the Dynamic SVC utility (DFSUSVC0) to update the SVC routines without having to restart z/OS.

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 11 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 90.
- 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 9 (V9) CQS that is using a resource structure.
- One RM and one OM running on the LPAR.
- Two IMS Version 9 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 11 (V11):

1. Prepare the IMSA libraries and data sets for IMS Version 11 (for example, perform a system definition, set up JCL, and so on).
2. Stop the V9 SCI.
3. Start the V11 SCI.
4. Start the V11 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 V9 OM.
6. Shut down IMSA.
7. Shut down IMSB.
8. Stop the V9 RM.
9. Stop the V9 CQS.
10. Start the V11 CQS.
11. Start the V11 RM.
12. Cold start IMSA.
13. Restart IMSB.
14. Test IMSA.
15. After IMSA (V11) 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 9 and repeat this process after any problems are fixed.
16. Stop the V9 OM.
17. Take IMSB offline and migrate it to IMS Version 11.

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 9 (V9) CQS
  - One Common Service Layer (CSL), consisting of an OM, RM, and SCI
  - One IMS Version 9 system (named IMSC)

  LPAR2
  - One IMS Version 9 (V9) CQS
  - One Common Service Layer (CSL), consisting of an OM, RM, and SCI
  - Two IMS Version 9 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 11 (V11):

1. Prepare the IMSC libraries and data sets for IMS Version 11 (for example, perform a system definition, set up JCL, and so on).
2. Stop the V9 SCI.
3. Start the V11 SCI.
4. Stop the V9 OM (assuming the same OM name is used before and after the migration).
5. Start the V11 OM.

6. Shut down IMSC.
7. Stop the V9 RM.
8. Shut down the V9 CQS.
9. Start the V11 CQS.
10. Start the V11 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 9 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 11 (for example, perform a system definition, set up JCL, and so on).
15. Stop the V9 SCI.
16. Start the V11 SCI.
17. Start the V11 OM.
18. Stop the V9 OM.
19. Shut down IMSD.
20. Shut down IMSE.
21. Stop the V9 RM.
22. Stop the V9 CQS.
23. Start the V11 CQS.
24. Start the V11 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 9 and repeat this process after any problems are fixed.
28. After IMSD (V11) has tested successfully, proceed to the next step.
29. Stop the V9 OM.
30. Take IMSE offline and migrate it to IMS Version 11.

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 9 (V9) CQS
  - One Common Service Layer (CSL), consisting of an OM, RM, and SCI
  - One IMS Version 9 system (named IMSF)
  - One IMS Connect that is communicating with IMSF, IMSG, and IMSH

LPAR2

- One IMS Version 9 (V9) CQS
- One Common Service Layer (CSL), consisting of an OM, RM, and SCI
- Two IMS Version 9 systems (named IMSG and IMSH)

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

To migrate the IMS systems in this example IMSplex to IMS Version 11 (V11):

1. Prepare the IMSF libraries and data sets for IMS Version 11 (for example, perform a system definition, set up JCL, and so on).
2. Stop the V9 SCI.
3. Start the V11 SCI.
4. Stop the V9 OM (assuming the same OM name is used before and after the migration).
5. Start the V11 OM.
6. Shut down IMS Connect.
7. Shut down IMSF.
8. Stop the V9 RM.
9. Shut down the V9 CQS.
10. Start the V11 CQS.
11. Start the V11 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 9 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 11 (for example, perform a system definition, set up JCL, and so on).
17. Stop the V9 SCI.
18. Start the V11 SCI.
19. Start the V11 OM.
20. Stop the V9 OM.
21. Shut down IMSG.
22. Shut down IMSH.
23. Stop the V9 RM.
24. Stop the V9 CQS.
25. Start the V11 CQS.
26. Start the V11 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 9 and repeat this process after any problems are fixed.
30. After IMSG (V11) has tested successfully, proceed to the next step.

31. Stop the V9 OM.
32. Take IMSH offline and migrate it to IMS Version 11.

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.

In IMS Version 10 and later, the Variable Export utility can be directly accessed as an option from the IVP Phase Selection panel, which makes it easier to import the IVP variables from an earlier release of IMS.

IMS Connect support migration considerations

Many migration considerations pertain to migrating IMS Connect from IMS Version 9 or IMS Version 10 to IMS Version 11.

Consider the following items when planning to migrate IMS Connect support to IMS Version 11:

- 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 (HWSEXPRM) changed for IMS Version 11. You must reassemble and rebind the IMS Connect exit routines that use HWSEXPRM 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 new PORT parameter with the KEEPAV option on the TCP/IP configuration statement in the HWSCFG PROCLIB member to enable the KeepAlive function.
- Code the new 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 11:

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.

The com.ibm.ims.base.DLISecondaryIndexInfo class has been removed from the library. This change impacts you only if you did not use the IMS Enterprise Suite

DLIModel utility plug-in to generate the metadata classes (the database view) or if you use the DLISecondaryIndexInfo class explicitly in your code.

The com.ibm.ims.db.SecondaryIndexInfo class has been renamed to com.ibm.ims.base.SecondaryIndexInfo. This change impacts you only if you use the class directly in your code. The metadata that is generated by the DLIModel utility plug-in is not affected.

The `imsjava.jar` file is not supported in versions later than IMS Version 9. See the following tables for the JAR or RAR files that pertain to your environment.

Table 9. JAR and RAR files for Java applications that use the IMS Universal drivers

Driver	JAR or RAR file
IMS Universal DL/I driver	`imsudb.jar`
IMS Universal JDBC driver	`imsudb.jar`
IMS Universal Database resource adapter	For use within WebSphere Application Server (both z/OS and distributed platforms): • `imsudbXA.rar` for CCI two-phase commit transaction support • `imsudbLocal.rar` for CCI local transaction support • `imsudbJXA.rar` for JCA/JDBC two-phase (XA) commit processing or local transaction processing • `imsudbJLocal.rar` for JDBC local transaction processing only

Table 10. JAR and RAR files for Java applications that use the classic Java APIs for IMS

Environment	JAR file
All	`imsjavaBase.jar`
Java message processing (JMP) region and Java batch processing (JBP) region	`imsjavaTM.jar`
JDBC only	`imsJDBC.jar`
WebSphere Application Server for z/OS only	`imsDBJCA.jar` `imsDBJCA.rar`

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 11.

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.applcation.class.path and the -Dibm.trusted.middlware.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.

Knowledge-Based Log Analysis (KBLA)

When you install a new version of IMS, you must also migrate KBLA.

The first time you run a new version of KBLA, the KBLA Migration panel opens, enabling you to supply a version-specific IMS.SDFSRESL data set name:

```
         IMS KBLA - Migration Panel
Command ===>

                                                        TIME....15:08:32
                                                        DATE....2008/12/09
 Supply the indicated values and press ENTER .          JULIAN..2008.344




  Version 11  IMS.SDFSRESL DSN IMS.IMSV11.SDFSRESL



  KBLA Test Loadlib. . . . . KBLA.OVERRIDE.PGMLIB
  (If the KBLA Loadlib DSN is the same as the SDFSRESL for IMS Version 10
   it will be set to a null value)

  To Perform Migration, press ENTER.
  To Exit panel, press END.
```

Figure 1. KBLA Migration panel

To migrate KBLA to a new version:

1. Verify that the version-specific IMS.SDFSRESL data set name and the KBLA Test Loadlib names are correct, or type different values.
2. Press Enter.

The IMS KBLA Migration panel facilitates migrating KBLA from IMS Version 9 or IMS Version 10 to IMS Version 11 by prompting users to enter IMS Version 11 ISPF variables. When the Migration panel opens, the IMS Version 11 IMS.SDFSRESL library name is initialized to *hlq*.SDFSRESL, where *hlq* is the high-level qualifier that was used to install IMS.

If you are migrating from IMS Version 9, the KBLA Test Loadlib displays the value from the earlier (pre-migration) version of IMS. If this KBLA Test Loadlib value is the same as the value for the currently installed IMS Version 9 IMS.SDFSRESL, the KBLA Test Loadlib value in the migration panel is blank. This blank value ensures that the IMS Version 11 IMS.SDFSRESL is not inadvertently overridden by the IMS Version 9 IMS.SDFSRESL in the JOBLIB concatenation. If you want the IMS Version 11 IMS.SDFSRESL data set to override the IMS Version 9 IMS.SDFSRESL data set, use the ISPF KBLA Parameter Maintenance panel (Option 0.1 panel) to do so.

KBLA is limited to using four concurrent IMS.SDFSRESL data sets. If four data sets already exist in the list, the migration panel is not able to add the IMS Version 11 IMS.SDFSRESL entry. In this case, the migration panel automatically switches to the KBLA Option 0.1 panel, and displays an error message indicating that the Option 0.1 panel entries are full. You can enter the IMS Version 11 IMS.SDFSRESL entry on the Option 0.1 panel in place of one of the existing IMS.SDFSRESL entries.

IMS Version 11 is the last version of IMS that supports the KBLA facility. Customers using this function should migrate to use other IBM analysis utilities and reports, such as the:

- Fast Path Log Analysis utility (DBFULTA0)
- File Select and Formatting Print utility (DFSERA10)

- IMS Monitor Report Print utility (DFSUTR20)
- Log Transaction Analysis utility (DFSILTA0)
- Offline Dump Formatter utility (DFSOFMD0)
- Statistical Analysis utility(DFSISTS0)
- Other complementary products, such as IMS Problem Investigator, IMS Performance Analyzer, or similar products

Large sequential data set support enhancement migration considerations

Migration to large format data sets can be done only at data set creation time and involves several steps.

IMS Version 10 introduced support for large format data sets. Migration to these data sets can be done only at data set creation time. The following example steps show one possible approach to using this support with GSAM or OSAM data sets:

1. Determine which existing GSAM data sets that use the BSAM access method and which sequential OSAM data sets span more than one volume because they are larger than 65,535 tracks.
2. Determine whether you have hardware that supports more than 65,535 tracks.
3. Add the DSNTYPE=LARGE DD statement to the JCL that defines these data sets.
4. Allocate the new data sets.
5. Bring the new data sets online.

   If you are using the new data sets for an online data set (OLDS) or a message queue, cold start IMS to bring the new data sets online.

   If you are using the new data sets for a database, use a database reorganization process (unload and reload) to bring the new data sets online.

Program specification block (PSB) size increase

The size of IMS Version 10 and IMS Version 11 program specification blocks (PSBs) is larger per PCB than in earlier versions of IMS. This size change can impact storage pool size.

IMS Version 10 and IMS Version 11 PSBs are 16 bytes larger per PCB than in earlier versions of IMS. When there are multiple PCBs within a PSB, this size increase is magnified by the number of PCBs within the PSB. When there are multiple copies of a PSB scheduled, the increased size is magnified by the number of PSB copies in the PSB pool. Therefore, the larger PCBs require that you increase the space in PSB pools appropriately.

When the DL/I address space option is not selected, the increased size affects the single PSB pool size. When the DL/I address space option is selected, the increased size affects the DL/I local storage pool size (DLIPSB parameter).

RACF enhancements to replace SMU

Because IMS Version 9 is the last version of IMS that supports the Security Maintenance utility (SMU) and AGN security, you might need to migrate SMU security implementations to RACF (or an equivalent product).

IMS Version 9 is the last release that supports the Security Maintenance utility (SMU) and AGN security. To prepare for this, IMS Version 9 allows you to use

RACF (through the SAF interface), user exit routines, and RACF-driven resource access security (RAS) to implement security functions that previously required the use of SMU.

The IMS Version 9 security enhancements also eliminate the 65 535 terminal limit of SMU-defined signon verification security. There is no limit to the number of terminals you can secure with RACF.

IMS Version 10 and higher versions do not support SMU security.

The principle security enhancements introduced in IMS Version 9 and the SMU security functions they replace are shown in Table 11.

Table 11. RACF replacements for SMU functions

SMU function	Replacement
AGN security for dependent regions	RAS security for dependent regions implemented by RACF security profiles and exit routines
Signon verification security	Signon verification security that is defined in the system definition macros
LTERM security of TCO-script-issued commands	RACF security of TCO-script-issued commands
CMD call security	RACF security
MSC link security for transactions	RACF and exit-routine security for both direct and non-direct routed transactions that are received from an MSC link

To migrate current SMU security implementations to RACF (or an equivalent product), the system programmer might need to perform some or all of the following tasks:

- Translate the current AGN definitions into RACF only definitions. Examples of AGN definitions and equivalent RACF definitions are described later in this topic.
- Add the four new security classes with the prefixes I, J, L, and M to the installation-defined class descriptor table if the classes are not already defined as default classes in the class descriptor table that is supplied by IBM.
- Specify the new OPTIONS=SIGNON parameter on all applicable TYPE or TERMINAL system-definition macros, or specify the new SIGNON=ALL|SPECIFIC parameter in the DFSDCxxx PROCLIB member for static terminals that are currently defined through SMU as terminals that are required to sign on.
- Specify the new type-1 AOI definitions for the startup parameter AOI1= and on the system-definition TRANSACT macro for type-1 AOI and type-2 AOI.
- Change the TCO and AOI definitions to use the SAF and DFSCCMD0 exit routine for security.
- Define the new RAS parameters in the IMS system-definition SECURITY macro or the parameters on the existing parameter ISIS=.
- Change the MSC link receive security definitions to use SAF and the DFSCCMD0 exit routine for security.
- Change the use of passwords for the `/LOCK` and `/UNLOCK` commands to use SAF and the DFSCCMD0 exit routine.

- Disable resource consistency checking for the MATRIX data set if you are going to have a mixed-version IMSplex that includes IMS Version 9 and do not intend to use SMU in that IMS Version 9 system. To disable resource consistency checking for the MATRIX data set, specify MODBLKS in the NORSCCC= keyword of the DFSCGxxx PROCLIB member. This disables resource consistency checking for both the MATRIX and MODBLKS data sets.

Ensure that your RACF definitions for the VSAM catalog data sets include IMS so that IMS can extend data sets and update the catalog with the new extent information.

Specifying any valid value for RAS (RAS | RASRACF | RASEXIT | NORAS) in the SECURITY system definition macro overrides any specifications for AGN definitions. However, AGN definitions are retained if you do not specify a RAS value (IMS uses a default of NORAS). Specifying either ISIS=N or ISIS=0 results in no RAS security and no AGN security.

Another option to using the SECURITY macro is to use EXEC parameters in your startup procedures to specify the various security values. For more information about these EXEC parameters, see Controlling security during system startup for DB/DC and DCCTL (System Administration).

The SMU to RACF Conversion utilities are a set of programs that read and convert SMU control statements and Stage 1 macros to create comparable RACF control statements or system definition stage 1 macros. For the details of these utilities, see SMU to RACF Conversion utilities.

You should be able to convert most of your existing SMU AGN definitions to use RACF resource group names. "AGN definitions for a BMP region" shows a set of AGN definitions with their associated RACF definitions. "Equivalent RACF definitions for a BMP region" shows an equivalent set of definitions that use only RACF.

AGN definitions for a BMP region

```
)( AGN IMSDGRP
   AGPSB DEBS
   AGPSB APOL1
   AGTRAN DEBSTRN1
   AGTRAN APOL12
   AGLTERM IMSUS02
   AGLTERM T3270LD

ADDUSER BMPUSER1 PASSWORD(BMPPW1)
RDEFINE AIMS IMSDGRP OWNER(IMSADMIN) UACC(NONE)
PERMIT IMSDGRP CLASS(AIMS) ID(BMPUSER1) ACCESS(READ)
SETROPTS CLASSACT(AIMS)
```

Equivalent RACF definitions for a BMP region

```
ADDGROUP IMSDGRP OWNER(IMSADMIN)
RDEFINE JIMS RASPGRP ADDMEM(DEBS,APOL1) UACC(NONE)
PERMIT RASPGRP CLASS(JIMS) ID(IMSDGRP) ACCESS(READ)
RDEFINE GIMS RASTGRP ADDMEM(DEBSTRN1,APOL12) UACC(NONE)
PERMIT RASTGRP CLASS(GIMS) ID(IMSDGRP) ACCESS(READ)
RDEFINE MIMS RASLGRP ADDMEM(IMSUS02,T3270LD) UACC(NONE)
PERMIT RASLGRP CLASS(MIMS) ID(IMSDGRP) ACCESS(READ)
ADDUSER BMPUSER1 PASSWORD(BMPPW1)
CONNECT BMPUSER1 GROUP(IMSDGRP)
```

With AGN support, you can specify that a particular AGN name has access to all entities of a particular resource. "AGN definitions for access to all entities of a resource" shows how to specify this access using AGN definitions. To accomplish the equivalent definitions using RACF, you can use generic resource definitions. "Equivalent RACF definitions for access to all entities of a resource" shows how to use RACF generic resource definitions to support AGTRAN=ALL and AGLTERM=ALL.

AGN definitions for access to all entities of a resource

```
)( AGN IMSDGRP2
   AGTRAN ALL
   AGLTERM ALL
```

Equivalent RACF definitions for access to all entities of a resource

```
ADDGROUP IMSDGRP2 OWNER(IMSADMIN)
RDEFINE TIMS ** UACC(NONE)
PERMIT ** CLASS(TIMS) ID(IMSDGRP2) ACCESS(READ)
RDEFINE LIMS ** UACC(NONE)
PERMIT ** CLASS(LIMS) ID(IMSDGRP2) ACCESS(READ)
ADDUSER BMPUSER2 PASSWORD(BMPPW2)
CONNECT BMPUSER2 GROUP(IMSDGRP2)
```

You can also use a combination of resource grouping and generic-resource definitions. "AGN definitions combining resource grouping and generic resource definitions" shows the AGN and associated RACF definitions for defining this combination. "Equivalent RACF definitions combining resource grouping and generic resource definitions" shows the equivalent RACF definitions.

AGN definitions combining resource grouping and generic resource definitions

```
)( AGN IMSDGRP3
   AGTRAN DEBSTRN1
   AGTRAN CDEBTRN2
   AGLTERM ALL

ADDUSER MPPUSER3 PASSWORD(MPPPW3)
RDEFINE AIMS IMSDGRP3 OWNER(IMSADMIN) UACC(NONE)
PERMIT IMSDGRP3 CLASS(AIMS) ID(MPPUSER3) ACCESS(READ)
SETROPTS CLASSACT(AIMS)
```

Equivalent RACF definitions combining resource grouping and generic resource definitions

```
ADDGROUP IMSDGRP3 OWNER(IMSADMIN)
RDEFINE GIMS RASTGRP ADDMEM(DEBSTRN1,CDEBTRN2) UACC(NONE)
PERMIT RASTGRP CLASS(GIMS) ID(IMSDGRP3) ACCESS(READ)
RDEFINE LIMS ** UACC(NONE)
PERMIT ** CLASS(LIMS) ID(IMSDGRP3) ACCESS(READ)
ADDUSER MPPUSER3 PASSWORD(MPPPW3)
CONNECT MPPUSER3 GROUP(IMSDGRP3)
```

For more information about migrating off SMU security, see the *IMS Version 9 Release Planning Guide*.

Remote Site Recovery migration

To avoid a loss of disaster recovery protection during the migration period, plan for an orderly migration to IMS Version 11 of IMS systems that participate in Remote Site Recovery (RSR). Migrating RSR to IMS Version 11 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 11 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 9 and IMS Version 10 to IMS Version 11. 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 9 or IMS Version 10 to IMS Version 11 in an RSR environment:

1. Migrate the tracking IMS and Transport Manager Subsystem (TMS) to the IMS Version 11 level.
2. Migrate the active site TMS that is running isolated log sender (ILS) to the IMS Version 11 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 11 level as necessary.

Pre-Version 11 library retention

Retain all pre-IMS Version 11 libraries that are required for processing the pre-IMS Version 11 tracking log data sets until there is no possibility of needing the pre-IMS Version 11 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 11 libraries at the remote site, even if all active IMS subsystems have been migrated to IMS Version 11.

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 11 level, perform an emergency restart at the pre-IMS Version 11 level and successfully shut down before you migrate to IMS Version 11. 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 11 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 9 or IMS Version 10 tracking IMS during shutdown, resolve the problem that is causing the error before you migrate the tracking IMS system to IMS Version 11. 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 11 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 9 or IMS Version 10 system before migrating the tracking IMS to IMS Version 11 (the active PRILOG is not closed).
2. The tracking IMS migrates to an IMS Version 11 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 11 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 11

The following table describes steps for migrating IMS and TMS from IMS Version 9 or IMS Version 10 to IMS Version 11, 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 12. Supported paths and configurations for migrating RSR to IMS Version 11

Steps		Active site state			Remote site state			Notes
A	**R**	**IMS**	**TMS/ILS**	**RECON**	**IMS**	**TMS/ILS**	**RECON**	
0	0	pre-V11	pre-V11	pre-V11	pre-V11	pre-V11	pre-V11	1
1	1	pre-V11	pre-V11	**V11**	pre-V11	pre-V11	**V11**	2
1	2	pre-V11	pre-V11	V11	**V11**	**V11**	V11	3
2	2	pre-V11	**V11**	V11	V11	V11	V11	4 on page 79
3	2	**V11**	V11	V11	V11	V11	V11	5 on page 79

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 11 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 11. 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 11. This can be accomplished as part of migrating the active IMS to IMS Version 11. All non-IMS Version 11 isolated log senders (ILSs) must be stopped and ILS started on the IMS Version 11 TMS so that missing log data from the IMS Version 11 IMS can be sent to the tracking IMS.
5. (3,2) - The active IMS subsystems are migrated to IMS Version 11. 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 11 simultaneously.
- Disable the RSR function while active site systems migrate to IMS Version 11.

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 DFSPB*xxx* PROCLIB member.

   The following table shows SECLVL and TYPE specifications in the SECURITY macro parameters and the parameter specifications in the DFSPB*xxx* PROCLIB member that replace them.

Table 13. 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	• RCF=C (specifies command authorization for ETO terminals) • RCF=S (specifies command authorization for ETO terminals and statically defined terminals)
TYPE=RACFTERM+RACFCOM	• 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
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 DFSDC*xxx* PROCLIB member.
   - For all system types, you can move the RCLASS parameter specification to the DFSPB*xxx* 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 11 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 11 System Administration*.

Serviceability enhancements from IMS Version 10

To take advantage of serviceability enhancements when you migrate to IMS Version 11, you might need to increase storage or modify automated tools or procedures.

Because the number of address spaces included in the system dump is limited by the amount of storage specified by the MAXSPACE parameter of the z/OS CHNGDUMP command, you might need to increase the amount of storage to accommodate the additional address spaces. However, IMS does not exceed the MAXSPACE value.

You might need to modify your automated operations tools or procedures if they are dependent on the format of the DFS064I or DFS065 messages. However, no modifications to automated operations tools are necessary if the tools examine only the first portions of the messages (generally the first 26 to 40 characters, depending on the message).

IMS Version 10 enhanced the text in the DFS064I and DFS065 messages to include the name of the transaction or LTERM for which the message is issued.

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.

TRANSACT macro migration considerations

For Fast Path-potential transactions in IMS Version 10 and later, the behavior of the PROCLIM parameter in the TRANSACT macro is changed from what the behavior was in IMS Version 9 and earlier systems.

For Fast Path-potential transactions, the PROCLIM time value that is specified on the TRANSACT macro (PROCLIM=*count*,*CPU-time-per-transaction*) is treated differently in IMS Version 10 and later than it is in IMS Version 9 and earlier.

- In IMS Version 9 and earlier, IMS evaluates the time specified on the PROCLIM keyword for Fast Path potential transactions as seconds if the transaction runs in an MPP region, but as hundredths of seconds if the transaction runs in an IFP region.
- In IMS Version 10 and later, IMS evaluates the time specified on the PROCLIM keyword for Fast Path potential transactions as hundredths of seconds when the transaction runs in either an MPP region or an IFP region.

For example, in IMS Version 9, a Fast Path potential transaction with PROCLIM=(5,1) has 5 seconds of CPU time per schedule when running in an MPP region, but in IMS Version 10 and later, the transaction has 0.05 seconds.

This change might result in IMS 0240 abends when migrating from IMS Version 9 and earlier versions to IMS Version 10 and later versions.

Recommendation: Evaluate the PROCLIM time values for your Fast Path potential transactions and specify a value that works for both MPP and IFP regions. Because

IMS interprets the second parameter on the PROCLIM keyword (*CPU-time-per-transaction*) in hundredths of a second, you might need to change the value in your IMS system definition.

This change is also implemented for the dynamic resource definition (DRD) commands that are equivalent to the TRANSACT macro: CREATE TRAN, CREATE TRANDESC, QUERY TRAN, UPDATE TRANDESC, UPDATE TRAN, and QUERY TRANDESC. For information about the PROCLIM keyword on the TRANSACT macro, see *IMS Version 11 System Definition*.

VSCR enhancements migration considerations

There are no migration considerations for these enhancements.

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 11 level, complete the following steps:
  1. Ensure that the status of all databases updated by IMS Version 11 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 11.
  4. Install the version of IMS that you want.

     If global online change is enabled, ensure that the OLCSTAT data set is initialized to version 1 when falling back to IMS Version 9. If the OLCSTAT data is initialized to a later version (for example, version 2), and you are falling back to IMS Version 9, the IMS initialization abends with abend U2800.
  5. Cold start the IMS.
- You can use the IBM IMS Queue Control Facility for z/OS (QCF) to requeue IMS Version 11 messages to IMS Version 9 or IMS Version 10 message queues.

If you fall back from IMS Version 11 to IMS Version 10, ensure that the IMS Version 10 DBRC Coexistence SPE (PK61583) is applied to the IMS Version 10 system.

If you fall back from IMS Version 11 to IMS Version 9, ensure that the IMS Version 9 DBRC Coexistence SPE (PK61582) is applied to the IMS Version 9 system.

DBRC fallback considerations

Certain steps must be taken to revert the level of DBRC from IMS Version 11 to IMS Version 9 or IMS Version 10.

BPE-based DBRC

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 11 to IMS Version 9 and you have change accumulation (CA) data sets created at the Version 11 level, the database changes in these CA data sets are not recoverable because the IMS Version 9 utility cannot process them. Invalidate the Version 11 change accumulation data sets by running an image copy of the related databases at the IMS Version 9 level.

DBRC applications

If you fall back from IMS Version 11 to IMS Version 9, and your system includes an application program that was compiled as using Version 2 of the DBRC API, and that application issues DBRC API requests, the application must be recompiled on the IMS Version 9 system indicating that it now uses Version 1 of the DBRC API. The application program is limited to using only the functions available with the DBRC API Version 1 in the IMS Version 9 system. If the application was compiled as using Version 1 of the DBRC API on IMS Version 11, no fallback action is required.

Minimum version value in the RECON data set

If the MINVERS value is set to '11.1' and you need to fall back from IMS Version 11 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 '11.1'.

To change the MINVERS value to '9.1':

1. Shut down all IMS Version 11 subsystems.
2. Determine the status of your databases. If the databases need recovery with IMS Version 11 logs, perform those recoveries in IMS Version 11. If the databases need recoveries to a time before the IMS Version 11 updates, perform those recoveries in IMS Version 11 or in IMS Version 9.
3. Ensure that all IMS Version 11 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 11 subsystem records in the RECON data set by using the DELETE.SUBSYS command.
4. Use the DELETE.LOG and DELETE.ALLOC commands to delete all IMS Version 11 log records and all the allocation records on those logs from the RECON data set.
5. Reset the MINVERS value by issuing a CHANGE.RECON MINVERS('9.1') command using IMS Version 11.
6. If you receive message DSP1205E (meaning that the database quiesce flags are active), use the CHANGE.DB or CHANGE.DBDS command to set the flags off. After the flags are off, reissue the CHANGE.RECON MINVERS('9.1') command.
7. Establish new recovery points for all databases updated by IMS Version 11 by taking image copies of those databases in IMS Version 9.

To change the MINVERS value to '10.1':

1. Shut down all IMS Version 11 subsystems.

2. Ensure that all IMS Version 11 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 11 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 11.
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.

Parallel RECON access

If parallel RECON access is activated for an IMS Version 11 system and that IMS must revert to an IMS Version 9 system:

1. Issue a CHANGE.RECON ACCESS(SERIAL) command from the IMS Version 11 system.
2. Issue a LIST.LOG command to determine whether there are IMS Version 11 logs in the RECON data set. If these logs exist, use the DELETE.LOG and DELETE.ALLOC commands to delete all log records and allocation records created for those log records from the RECON data set. Time-stamp precision was increased to the microsecond level and what might appear as duplicate log records can result when the time-stamp precision is reset to the tenth of a second.
3. Complete the steps in "Minimum version value in the RECON data set" on page 83.

See the *IMS Version 11 Commands, Volume 3: IMS Component and z/OS Commands* for the details of the CHANGE.RECON MINVERS, DELETE.ALLOC, DELETE.LOG, and LIST.LOG commands.

Time-stamp precision enhancement

If the MINVERS value in the RECON data set is set to '10.1' or higher and must lower the MINVERS value to less than '10.1', determine if there are IMS Version 11 logs in the RECON data set by issuing a LIST.LOG command. If these logs exist, use the DELETE.LOG and DELETE.ALLOC commands to delete all log records and allocation records created for those log records from the RECON data set. Time-stamp precision was increased to the microsecond level in IMS Version 10 and what might appear as duplicate log records can result when the time-stamp precision is reset to the tenth of a second.

See *IMS Version 11 Commands, Volume 3: IMS Component and z/OS Commands* for the details of the LIST.LOG, DELETE.LOG, and DELETE.ALLOC commands.

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.

1. Ensure that you have a non-system RDDS that contains a complete set of all the resource definitions before shutting down IMS Version 11.
2. Cold start the IMS Version 10 or IMS Version 9 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.

Large sequential data set fallback considerations

If necessary, you can fall back from using large sequential data sets.

To fall back from using large sequential data sets:

1. Define data sets with less than 65,535 tracks on one volume.
2. Perform a database reorganization process (unload from the large sequential data sets and reload onto multiple volumes) if the large sequential data sets are used for databases.
3. Remove the JCL that defines the large sequential data set or sets.
4. Cold start IMS to bring the multivolume data set or sets online.

Chapter 4. Coexistence with IMS Version 11

Restrictions and compatibility considerations apply for coexistence of IMS Version 11 with earlier versions of IMS.

If an IMS Version 11 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 9 and IMS Version 10 must have certain APARs installed to coexist with IMS Version 11.

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 14. APARs and PTFs needed for IMS Version 11 coexistence with IMS Version 9 and IMS Version 10

IMS Version 11 function	IMS Version 9 coexistence APAR/PTF	IMS Version 10 coexistence APAR/PTF	Additional information
DBRC RECON data sets	PK61582/UK42649	PK61583/UK42503	For more information, see "Database Recovery Control (DBRC) coexistence considerations" on page 91.
Data Entry Database Randomizing routine (DBFHDC40 / DBFHDC44) extended call interface (XCI) option	PK40642/UK23974	None	For more information, see "Exit routine coexistence considerations" on page 95.
Global online change	• PK23402/UK20811 • PK32970/UK24486	None	For more information, see "Global online change coexistence considerations" on page 96 and "IMSplex coexistence considerations" on page 98.
IMS Connect	• PK00895/UK01650 • PQ87088/UQ89762	None	For more information, see "Integrated IMS Connect support coexistence considerations" on page 99.
IMS synchronous callout function	Coexistence not supported	• Preconditioning APARs/PTFs: – PK70078/UK40363 – PK73224/UK40813 – PK70330/UK40215 • Activation APARs/PTFs: – PK71135/UK42415 – PK74168/UK42459 – PK75209/UK45249 – PK75824/UK43077 – PK75460/UK43595	For more information, see "IMS synchronous callout function coexistence considerations" on page 97.

Table 14. APARs and PTFs needed for IMS Version 11 coexistence with IMS Version 9 and IMS Version 10 (continued)

IMS Version 11 function	IMS Version 9 coexistence APAR/PTF	IMS Version 10 coexistence APAR/PTF	Additional information
IMSplex	• PK23402/UK20811 • PK32970/UK24486 • PK27280/UK18913 • PK30189/UK22059	None	For more information, see "IMSplex coexistence considerations" on page 98.
ODBA	PK66020/UK42176	PK66022/UK42410	For more information, see "ODBA coexistence considerations" on page 101.
OTMA	PK47172/UK37827	None	For more information, see "OTMA coexistence considerations" on page 101.
System management enhancements	PK30189/UK22059	None	For more information, see "System management enhancements" on page 104.

Determining which coexistence service needs to be installed

You can identify the outstanding service that needs to be installed on your IMS Version 9 and IMS Version 10 systems to enable them to coexist with IMS Version 11 by using SMP/E and the IMS Version 11 FIXCAT category.

The FIXCAT category for IMS Version 11 is `IBM.Coexistence.IMS.V11` with the keyword `IMSV11COEX`.

The following is an example of the steps to determine what IMS service needs to be installed on IMS Version 9 or IMS Version 10 to coexist with IMS Version 11:

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 9 or IMS Version 10 zone (for example):

```
SET BOUNDARY (GLOBAL) .
    REPORT MISSINGFIX ZONES (targetzone)


    FIXCAT(IBM.Coexistence.IMS.V11)
```

Related information:

Enhanced HOLDDATA for z/OS

IBM Fix Category Values and Descriptions

General coexistence considerations

Although IMS Version 11 can coexist with earlier versions of IMS, general coexistence considerations apply.

IMS Version 11 can coexist with earlier versions, so existing applications and data can be used without change. Migration and coexistence support is provided for IMS Version 9 and IMS Version 10.

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 (DFSAFMD0) installed in the host z/OS system must be from the most recent IMS release. The Offline Dump Formatter from IMS Version 11, IMS Version 10, or IMS Version 9 works without modification, provided the appropriate formatter libraries are used. For more information about installing DFSAFMD0, see "Abend dump formatting exit coexistence considerations" on page 90.
- 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 (DFSMRC20). 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 (DFSMRC20) 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 11, see Chapter 7, "New, changed, and deleted log records," on page 113.
- **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 11 have specific coexistence considerations.

The following topics describe specific coexistence considerations for IMS Version 11.

Abend dump formatting exit coexistence considerations

IMS Version 11 dynamically installs the abend dump formatting exit module (DFSAFMD0) during IMS startup. If you use IMS Version 9, IMS Version 10, or use both IMS Version 11 and these earlier IMS releases, you must still install the DFSAFMD0 module as part of the IMS installation if you want to use IMS online dump formatting.

The DFSAFMD0 module must be the highest version prior to IMS Version 11. When all IMS systems (control region and batch regions) are IMS Version 11 or later, you can remove DFSAFMD0 from SYS1.LPALIB and from the IEAVADFM CSECT of z/OS module IGC0805A.

For more information about the IMS abend dump formatting exit routine, see Binding the abend formatting routine.

APPC local LU enhancements

All members of an IMSplex that participate in APPC processing must be at an IMS Version 10 or later level before using the APPCLLU startup parameter (introduced in IMS Version 10) in the DFSDCxxx PROCLIB member.

Unpredictable results might occur if you try to perform APPC processing in a mixed-version IMSplex because the IMS systems that are earlier than IMS Version 10 will always use the base LU for RACF security checking, even if the message originates in an IMS Version 10 that supports the APPCLLU parameter.

For example, the following scenario might occur:

1. An application that is running in IMSA (an IMS Version 10 with APPCLLU=Y in the DFSDCxxx PROCLIB member) places a message on a shared queue.
2. IMSB (another IMS Version 10 in the IMSplex) takes the message off the queue for processing.
3. IMSB sends the message to IMSC (an IMS Version 9) for back-end processing. At this point in the processing, the local LU information is lost because IMSC does not support the IMS Version 10 APPC local LU enhancements and a RACF initiation failure might occur.

In addition, enhancements to the `/CHANGE APPC` command allowing users to specify a timeout value in seconds is valid only for IMS Version 10 and later systems.

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 9 IMS or a Version 10 IMS can register with an IMS Version 11 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.
- A Version 9 IMS cannot register with a pre-IMS Version 9 CQS.
- User or vendor-written CQS clients that want to register with an IMS Version 11 CQS must be compiled with the IMS Version 9 or later CQS macros.
- 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.
- User or vendor-written CQS clients that are compiled with the IMS Version 9 CQS macros cannot register with a pre-IMS Version 9 CQS.
- An IMS Version 9 CQS, an IMS Version 10 CQS, and an IMS Version 11 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 11 CQS supports clients that are assembled with the IMS Version 9, IMS Version 10, or IMS Version 11 CQS macros.
- A client that is assembled with the IMS Version 11 CQS macros can register only with an IMS Version 11 CQS. The IMS Version 11 client cannot register with an IMS Version 9 or an IMS Version 10 CQS. Similarly, a client that is assembled with the IMS Version 10 CQS macros cannot register with an IMS Version 9 CQS.

Database Recovery Control (DBRC) coexistence considerations

An IMS Version 11 DBRC can coexist with an IMS Version 9 DBRC or an IMS Version 10 DBRC if you install the DBRC coexistence small programming enhancements (SPEs) to the IMS Version 9 or IMS Version 10 systems, and upgrade your RECON data set to the IMS Version 11 format by issuing a CHANGE.RECON UPGRADE command. Additional coexistence considerations apply to other DBRC functions.

SPEs are available for IMS Version 9 and IMS Version 10 that enable the coexistence of the earlier version DBRC with DBRC for IMS Version 11. With the appropriate SPE installed, IMS Version 11 and earlier version DBRCs can share the upgraded RECON data set. If the RECON data set has not been upgraded to IMS Version 11, 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 11.

The following coexistence SPEs must be installed to the IMS Version 9 or IMS Version 10 DBRC for coexistence purposes:

- IMS Version 9: PK61582//UK42649
- IMS Version 10: PK61583/UK42503

Restriction: After a RECON data set is upgraded to the IMS Version 11 level, it is not accessible to any pre-IMS Version 11 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 11 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.

Automatic RECON loss notification

Explicit support for DBRC sharing groups (DBRC group ID) does not exist in IMS versions earlier than IMS Version 10. If you are using automatic RECON loss notification in a mixed-version environment, notifications from the IMS Version 10 or IMS Version 11 DBRC are sent to and processed by an earlier-version DBRC, regardless of the DBRC group ID used by the IMS Version 10 or IMS Version 11 DBRC. Notifications from an earlier-version DBRC do not have a DBRC group ID associated with them. An IMS Version 10 and an IMS Version 11 DBRC can process these notifications.

If you do not use the DBRC sharing group support, an existing DBRC SCI Registration exit routine (DSPSCIX0) works in an IMS Version 10 and later system without modification.

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 11 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

Parallel RECON access coexistence considerations

Although an IMS Version 11 can coexist with earlier versions of IMS (with the appropriate SPEs installed), to use the parallel RECON access function, all systems and jobs that access the RECON data set must be at the IMS Version 10 level or later, and the value for MINVERS must be set to a minimum of '10.1'.

Time-stamp enhancements

Increased precision to the microsecond for all time stamps is provided in an IMS Version 10 RECON only when the MINVERS level is set to '10.1' or later. Therefore, no coexistence is provided because an IMS Version 9 instance either fails signon for online environments or fails DBRC initialization for batch environments with MINVERS level set at '10.1' or '11.1'.

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.

Data sets created on an IMS Version 11 system by any of the following utilities can be used as input only by the IMS Version 10 or later Database Recovery utility (DFSURDB0). Also, the data sets created by these IMS Version 10 or later utilities cannot be used by any pre-IMS Version 10 utilities:

- Database Change Accumulation utility (DFSUCUM0)
- Database Image Copy utility (DFSUDMP0)
- Database Image Copy 2 utility (DFSUDMT0)

- HISAM Reorganization Unload utility (DFSURUL0)

The IMS Version 10 or later Database Change Accumulation utility and Database Recovery utility accept the following data sets created by IMS Version 9:

- Change accumulation
- Image copy
- Log

JCL from earlier versions of IMS might need to be changed because of the DBRC time-stamp enhancements that were introduced in IMS Version 10.

Recommendation: Use DBRC with all IMS Version 11 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:

- Image copies created by an IMS Version 11 Database Image Copy 2 utility (DFSUDMT0) using the DFSMS fast replication copy option (FlashCopy or Snapshot) cannot be used as input to an IMS Version 9 Database Image Copy 2 utility.
- IMS Version 11 utilities must be used whenever the input data for a DBDS contains log, image copy, or change accumulation records created by the IMS Version 11 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 10 utilities can process either IMS Version 9 or IMS Version 10 log records, but cannot process IMS Version 11 log records.

Dynamic resource definition coexistence considerations

Coexistence considerations for dynamic resource definition (DRD) exist for how the Destination Creation exit routine (DFSINSX0) supports IMSplexes that are enabled for DRD.

The QUERY TRAN and UPDATE TRAN commands were modified in IMS Version 10 for DRD. These commands no longer support some status values as parameters and these values are no longer displayed as status:

- Status CONV is now displayed as output field CONV with a value of Y.
- Status FPE is now displayed as output field FP with a value of E.
- Status FPP is now displayed as output field FP with a value of P.
- Status REMOTE is now displayed as output field RMT with a value of Y.
- Status RESP is now displayed as output field RESP with a value of Y.

In an IMSplex that includes an IMS Version 9 system, to issue the QUERY TRAN command, specify the value using both the STATUS filter (as was done in IMS Version 9) and one of the filters that were added in IMS Version 10 (CONV, FP, RMT, or RESP). For example:

- QUERY TRAN NAME(abc) CONV(Y) STATUS(CONV)

- QUERY TRAN NAME(abc) FP(E) STATUS(FPE)
- QUERY TRAN NAME(abc) FP(P) STATUS(FPP)
- QUERY TRAN NAME(abc) RMT(Y) STATUS(REMOTE)
- QUERY TRAN NAME(abc) RESP(Y) STATUS(RESP)

In the earlier examples, the IMS Version 9, and IMS Version 10 or IMS Version 11 systems detect the parameters that are specific to each version. In the first example, the IMS Version 9 system detects the STATUS (CONV) parameter, and the IMS Version 10 or IMS Version 11 systems detect the new parameter CONV(Y).

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.

Related information:

Exit routine coexistence considerations

Exit routines that run in IMS Version 9 or IMS Version 10 will work without modification in IMS Version 11. They will not, however, be able to use the latest functions without being modified.

IMS Version 10 introduced changes to the IMS Connect exit parameter list (HWSEXPRM) and the extended call interface (XCI) option to the Data Entry Database Randomizing routine (DBFHDC40 / DBFHDC44). 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.

The Data Entry Database Randomizing routine (DBFHDC40 / DBFHDC44) extended call interface (XCI) option was introduced in IMS Version 10. If, while in coexistence mode, your randomizing routine must run on earlier releases and the routine references the version number field, the required maintenance must be applied to your earlier systems before the exit can reference that field. The coexistence APAR/PTF for IMS Version 9 is PK40642/UK23974.

For more information about migrating exit routines from IMS Version 9 or IMS Version 10 to IMS Version 11, see “Exit routine migration considerations” on page 61.

For more information about the changes to exit routines for IMS Version 11, see Chapter 17, “User exit enhancements,” on page 173.

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 11 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.

Global online change coexistence considerations

Coexistence considerations for global online change involve changes to ACB library member online change, dynamic resource definition (DRD), and resource consistency checking.

For IMS Version 9, the coexistence APAR/PTF for global online change processing where multiple versions of IMS are in the same IMSplex is PK23402/UK20811. This APAR/PTF enables an IMS Version 9 system to coexist with an IMS Version 10 and later system in the OLCSTAT data set and enables the OLCSTAT header information to be updated by an IMS Version 10 or later system during cold start processing.

ACB library member online change

All IMS systems that use the ACB library member online change function must be at the IMS Version 10 or later level. Therefore, this function does not support coexistence with IMS Version 9. Additionally, the OLCSTAT must be initialized to the IMS Version 10 or later level (the version of the OLCSTAT data set is set to 2). Versioning of the OLCSTAT data set was introduced in IMS Version 10 with APAR/PTF PK37127/UK39556.

The OLCSTAT data set is larger in IMS Version 10 and later systems than it is in IMS Version 9. If an ACB library member online change (issuing an INIT OLC TYPE(ACBMBR) command) is attempted and the OLCSTAT data set is the smaller size or the OLCSTAT data set contains IMS systems earlier than Version 10, the command fails.

Dynamic resource definition

Global online change supports an IMSplex where dynamic resource definition (DRD), introduced in IMS Version 10, is enabled on some IMS systems but not on others. An IMS with DRD enabled has online change for the IMS.MODBLKS data set disabled. If the INITIATE OLC PHASE(PREPARE) command is specified with type MODBLKS alone, IMS systems with MODBLKS online change enabled perform the MODBLKS online change and return a good completion code. IMS

systems with DRD enabled ignore the MODBLKS keyword and return a completion code of not applicable. The overall return and reason code is good. If the INITIATE OLC PHASE(PREPARE) command is specified with type ALL, MODBLKS and ACBLIB, FMTLIB, or MODBLKS, ACBLIB and FMTLIB, IMS systems with MODBLKS online change enabled perform the MODBLKS online change and return a good completion code. IMS systems with DRD enabled ignore the MODBLKS keyword, perform the ACBLIB or FMTLIB online change, and return a good completion code. DBCTL subsystems with DRD enabled ignore the MODBLKS and FMTLIB keyword, perform an ACBLIB online change, and return a good completion code.

Resource consistency checking

The resource consistency checking function is disabled in IMS Version 10 and later systems. The PK32970/UK24486 SPE allows resource consistency checking to work in an IMS Version 9 system that might share the OLCSTAT data set with IMS Version 10 or later systems.

IMS Version 10 and later versions do not support resource consistency checking for the IMS.ACBLIB, IMS.FORMAT, and IMS.MODBLKS libraries, regardless of whether a resource structure or values are specified on the NORSCCC parameter of the DFSCGxxx member of the IMS.PROCLIB data set. The NORSCCC keyword is allowed for compatibility, but its values are ignored.

For example, if an IMS Version 11 is the first IMS system that is initialized in an IMSplex, resource consistency checking is not performed. To keep resource consistency checking for any IMS Version 9 systems that are initialized after IMS Version 11, ensure that resource consistency checking is not disabled, and then install the coexistence APAR for IMS Version 9.

If a resource structure is defined for the IMSplex, by default, consistency checking is performed for the ACBLIB, FORMAT, and MODBLKS libraries. The consistency checking is performed between all IMS Version 9 systems in the IMSplex.

If the IMSplex contains any IMS Version 10 or later systems, and the coexistence APAR is applied to the IMS Version 9 system, resource consistency checking is disabled in IMS Version 10 and later systems. In this scenario, consistency checking is performed on the data set names and is not performed on the resources that reside in the libraries.

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 abend search and notification coexistence considerations

The IMS abend search and notification function, introduced in IMS Version 10, works only on IMS Version 10 and later systems.

IMS synchronous callout function coexistence considerations

There are no coexistence considerations for application programs that use the synchronous callout function in IMS Version 11 exclusively within IMS Version 11.

However, if you want to deploy that application program from 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 Version 9 does not support the synchronous callout function.

IMSplex coexistence considerations

Coexistence considerations for IMSplexes involve global online change, CSL version levels, systems management enhancements, and unsolicited message support.

The following coexistence considerations apply to IMSplexes:

- Global online change

  The following coexistence IMS Version 9 APARs/PTFs are required if your IMS Version 11 is coexisting with an IMS Version 9 system and you perform global online change operations:

  – PK23402/UK20811
  – PK32970/UK24486

- Multiple versions of the Common Service Layer (CSL) in the same IMSplex

  The PK27280/UK18913 coexistence APAR/PTF for IMS Version 9 is required when you have multiple versions of the CSL in the same IMSplex and one or more of the CSLs are at the IMS Version 9 level.

  Recommendation: If you are running a mixed-version IMSplex (for example an IMS Version 9 system and an IMS Version 11 system running on the same LPAR served by a SINGLE OM and SCI), use the OM and SCI address spaces of the later version.

  The OOUX_OUTMDLEN undeliverable output field for the CSL OM output user exit is ignored in IMS Version 9, but is used by the exit in IMS Version 10 and IMS Version 11.

- Systems management enhancements that were introduced in IMS Version 10

  The coexistence APAR/PTF for the systems management enhancements is PK30189/UK22059 for IMS Version 9.

  The System Management Enhancement coexistence SPE enables earlier versions of IMS systems to coexist with IMS Version 10 or later systems. Earlier-level IMS systems that process transactions submitted from the OM API receive an AD status code if they reply to the IOPCB. For messages from the OM API, an application program can only ISRT to an alternate destination.

- Unsolicited message support

If your IMSplex environment includes multiple versions of IMS, be aware that:

- Unsolicited message support and OM audit trail support is valid only for IMS Version 10 and later OMs.
- The IMS Version 10 and later components send their unsolicited messages to OM.

Integrated IMS Connect support coexistence considerations

The IMS Version 11 IMS Connect function supports IMS Version 10 and IMS Version 9, 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 11 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 11 IMS Connect can coexist with an IMS Version 10 or IMS Version 9 system with the following considerations:
  - 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).
  - Recorder trace from IMS Version 10 and earlier versions can coexist but cannot be used concurrently. Versions of the recorder trace can be used serially, switching between versions without the need to stop the IMS Connect address space.
- The IMS Connect XML-to-COBOL conversion support in IMS Version 11 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.
- If you will use either the purge not deliverable or reroute functions while coexisting with IMS Version 9, IMS OTMA co-requisite APARs/PTMs are required. These APARs provide required IMS OTMA support for purge not deliverable and reroute support. The IMS Version 9 APARs/PTFs are PK00895/UK01650 and PQ87088/UQ89762.

IRLM coexistence considerations

To use IRLM in an IMS Version 11 environment, certain coexistence considerations apply.

You can use IRLM 2.2 with IRLM 2.1 in an IMS Version 9 environment, including a data-sharing environment. IRLM 2.2 can use storage above the 2 GB bar for 64-bit processors, but IRLM 2.2 can also run on 32-bit processors.

You can also use IRLM 2.2 with IMS Version 9 using either 64-bit or 32-bit processors.

IRLM 2.1 is supported with IMS Version 9. IRLM 2.1 is not supported with IMS Version 10 and later versions. IRLM 2.2 with IMS Version 10 or later can connect to IRLM 2.1 with IMS Version 9.

Java application coexistence considerations

Coexistence considerations apply to Java applications that use the IMS-to-XML mapping rules.

Java applications that use the IMS-to-XML mapping rules available with IMS Version 9 will run without needing to be modified in a mixed-version IMS environment where both IMS Version 9 and IMS Version 10 and later versions are present (for example, in an IMSplex or a shared-queue environment).

Java applications that use the extended IMS-to–XML mapping rules that are available with IMS Version 10 and later versions will run only when all IMS systems are at the Version 10 or later level.

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.

Large sequential data set coexistence considerations

The large sequential data set support (introduced in IMS Version 10) cannot be used with IMS Version 9.

Multiple Systems Coupling coexistence considerations

IMS Version 10 and later systems support IMS Multiple Systems Coupling (MSC) and shared-queue networks of mixed (but supported) IMS releases. Each IMS in these networks can use the exit routines that are supported for that version. MSPLINK buffer size ranges are also a consideration.

MSPLINK buffer size ranges changed in IMS Version 10. The minimum size is 1024, maximum is 65,536. VTAM sizes for IMS Version 10 and later can be any size and no longer follow an algorithm. Validate that partner IMS systems have matching buffer specifications. If the IMS Version 9 systems have link buffer sizes less than 1024, they must be modified to a minimum of 1024 to coexist with IMS Version 10 and later systems.

TM and MSC Message Routing and Control User exit routines (DFSMSCE0) from IMS Version 9 and IMS Version 10 work without modification with IMS Version 11 but the exit must be reassembled with IMS Version 11.

The following exit routines work with an IMS Version 9 system, but do not work with an IMS Version 10 or later system:

- Terminal Routing exit routine (DFSCMTR0)
- Input Message Routing exit routine (DFSNPRT0)
- Link Receive Routing exit routine (DFSCMLR0/DFSCMLR1)

- Program Routing exit routine (DFSCMPR0)

See *IMS Version 11 Exit Routines* for information about the rules for calling the TM and MSC Message Routing and Control User exit routine (DFSMSCE0).

ODBA coexistence considerations

The ODBA interface from earlier versions of IMS can coexist with IMS Version 11 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 9 or IMS Version 10 ODBA application to use the IMS Version 11 ODBA interface:

1. Apply the coexistence APAR/PTF:
   - For IMS Version 9: PK66020/UK42176
   - 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 9 or IMS Version 10 system, you must apply coexistence APAR/PTF PK66022/UK42410.

The IMS Universal drivers can be used by distributed Java applications that access IMS Version 9 or IMS Version 10 databases as long as the IMS Version 9 or IMS Version 10 systems are part of a mixed-version IMSplex that includes an IMS Version 11 system (along with its ODBM and IMS Connect address spaces) and the appropriate coexistence APARs/PTFs are installed. The coexistence APARs/PTFs are:

- For IMS Version 9: PK66020/UK42176
- For IMS Version 10: PK66022/UK42410

IMS Version 9 or IMS Version 10 ODBA applications can use the IMS Version 11 ODBA interface as long as the coexistence APARs are installed to the IMS Version 9 or IMS Version 10 system. Optionally, the IMS Version 9 and 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 11 OTMA coexists with earlier versions, certain considerations apply.

The OTMA IMS Version 9 coexistence SPE (PK47172/UK37827) is required if all the following conditions are true:

- OTMA shared queues solution for CM1 or CM0 is being used
- The shared queues front-end IMS is IMS Version 10 or IMS Version 11 and the back-end IMS is IMS Version 9
- The back-end IMS is using ALT-PCB to generate asynchronous output for OTMA clients
- OTMA clients, such as WebSphere MQ or IMS Connect, connect to the back-end IMS to retrieve the asynchronous output

Without the coexistence SPE, the OTMA client connected to the shared queues back-end IMS will fail to retrieve the ALT-PCB output messages.

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 or earlier, the expiration request is ignored by IMS.

RACF enhancements in IMS Version 9 to replace SMU

Enhancements to RACF to replace the SMU in IMS Version 9 require changes to the IMS.PROCLIB data set to disable resource consistency checking for the MATRIX library.

If an IMSplex contains IMS Version 9 systems, specify the NORSCCC(MODBLKS) parameter in the DFSCGxxx member of the IMS.PROCLIB data set to disable the resource consistency checking for the MATRIX library. If your IMS Version 9 system is running without SMU security, and the systems with earlier IMS releases are using SMU security in some way, the resource consistency check fails for the MATRIX library that is used by the earlier systems.

The AOI parameter, introduced in IMS Version 9 in the system definition TRANSACT macro, specifies whether (YES | TRAN | CMD) or not (NO) a particular transaction is allowed to issue Automated Operator Interface (AOI) calls, such as CMD. AOI=NO applies only to type-1 AOI calls. The other possible parameters for AOI= (YES | TRAN | CMD) affect both type-1 and type-2 AOI calls.

Remote Site Recovery (RSR) coexistence considerations

RSR coexistence supports configurations that meet certain version level requirements.

IMS Version 11 RSR coexistence supports configurations in which:

- The tracking site Transport Manager Subsystem (TMS) is at the IMS Version 11 level and the active site is at IMS Version 9 or IMS Version 10 level.
- The active site RECON data sets are at the IMS Version 9 or IMS Version 10 level (with the IMS Version 11 DBRC coexistence SPE applied).
- The active TMS that is running ILS is at the IMS Version 9 or IMS Version 10 level.
- One or more active IMS systems are at the IMS Version 9 or IMS Version 10 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-V11: IMS Version 9 or IMS Version 10
- pre-V11 + SPE: IMS Version 9 or IMS Version 10, with the appropriate IMS Version 11 DBRC coexistence SPE applied
- V11: IMS Version 11

Table 15. Valid RSR coexistence subsystem configurations and migration progression.

Active site state			**Remote site state**			
IMS	**TMS/ILS**	**RECON**	**IMS**	**TMS**	**RECON**	**Notes**
pre-V11	pre-V11	pre-V11	pre-V11	pre-V11	pre-V11	Supported.
pre-V11 + SPE	pre-V11	pre-V11	pre-V11	pre-V11	pre-V11	Supported.
pre-V11 + SPE	V11	V11	pre-V11	pre-V11	pre-V11	Supported.
pre-V11	V11	pre-V11	pre-V11	pre-V11	pre-V11	Not supported. The local TMS/ILS cannot be migrated to IMS Version 11 if the RECON data sets have not been upgraded to IMS Version 11.
pre-V11 + SPE	pre-V11 + SPE	pre-V11	pre-V11	pre-V11	pre-V11	Supported.
V11	pre-V11 + SPE	pre-V11	pre-V11	pre-V11	pre-V11	Not supported. The RECON data sets must be upgraded to IMS Version 11 before running any IMS at the IMS Version 11 level. The active IMS cannot be at the IMS Version 11 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-V11 + SPE	pre-V111 + SPE	V11	pre-V11	pre-V11	pre-V11	Supported.
pre-V11	V11	V11	pre-V11	pre-V11	pre-V11	Not supported. The local site TMS that is running ILS cannot be at the IMS Version 11 level if the tracking IMS is at the pre-Version 11 level. Also, if the active RECON is at IMS Version 11, the IMS must have the SPE applied.
V11	V11	V11	pre-V11	pre-V11	pre-V11	Not supported. The local site TMS that is running ILS and the active IMS cannot be at the IMS Version 11 level if the tracking IMS is at the pre-Version 11 level. The active IMS also cannot be at the IMS Version 11 level.
pre-V11	pre-V11	pre-V11	pre-V11 + SPE	pre-V11	pre-V11	Supported.
pre-V11 + SPE	pre-V11	pre-V11	pre-V11 + SPE	pre-V11	pre-V11	Supported.

Table 15. Valid RSR coexistence subsystem configurations and migration progression (continued).

Active site state			Remote site state			
IMS	**TMS/ILS**	**RECON**	**IMS**	**TMS**	**RECON**	**Notes**
pre-V11 + SPE	pre-V11 + SPE	pre-V11	pre-V11 + SPE	pre-V11	pre-V11	Supported.
V11	pre-V11 + SPE	V11	pre-V11 + SPE	pre-V11	pre-V11	Not supported. An active IMS cannot be at the IMS Version 11 level if the tracking IMS is not at the IMS Version 11 level. The active site TMS that is running ILS also cannot be at the pre-Version 11 level or at the pre-Version 11 + SPE level. 1
pre-V11	pre-V11 + SPE	pre-V11	pre-V11 + SPE	pre-V11	pre-V11	Supported 1.
pre-V11 + SPE	pre-V11 + SPE	pre-V11	pre-V11 + SPE	pre-V11	pre-V11	Supported 1.
pre-V11 + SPE	pre-V11 + SPE	V11	pre-V11 + SPE	pre-V11	pre-V11	Supported 1.
pre-V11 + SPE	pre-V11 + SPE	V11	V11	pre-V11	pre-V11	Not supported. The tracking IMS cannot be at the IMS Version 11 level if the remote site RECON data sets are not upgraded to IMS Version 11. 1 2
pre-V11 + SPE	pre-V11 + SPE	V11	pre-V11 + SPE	pre-V11 + SPE	V11	Supported.
V11	pre-V11 + SPE	V11	pre-V11 + SPE	pre-V11 + SPE	V11	Not supported. The active IMS cannot be at the IMS Version 11 level if neither the tracking IMS nor the active site TMS that is running ILS is not at the IMS Version 11 level.
pre-V11 + SPE	pre-V11 + SPE	V11	V11	V11	V11	Supported.
V11	pre-V11 + SPE	V11	V11	V11	V11	Not supported. The active IMS cannot be at the IMS Version 11 level if the active site TMS that is running ILS is not at the IMS Version 11 level.
pre-V11 + SPE	V11	V11	V11	V11	V11	Supported.
V11	V11	V11	V11	V11	V11	Supported.

Note:

1. The remote site TMS can also be at the IMS Version 9 or IMS Version 10 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 9, IMS Version 10, and IMS Version 11 can share an IMS message queue in an IMSplex.

System management enhancements

The system management enhancements that were introduced in IMS Version 10 (and are part of the base code in later versions) can coexist with IMS Version 9 if coexistence APAR/PTF PK30189/UK22059 is installed.

Sysplex serialized program management coexistence considerations

IMS Version 11 supports sysplex serialized program management.

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 11 Syntax Checker supports IMS Version 9, IMS Version 10, and IMS Version 11.

Be sure that the version shown is correct when you use the Syntax Checker to check the parameters of earlier versions.

Type-2 QUERY and UPDATE command coexistence considerations

The type-2 commands QUERY TRAN and UPDATE TRAN no longer support some status values as parameters.

The QUERY TRAN and UPDATE TRAN commands no longer support some status values as parameters, and these values are no longer displayed as status:

- Status CONV is now displayed as output field CONV with a value of Y.
- Status FPE is now displayed as output field FP with a value of E.
- Status FPP is now displayed as output field FP with a value of P.
- Status REMOTE is now displayed as output field RMT with a value of Y.
- Status RESP is now displayed as output field RESP with a value of Y.

In an IMSplex that includes an IMS Version 9, to issue the QUERY TRAN command, specify the value by using both the STATUS filter (as was done before IMS Version 10) and one of the new filters (CONV(), FP(), RMT(),or RESP()). For example:

- QUERY TRAN NAME(abc) CONV(Y) STATUS(CONV)
- QUERY TRAN NAME(abc) FP(E) STATUS(FPE)
- QUERY TRAN NAME(abc) FP(P) STATUS(FPP)
- QUERY TRAN NAME(abc) RMT(Y) STATUS(REMOTE)
- QUERY TRAN NAME(abc) RESP(Y) STATUS(RESP)

Unsolicited message support coexistence considerations

In an IMSplex environment that includes multiple versions of IMS, unsolicited message support and OM audit trail support is valid only for IMS Version 10 and later Operations Managers (OMs). IMS Version 10 and later components send their unsolicited messages to OM.

Restrictions for IMS Version 11 during coexistence

There are no general restrictions for IMS Version 11 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

Changes to the IMS library for IMS Version 11 include minor title changes to all the publications, merging four sets of publications, a change to how *IMS Messages and Codes* are delivered, and a reorganization of *IMS Version 11 Exit Routines*. The library is no longer provided in BookManager format. In addition, as of the May, 2012, a master index is no longer provided.

The titles of all PDF publications in the IMS Version 11 library have been changed so that the publication titles match the contents view (navigation tree) titles in the information center. For example, the *IMS Diagnosis Guide* has been renamed to *IMS Diagnosis*. In addition, the titles for the three *IMS Command Reference* PDF volumes have been renamed so that their titles better reflect the contents of each publication, as follows:

- *IMS Version 11 Commands, Volume 1: IMS Commands A-M*
- *IMS Version 11 Commands, Volume 2: IMS Commands N-V*
- *IMS Version 11 Commands, Volume 3: IMS Component and z/OS Commands*

Four sets of publications have been streamlined:

- To eliminate redundancy and group relevant application programming planning information with associated application programming tasks, the *IMS Application Programming Planning Guide* has been merged with the *IMS Application Programming Guide*, in a new title: *IMS Version 11 Application Programming*.
- To group diagnosis reference information with associated diagnosis tasks, the *IMS Diagnosis Reference* has been merged with the *IMS Diagnosis Guide*, in a new title: *IMS Version 11 Diagnosis*.
- To group all system administration tasks, regardless of whether the tasks relate to using a single IMS or an IMSplex, the *IMS IMSplex Administration Guide* has been merged with the *IMS System Administration Guide*, in a new title: *IMS Version 11 System Administration*.
- To group system definition reference information with associated system definition tasks, the *IMS System Definition Reference* has been merged with the *IMS System Definition Guide*, in a new title: *IMS Version 11 System Definition*.

IMS Version 11 Exit Routines is now organized by the call interface and available services for each group of exit routines, as follows:

- IMS system exits, database manager exits, and transaction manager exit routines are grouped under “IMS control region exit routines.”These exit routines use IMS interfaces and callable services, as described in the topic “Overview of exit routines for IMS.”
- Exit routines that run in an address space with BPE support, including those for CQS, BPE-based DBRC, and most CSL components, are grouped under “Base Primitive Environment-based exit routines.” 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.”
- 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 execute in a CQS client address space are grouped under “CQS client exit routines.”

- Standard DBRC exit routines are grouped under “IMS system exit routines,” while the variants that run in BPE are group under “BPE-based DBRC 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.”
- Exit routines that have specific guidelines, including those for IMS Connect, CQS clients, and CSL SCI IMSPlex members, are described in the sections for those routines.

IMS publication packaging

When you order IMS Version 11, you will receive one printed copy of certain books and one copy of the entire IMS library on a CD. A PDF of the *Program Directory for Information Management System Transaction and Database Servers V11.0* is also included on the publications CD.

The following publications are included in with every order of IMS Version 11:

- *IMS Version 11 Installation*
- *IMS Version 11 Licensed Program Specifications*
- *Program Directory for Information Management System Transaction and Database Servers V11.0*
- *IMS Version 11 Release Planning*
- *IMS Version 11 System Definition*
- *IMS Version 11 Softcopy Library* (a CD that contains all of the IMS information)
- *IMS and SOA Executive Overview*

All of the IMS Version 11 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. The IMS Version 11 documentation is not provided in BookManager 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 11 includes new and changed messages and abend codes. No messages or abend codes have been deleted from IMS Version 11.

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 11

A number of messages and abend codes are new in IMS Version 11.

Table 16. New messages and codes for Version 11

CSL messages	DFS and DMAN messages		DSP and DHB messages	G, HWS, and MDA messages			Abend and AIB (DL/I) codes
CSL0004E	DFS0004I	DFS2384W	DSP0837E	G316	HWSK2880E	HWSQ2205E	0070
CSL1000I	DFS0287A	DFS3215W	DSP1113A		HWSK2885E	HWSQ2225E	0109
CSL3120E	DFS0571E	DFS3252I	DSP1114E	HWSA0380E	HWSK2900E	HWSQ2230W	0199
CSL4001A	DFS0572A	DFS3253I	DSP1115E	HWSJ2500E	HWSK2910E	HWSQ2235W	0229
CSL4002I	DFS0573E	DFS3299I	DSP1116E	HWSJ2510W	HWSK2915E	HWSQ2240W	0670
CSL4003W	DFS0580E	DFS3300I	DSP1117E	HWSJ2520E	HWSK3000W	HWSQ2245W	1042
CSL4004I	DFS0581E	DFS3301W	DSP1183W	HWSJ2530W	HWSK3005I	HWSQ2255W	1043
CSL4005W	DFS0582E	DFS3323E	DSP1190W	HWSJ2540E	HWSK3005E	HWSS0772W	2490
CSL4006W	DFS0583E	DFS3494E	DSP1205E	HWSJ2700W	HWSK3010E	HWSS0773I	ODBM 0010
CSL4007W	DFS0584E	DFS3495W	DSP1210E	HWSJ2710W	HWSN1900I	HWSX0940A	ODBM 0400
CSL4008E	DFS0585E	DFS3511I	DSP1211W	HWSJ2740E	HWSN1910E		ODBM 0411
CSL4100E	DFS0793I	DFS3678E	DSP1212W	HWSK2800E	HWSN1915E	MDA045E	OTMA 0033
CSL4101E	DFS0798I	DFS3688I	DSP1213I	HWSK2805I	HWSN1920E	MDA046E	
CSL4103E	DFS0798W	DFS3923I	DSP1214I	HWSK2810E	HWSN1925E		0108/0900
CSL4104E	DFS0811A	DFS3974W	DSP1215I	HWSK2815E	HWSN1930E		
CSL4105E	DFS0887A	DFS3975W	DSP1216I	HWSK2820W	HWSN1935W		
CSL4106E	DFS0905E	DFS4342E	DSP1217E	HWSK2825E	HWSN1940W		
CSL4107E	DFS1058E	DFS4343E	DSP1247W	HWSK2830E	HWSN1945W		
CLS4108E	DFS1277W	DFS4515W	DSP2001I	HWSK2835E	HWSN1950W		
CSL4109E	DFS1278E	DFS4516E	DSP2002E	HWSK2840E	HWSN1960I		
CSL4110E	DFS1279I	DFS4517I	DSP2003A	HWSK2845E	HWSN1965E		
CSL4111E	DFS1299W	DFS4572E	DSP2005I	HWSK2850E	HWSN1985I		
CSL4112E	DFS1710A	DFS4573E		HWSK2855E	HWSN2000E		
CSLM130I	DFS2382I	DFS4574E	DHB0901E	HWSK2860E	HWSN2010W		
		DFSD0023E	DHB0902E	HWSK2865E	HWSN2020W		
		DFSIX107	DHB0903E	HWSK2870E	HWSN2030W		
			DHB0904E	HWSK2875W	HWSQ2200E		
		DMAN355E					

Changed messages and abend codes for Version 11

Some messages and abend codes have changed for IMS Version 11.

The following messages and abend codes are changed. An asterisk (*) indicates that the message text is changed.

Table 17. Changed messages and codes for Version 11

BPE, CQS, and CSL messages	DFS and DSP messages		DSP and other messages	Abend, AIB, and DL/I codes	Component codes
BPE0003E	DFS030I	DFS1987I	DSP0012I	AC6	CG
BPE0014E	DFS047A	DFS2088I	DSP0029I*	0071	FM
	DFS0404W	DFS2089I	DSP0044I	0101	CSL ODBM 0010
CQS0114E	DFS0415W	DFS2166	DSP0049I	0102	CSL ODBM 0400
CQS0115E	DFS0488I	DFS2419A	DSP0087I	0107	OTMA 0029
	DFS0535I*	DFS2493W*	DSP0094I	0168	OTMA 002F
CSL0001E	DFS0548E	DFS2572I	DSP0126I	0182	
CSL0002E	DFS0586I	DFS2758I	DSP0133I	0243	AIB 0108/0580
CSL0003A	DFS0651W	DFS2868W	DSP0144I	0407	
CSL0020I	DFS686W	DFS2916W	DSP0222I	0457	
CSL0021I	DFS070	DFS2930I	DSP0224I	0689	
CSL0300I	DFS0840I	DFS2958A	DSP0249I	0709	
CSL3114I	DFS0947I	DFS2971W	DSP0304I	0711	
CSL3115E	DFS554A	DFS2972E	DSP0313I	0735	
	DFS627W	DFS3187W	DSP0383A	0737	
	DFS682I	DFS3256I	DSP1023I	0775	
	DFS0757I	DFS3286W	DSP1048I*	0790	
	DFS0887A	DFS3402W	DSP1076I	0791	
	DFS0909I	DFS3403W	DSP1150I	0799	
	DFS1000I*	DFS3422X	DSP1154A	0830	
	DFS1058E	DFS3688I	DSP1160I	0844	
	DFS1198I	DFS3702I	DSP1164E	0844	
	DFS1269E	DFS3709A	DSP1201A*	0880	
	DFS1284E	DFS3710A	DSP2002E	1006	
		DFS3724I		1011	
		DFS3754A	G449	1026	
		DFS3919W	G561	1042	
		DFS4031A	G947	1063	
		DFS4342E	HWSA0340E	2480	
		DFS4384I	HWSC0001I	2484	
		DFS4570E	HWSC0112W	2490	
		DFS4571E	HWSC0114W	3041	
			HWSK2805E	3303	
			HWSP1410W*		
			HWSP1445E	0108/0214	
			HWSQ2200E*	AJ	
			HWSR0698W	A6	
			HWSX0909E*	QC	
			MDA022		

Deleted messages and abend codes for Version 11

A number of messages and abend codes were removed from IMS in Version 11.

Information on the IRLM messages and codes can be found in IRLM messages and codes.

Table 18. Deleted messages and codes for Version 11

DFS and DSP messages	Abend codes
DFS0571I	901
DFS0572I	
DFS0573I	
DFS0580I	
DFS0581I	
DFS0582I	
DFS0583I	
DFS0584I	
DFS0585I	
DFS0905I	
DFS2716I	
DFS3205	
DSP0077I	

Chapter 7. New, changed, and deleted log records

These log records are new or changed for IMS Version 11.

The following log records are new or changed for IMS Version 11:

Table 19. New or changed log records for IMS Version 11

X'11'	X'4081'	X'7029'
X'21'	X'45'	X'7030'
X'30'	X'4515'	X'7031'
X'221B'	X'4516'	X'7032'
X'4035'	X'5945'	X'9904'
	X'5960'	

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=59`*nn*. 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 11 enhancements

The information that is necessary to plan for the IMS Version 11 enhancements includes overview information and how the following areas are affected: installation, system definition, administration, troubleshooting, and reference.

Theses topics provide planning information for the larger enhancements to IMS Version 11.

Chapter 8. Application Control Blocks library usability enhancements

The Application Control Blocks library (ACBLIB) usability enhancements enable you to load the ACB members into 64-bit storage. They also enable you to create DFSMDA members for the dynamic allocation of the ACBLIB data sets.

These enhancements add options to:

- Load the ACB members into 64-bit storage. At application scheduling time, the nonresident PSB and any related DMBs that the application needs are loaded into the 31-bit nonresident pools, and are also loaded into the 64-bit ACB storage pool. From this point on, when this application is scheduled, ACB members not found in the 31-bit nonresident pools are copied from the 64-bit ACB storage pool to the 31-bit nonresident pools, which reduces the amount of I/O to the ACBLIB data set.

  If the 64-bit ACB storage pool is full, a least recently used algorithm is used to remove old members and create space for new members.
- Use the Dynamic Allocation macro (DFSMDA) macro to create DFSMDA members for the dynamic allocation of the ACBLIB data sets. DFSMDA members provide the following benefits:
  - You can increase the size of the ACBLIB data sets without stopping and restarting IMS.
  - You can correct errors with the inactive ACBLIB without stopping and restarting IMS.
  - You can add additional data sets to the ACBLIB concatenation without stopping and restarting IMS.

The dynamic allocation of the ACBLIB data sets and the 64-bit storage pool for ACB members is supported in the following online IMS system configurations: DB/TM, DBCTL, DCCTL, XRF, and FDBR.

Migration considerations

To migrate to ACBLIB members in 64-bit memory, complete the following steps:

1. Specify the ACBIN64 parameter in the <SECTION=DATABASE> portion of the DFSDFxxx PROCLIB member.
2. Stop IMS and then restart it with the ACBIN64 parameter.

To migrate to using the DFSMDA macro for dynamic allocation of ACBLIBs, complete the following steps:

1. Create DFSMDA members for the ACBLIBA and ACBLIBB data sets.
2. Remove the IMSACBA and IMSACBB DD statements from the IMS and DL/I JCL procedures.
3. Stop IMS and then restart it with the DFSMDA members.

To fall back from ACBLIB members in 64-bit memory, complete the following steps:

1. Remove the ACBIN64 parameter from the DFSDFxxx PROCLIB member.
2. Stop IMS and then restart it with the updated DFSDFxxx PROCLIB member.

To fall back from the DFSMDA macro for dynamic allocation of ACBLIBs, complete the following steps:

1. Remove the DFSMDA members for the ACBLIBA and ACBLIBB data sets from the STEPLIB concatenation.
2. Add the IMSACBA and IMSACBB DD statements to the IMS and DL/I JCL procedures.
3. Stop IMS and then restart it with the updated JCL procedures.

Coexistence considerations

No impact.

Log record changes

The type X'45' log record includes the statistics from the 64-bit storage pool.

New and changed concepts

No new or changed concepts.

New and changed terms

No new terms.

Requirements

No impact.

Restrictions

The following restrictions apply to these enhancements:

- Dynamic allocation of ACBLIB data sets and the 64-bit storage pool for ACB members are not supported in IMS batch or in an RSR tracking system.
- Dynamic allocation statements for the ACBLIBA and ACBLIBB can be combined in the same job. However, the statements cannot be combined with other statements to dynamically allocate any other IMS data set.

Impact to installing and defining IMS

To calculate how much 64-bit storage must be allocated for PSB and DMB ACB members, calculate how much storage is being used for all the nonresident PSBs and nonresident DMBs in the ACB library. DEDB DMBs always reside in 31-bit storage. Because DMBs and PSBs both reside in the same 64-bit pool, sufficient storage must be allocated to accommodate all these members.

To specify how much 64-bit storage should be allocated, use the new ACBIN64 parameter in the in the <SECTION=DATABASE> portion of the DFSDFxxx PROCLIB member. ACBIN64=ggg can be specified with a numeric value from 1 to 999 GB.

To use dynamic allocation for your ACB libraries:

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 and then restart it with the DFSMDA members.

Impact to administering IMS

These enhancements add or modify the following system and database administration tasks:

- Loading ACB members into the 64-bit storage pool
- Accessing ACB members from the 64-bit storage pool
- Removing ACB members from the 64-bit storage pool
- Ensuring that FDBR and XRF alternate systems have the same contents as the 64-bit pool
- Understanding that for DBCTL warm standby, the nonresident storage pool and the 64-bit pool are allocated without content until the /ERE command is issued
- Understanding that using the 64-bit storage pool for ACB members can improve performance in application scheduling

Impact to programming for IMS

This enhancement has no impact here.

Impact to troubleshooting for IMS

The following information is added for diagnostic purposes:

- The type X'4515' log record now includes statistics from the 64-bit storage pool. These statistics are also displayed in the output from the QUERY POOL command.
- Two new messages are added for these enhancements:
  - `DFS0811A - UNABLE TO OBTAIN ggg GIGABYTES OF 64-BIT STORAGE FOR THE ACB POOL`
  - `DFS0887A - THE LOAD FOR DFSMDA MEMBER mmmmmmmm FAILED. REASON=xxxx`
- A new return code and sub-code are added to message DFS0404W.
- New error messages and codes are added for the DFSMDA macro.
- When the DFSMDA macro is not set up properly, ABEND 0023 is issued during allocation processing at IMS startup time.
- When there is no DFSMDA member for the active ACBLIB, ABEND 0071 is issued.

Impact to IMS reference information

Impact to commands

These enhancements affect commands in the following ways:

- The DELETE DB command is updated with usage information about deleting ACB members from both the 31-bit nonresident pool as well as the 64-bit storage pool.
- The DELETE PGM command is updated with usage information about deleting ACB members from both the 31-bit nonresident pool as well as the 64-bit storage pool.

- New completion codes are added to the INIT OLC PHASE(PREPARE) command.
- Information about the new status "U" for unallocated inactive ACBLIB data sets is added to the /DISPLAY MODIFY command.
- The new QUERY POOL TYPE(ACBIN64) command is added, which can be used to monitor the usage of the 64-bit storage pool.

Impact to exit routines

This enhancement has no impact to exit routines.

Impact to utilities

The IMS Monitor REGION IWAIT report shows those members that were read from the 64-bit buffer pool.

Chapter 9. Database quiesce enhancement

Database quiesce enables you to create a coordinated recovery point across an IMSplex for IMS Fast Path data entry databases (DEDBs), Fast Path areas, full-function databases (including High Availability Large Databases - HALDBs), and database groups, without taking your resources offline or causing applications to encounter an unavailable database.

You can use database quiesce to establish a *point of consistency* for a DEDB or full-function database. The *point of consistency* is a time when no updates are pending for the database and the information that is stored on a direct access storage device (DASD) accurately reflects the current information that is stored in the database. When this point is reached, an image copy can be taken to provide a quick method of recovering the database, database group, or area to this point.

When the quiesce function is invoked, the point of consistency is reached when all updates that are in progress are committed. After all updates are committed, and stored on DASD, the database data sets reflect the current database information because no updates are pending. At this time, the point of consistency has been reached locally on a single IMS. This process must occur on every IMS in the IMSplex that is actively using the database. When all activity has been quiesced, a new recovery point is recorded.

During the time that the database is quiesced, only read-only applications can access the database. All other applications are held at the time when they attempt to access the database with a DL/I call, until the quiesce is released. Batch jobs with update access or above will fail authorization while the database is quiesced.

When the quiesce is released, the applications are able to access the database again. The quiesce leaves the database data sets in the same state that they were in at the start of the quiesce process.

In addition, you can create a point of consistency on a database without making the database unavailable to applications by using a new form of the existing type-2 UPDATE command (for example, UPDATE DB START (QUIESCE)). This command quiesces all work in progress so that a new recovery point can be created for a database while it is actively in use in the IMSplex.

In an XRF environment, XRF obtains the quiesce status of the databases from DBRC at the XRF takeover.

A quiesce command can be issued against the following types of databases:

- DEDB
- HSAM
- HISAM
- SHSAM
- SHISAM
- HDAM
- PHDAM
- HIDAM
- PHIDAM

- PSINDEX
- INDEX

Migration considerations

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

- To use database quiesce, the MINVERS field in the RECON data sets must be set to '11.1'.
- 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 do not want to access the fields added with the database quiesce enhancement. Applications that want to get the new output must map to the new output fields and ensure that the block returned has a minimum version of 3.0.

Coexistence considerations

No coexistence considerations are associated with the use of database quiesce.

Log record changes

None.

New and changed concepts

point of consistency
: The *point of consistency* is a time when no updates are pending for the database and the information that is stored on a direct access storage device (DASD) accurately reflects the current information that is stored in the database.

New and changed terms

No new terms.

Requirements

Database quiesce 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 a multi-IMS IMSplex. An RM resource structure is recommended, but not required. RM is not required (RMENV=N) when using database quiesce in a single-IMS IMSplex (also known as the enhanced command environment).

The JCL for image copy jobs must specify DISP=SHR if the image copy is run while the database is quiesced because the online IMS subsystems can have the database data sets allocated during a quiesce operation.

Restrictions

The following restrictions exist for database quiesce:

- Databases can be quiesced only when they are not actively in use by another batch update IMS application. If the database that you want to quiesce is being used by a batch update application, the command to start the quiesce fails.

- The database can be quiesced only when a recovery point can be achieved. If the database is in a state where recovery or backout is needed, a quiesce cannot be started.
- A HALDB partition can be quiesced only when an integrated HALDB online reorganization (OLR) process is not active. If the cursor is active or there is an owner of the OLR for a HALDB partition, a quiesce cannot be started.
- During database quiesce, the database that is involved in the quiesce cannot have its status or attributes changed by other database commands. If a database command is in progress when quiesce is started, the quiesce command is rejected.
- A quiesce command is a global command. All the IMS systems participate in the processing of the command. The command master coordinates the command among all the IMS systems. If another quiesce command is issued on another command master, it will fail because the databases are already quiesced.
- A quiesce cannot be released while the command that initiated the quiesce is in progress.
- Only a single quiesce command can be executed on a command master IMS. If multiple commands are being processed by the same command master, they are executed serially.
- The quiesce command is not tracked by the RSR alternate. However, the records in the RECON data set that were created by the quiesce function are tracked by RSR.
- Database quiesce operations are not tracked by Fast Database Recovery (FDBR) regions.
- A quiesce command cannot be issued against the following types of databases:
  - MSDB
  - GSAM
- During a database quiesce, the following type-1 commands cannot be processed:
  - /DBR DB
  - /DBD DB
  - /DBR AREA
  - /STA DB
  - /STO DB
  - /STO AREA
  - /STA AREA
  - /VUN AREA
- During a database quiesce, the following type-2 commands cannot be processed:
  - INIT OLREORG
  - UPDATE AREA
  - UPDATE DB
  - UPDATE DATAGRP
- During a database quiesce, the following database utilities cannot be processed while the database has the status of “QUIESCE HELD” in the RECON data sets:
  - Database Prefix Update utility (DFSURGP0)
  - Database Scan utility (DFSURGS0)
  - Database Surveyor utility (DFSPRSUR)
  - DEDB Initialization utility (DBFUMIN0)
  - DEDB Sequential Dependent Delete utility (DBFUMDL0)

  - DEDB Sequential Dependent Scan utility (DBFUMSC0)
  - HALDB Partition Data Set Initialization utility (DFSUPNT0)
  - Batch Backout utility (DFSBBO00)
  - Database Recovery utility (DFSURDB0)
  - DEDB Area Data Set Compare utility (DBFUMMH0)
  - DEDB Area Data Set Create utility (DBFUMRI0)
  - HALDB Index/ILDS Rebuild utility (DFSPREC0)
  - HALDB Migration Aid utility (DFSMAID0)
  - HD Reorganization Reload utility (DFSURGL0)
  - HD Reorganization Unload utility (DFSURGU0)
  - High-Speed DEDB Direct Reorganization utility (DBFUHDR0)
  - HISAM Reorganization Reload utility (DFSURRL0)
  - HISAM Reorganization Unload utility (DFSURUL0)
  - Partial Database Reorganization utility (DFSPRCT1 and DFSPRCT2)
  - Utility Control Facility (DFSUCF00)
- During a database quiesce, the following database utilities cannot be executed while the database has the status of "QUIESCE IN PROGRESS" in the RECON data sets:
  - Database Prefix Update utility (DFSURGP0)
  - Database Scan utility (DFSURGS0)
  - Database Surveyor utility (DFSPRSUR)
  - DEDB Initialization utility (DBFUMIN0)
  - DEDB Sequential Dependent Delete utility (DBFUMDL0)
  - DEDB Sequential Dependent Scan utility (DBFUMSC0)
  - HALDB Partition Data Set Initialization utility (DFSUPNT0)
  - Database Image Copy utility (DFSUDMP0)
  - Database Image Copy 2 utility (DFSUDMT0)
  - Online Database Image Copy utility (DFSUICP0)
  - Batch Backout utility (DFSBBO00)
  - Database Recovery utility (DFSURDB0)
  - DEDB Area Data Set Compare utility (DBFUMMH0)
  - DEDB Area Data Set Create utility (DBFUMRI0)
  - HALDB Index/ILDS Rebuild utility (DFSPREC0)
  - HALDB Migration Aid utility (DFSMAID0)
  - HD Reorganization Reload utility (DFSURGL0)
  - HD Reorganization Unload utility (DFSURGU0)
  - High-Speed DEDB Direct Reorganization utility (DBFUHDR0)
  - HISAM Reorganization Reload utility (DFSURRL0)
  - HISAM Reorganization Unload utility (DFSURUL0)
  - Partial Database Reorganization utility (DFSPRCT1 and DFSPRCT2)
  - Utility Control Facility (DFSUCF00)

Impact to installing and defining IMS

The DFSCGxxx PROCLIB member and the <COMMON_SERVICE_LAYER> section of the DFSDFxxx PROCLIB member are updated with the new DBQUIESCETO

keyword, where you can specify the maximum amount of time (from 1 to 999 seconds) to allow a database quiesce process to complete before timing out. The default value is 30 seconds. A timeout value can also be specified on the UPDATE command.

Impact to administering IMS

The database administration information is enhanced to provide an overview of database quiesce. This information includes:

- A description of the two different types of quiesce that are triggered by the type-2 UPDATE command. The two types of quiesce differ, based on what happens after the quiesce has finished: one type releases the quiesce, causing a new recovery point, and the other type holds the quiesce until a command is issued to release the quiesce.
- A note that explains that quiescing a non-registered database does not change the restrictions for a database that is not registered in the RECON data sets.
- An explanation of the different quiesce statuses: "quiescing", which occurs when the command is waiting for the point of consistency to be reached, and "quiesced", which occurs after the point of consistency is reached.
- Guidance about issuing quiesce commands, such as:
  - If a HALDB master or DEDB is specified on a quiesce command, all the partitions or areas defined on the command master for the HALDB or DEDB are quiesced.
  - If a database group name is specified on a quiesce command, the quiesce will be achieved only when all databases in the group have been quiesced.
  - If multiple databases are specified on a quiesce command, the quiesce will be achieved only when all databases have been quiesced.
  - Release a quiesce after a "quiesce and hold" command is issued.

The operations information is enhanced with new topics that describe:

- How to quiesce a Fast Path area by issuing the UPDATE AREA command.
- How to quiesce a full-function database by issuing the UPDATE DB command.
- How to quiesce a full-function HALDB by issuing the UPDATE DB command.
- How to quiesce a Fast Path DEDB by issuing the UPDATE DB command.
- How to quiesce a database group by issuing the UPDATE DATAGRP command.

The system administration information is enhanced with a new topic that describes:

- How to manage the RECON data sets from a database quiesce perspective. To ensure that the coordination occurs across the IMSplex using only the systems with the same set of RECON data sets, the RECON data sets must be registered with the Structured Call Interface (SCI). In addition, a unique group ID must be specified.

Impact to programming for IMS

DBRC applications that use the query request can now interrogate the following new database quiesce fields in the RECON data sets:

- "QUIESCE" in the ALLOC record, when the database quiesce function is invoked. At this point, a DEALLOC time stamp is recorded in the ALLOC record.

- "QUIESCE IN PROGRESS" and "QUIESCE HELD" in the DB record, while a database quiesce process is in progress.

Impact to troubleshooting for IMS

Potential errors can occur during a quiesce, such as a timeout condition before reaching the point of consistency, an error preventing the point of consistency being reached, or a failure of the command master. These errors and others can cause IMS to issue certain messages or return codes on the quiesce commands.

The following messages are changed as a result of this enhancement:
- DFS047A
- DFS3702I
- DFS3709A
- DFS3710A
- DFS3754A
- DFS0535I
- DSP0222I
- DSP1023I

The following messages are new and are associated with this enhancement:
- DSP1114E
- DSP1115E
- DSP1116E
- DSP1117E
- DSP1205E

Impact to IMS reference information

Impact to commands

The information about the following IMS commands includes new keywords, statuses, and examples that have been added for this enhancement:
- DISPLAY ACT
- DISPLAY AREA
- DISPLAY DB
- QUERY AREA
- QUERY DB
- /RMCHANGE
- /RMGENJCL
- /RMLIST
- /RMNOTIFY
- UPDATE DATAGRP
- UPDATE AREA
- UPDATE DB

The information about the following DBRC commands includes new keywords, statuses, and examples that have been added for this enhancement:
- CHANGE.DB
- CHANGE.DBDS
- GENJCL.IC
- LIST.DB
- LIST.DBDS
- NOTIFY.ALLOC

The sample listing of the RECON data set shows the new fields (quiesce flags) associated with this enhancement.

Impact to exit routines

This enhancement does not impact exit routines.

Impact to utilities

As mentioned in "Restrictions" on page 122, certain utilities are allowed to run, others can run only under certain conditions, and others are not allowed to run at all while a database quiesce process is in progress.

Chapter 10. DBRC enhancements

DBRC in IMS Version 11 provides the ability to run on Base Primitive Environment (BPE) and also provides new serviceability options for the RECON data sets.

These topics describe the DBRC enhancements for IMS Version 11.

BPE-based DBRC enhancement

An online DBRC address space has the option in IMS Version 11 to run as a Base Primitive Environment (BPE)-based address space, so that DBRC can take advantage of some BPE services.

The following enhancements are available to BPE-based DBRC address spaces:

- Improved support for DBRC user exits by allowing multiple exits of the same type, ability to refresh exit routines, and a new DBRC Request exit
- Improved DBRC trace support
- Improved support for configuring the DBRC address space by using the new DBRC initialization PROCLIB member, DSPBIxxx

The IMS Syntax Checker is updated to support new options to existing keywords in the BPE configuration PROCLIB member and the BPE exit list member. It also supports the new DBRC initialization PROCLIB member, DSPBIxxx.

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.

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 exits might be required for DBRC executions not using BPE, such as batch jobs and utilities, the non-BPE interface to the exit routines must also be maintained. 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 Security exit routine (DSPDCAX0) and RECON I/O exit routine (DSPCEXT1) samples that are shipped with IMS Version 11 use this detection technique.

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

Coexistence considerations

The DBRC in all supported versions of IMS can coexist (use the same RECON data set) if the DBRC coexistence SPEs are applied. The coexistence SPEs are:

- PK61582/UK42649 for IMS Version 9
- PK61583/UK42503 for IMS Version 10

Log record changes

No changes.

New and changed concepts

None.

New and changed terms

None.

Requirements

None.

Restrictions

Only BPE-based DBRC regions can use the new exit interface. Other DBRC instances continue to call the existing DBRC user exits, DSPCEXT0 and DSPDCAX0, using the existing interface.

Impact to installing and defining IMS

The system definition information is updated as follows:

- To start DBRC on a BPE base, create new DBRC JCL and update the IMS EXEC parameter, DBRCNM=, to specify the new member name.
- The following information is added to the DBRC execution parameters topic:
  - BPECFG - Specifies an 8-character name for the BPE configuration parameters PROCLIB member.
  - BPEINIT=DSPBINI0 - Specifies the name of the module that contains the DBRC start-up values required by BPEINI00 to start a DBRC address space.
  - DBRCINIT - Specifies the 3-character suffix for the DBRC initialization parameters PROCLIB member, DSPBIxxx.
  - IMSPLEX - Specifies the 5-character IMSplex group name.
  - IMSID - Specifies a 1- to 4-character identifier that identifies the IMS subsystem ID of the IMS to which this DBRC address space will connect.
  - DBRCGRP= - Specifies the 3-character DBRC group ID.
- Information is added to the following PROCLIB members:
  - DBRC-related keywords in a BPE configuration member.
  - DBRC initialization parameters PROCLIB member - DSPBIxxx.

    Use the DSPBIxxx PROCLIB member to specify parameters that initialize the DBRC address space.
    - IMSPLEX() - specifies the IMSplex name used by DBRC for SCI registration.
    - DBRCGRP= - specifies the three-character DBRC group ID.
    - VSAMBUFF() - specifies the maximum number of index and data buffers to be assigned to the VSAM LSR pool.
  - BPE user exit list PROCLIB member.

Use the BPE user exit list PROCLIB member to define the BPE user exits that you want to include in the DBRC address space.

Impact to administering IMS

The system administration information is updated to describe the ramifications of running a BPE-based DBRC. For example, one of the benefits of converting DBRC exit routines to work with the BPE interface is that they can be refreshed without restarting IMS.

Impact to programming for IMS

This enhancement does not affect application programming for IMS.

Impact to troubleshooting for IMS

The diagnostic information is updated to include details of BPE tracing for DBRC. Also, the IMS enhanced dump analysis for DBRC now includes formatting of new DBRC control blocks that are used in both the BPE-based DBRC instances and those that are not based on BPE.

The following new messages are added:

- `DSP2001I DBRC READY`
- `DSP2002E DBRC INITIALIZATION FAILURE`
- `DSP2003A INVALID VALUE SPECIFIED FOR KEYWORD PARAMETER`
- `DSP2005I DBRC SHUTDOWN COMPLETE`

A new user abend is added: U2490 - An internal error using BPE services has occurred.

Impact to IMS reference information

Impact to commands

Information is added to the following command information:

BPE DISPLAY TRACETABLE command

DBRC is added to the list of possible values for the OWNER keyword.

Also, the following DBRC-defined trace tables can be displayed with this command:

RQST DBRC request trace table

MODF
DBRC module flow trace table

GRPS DBRC group services trace table

ERR DBRC error trace table

BPE DISPLAY USEREXIT command

DBRC is added to the list of possible values for the OWNER keyword.

Also, the following new user exit types that are defined in all DBRC BPE address spaces can be displayed with this command:

SECURITY
DBRC Security Exit routine (BPE)

RECONIO
RECON I/O Exit routine (BPE)

REQUEST
BPE DBRC request user exit

BPE REFRESH USEREXIT command
DBRC is added to the list of possible values for the OWNER keyword.

Also, the following new user exit types that are defined in all DBRC BPE address spaces can be refreshed with this command:

SECURITY
DBRC Security Exit routine (BPE)

RECONIO
RECON I/O Exit routine (BPE)

REQUEST
BPE DBRC request user exit

BPE UPDATE TRACETABLE command
DBRC is added to the list of possible values for the OWNER keyword.

Also, the following DBRC-defined trace tables can be updated with this command:

RQST DBRC request trace table

MODF
DBRC module flow trace

GRPS DBRC group services trace table

ERR DBRC error trace table

Impact to exit routines

A new topic is added that explains how to create new exits (based on current exits) that handle the BPE interface.

Information is added for the new BPE-managed user exits for DBRC:

RECONIO
Replaces the RECON I/O exit routine (DSPCEXT0) for a BPE-based DBRC region.

REQUEST
The DBRC Request exit routine activates both before and after DBRC request processing, and allows a user-supplied program to interrogate DBRC request information. The DBRC Request user exit support is added through the IMS Version 11 service process (APAR/PTF PK93338/UK52453).

SECURITY
Replaces the DBRC Command Authorization exit routine (DSPDCAX0) for a BPE-based DBRC region.

Attention: The invocation of the security exit is based on the CMDAUTH specification in the RECON data set. If CMDAUTH=(EXIT | BOTH) is not specified in RECON data set, the SECURITY exit is not called, regardless of whether an EXITDEF for type SECURITY exists.

STATS

The BPE Statistics user-supplied exit can be used to gather both BPE and DBRC statistics.

Impact to utilities

This enhancement does not affect utilities.

RECON data set security override enhancement

Use the enhanced CMDAUTH keyword on the INIT.RECON or CHANGE.RECON command to override DBRC security for non-production copies of the RECON data set, to enable non-authorized personnel to access and manipulate the data in the RECON. This access is needed, for example, for testing purposes or when the RECON data set is sent to IBM for diagnostic purposes.

Non-production copies of the RECON data set inherit the security level of the production RECON from which they were copied. This security characteristic poses a problem when someone who does not have the original authority level needs to access the RECON data set, such as for testing or debugging purposes.

To solve this access problem:

- The CMDAUTH keyword on the INIT.RECON and CHANGE.RECON commands is enhanced in IMS Version 11 with the option to override DBRC security for non-production copies of the RECON data set.
- The RECON header record (DSPRCNRC) is enhanced with the new RCNQUAL field, RCNCMDRNQ, which tells DBRC if the RECON data set is a copy and whether command authorization should be enforced or not.
- The new apqrc_CmdRNQ field that contains the RCNQUAL value is added to the DBRC API RECON status block (DSPAPQRC).

Migration considerations

The RECON header record is larger in IMS Version 11 (by 48 bytes) than in previous versions. Therefore, any programs that use the information in the RECON header might need to be modified to accommodate this increase in size.

Similarly, the DBRC API RECON status block (DSPAPQRC) has a new 44-byte field (APQRC_CMDRNQ), so any programs that use this status block and want to use the new RCNQUAL option will need to be modified to accommodate the new field.

Coexistence considerations

This enhancement does not support coexistence with IMS Version 10 and earlier systems.

Log record changes

None.

New and changed concepts

None.

New and changed terms

None.

Requirements

None.

Restrictions

None.

Impact to installing and defining IMS

This enhancement has no impact here.

Impact to administering IMS

This enhancement has no impact here.

Impact to programming for IMS

This enhancement has no impact here.

Impact to troubleshooting for IMS

This enhancement has no impact here.

Impact to IMS reference information

Impact to commands

The CMDAUTH keyword on the INIT.RECON and CHANGE.RECON commands has a new optional keyword value (rcnqual) to support this enhancement.

Impact to exit routines

This enhancement has no impact here.

Impact to utilities

This enhancement has no impact here.

Unconditional deletion of information from the RECON data set

You can use a new DBRC command, CLEANUP.RECON, to delete old or expired recovery-related information from the RECON data set.

The RECON data set contains information that is needed to recover databases. The PRILOG record in the RECON data set can grow to be large. PRILOG record compression, which is the automatic deletion of inactive data set entries in the PRILOG record, sometimes cannot take place for various reasons. In these cases, the information must be deleted manually.

With the appropriate authorization, you can use the CLEANUP.RECON command to remove obsolete information from the RECON data set. The CLEANUP.RECON

command can be issued with the Database Recovery Control utility (DSPURX00) or embedded in a DBRC Command API request.

The parameters on the CLEANUP.RECON command enable you to specify:

- Either a retention period or an absolute time to which recovery-related information and log information is to be deleted
- The databases that are associated with the inactive information
- Whether to just delete database recovery-related information and not log information
- That information pertaining to the last available image copy for a database can be deleted
- Whether data about the deleted information should be included in the SYSPRINT listing

Migration considerations

Before using this function, 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.

Coexistence considerations

This enhancement does not support coexistence with IMS Version 10 or earlier systems.

Log record changes

None.

New and changed concepts

None.

New and changed terms

None.

Requirements

If the DBRC commands are secured, the new CLEANUP.RECON command must be secured also.

Restrictions

The CLEANUP.RECON command cannot be issued as an /RMxxxxx online command.

Impact to installing and defining IMS

This enhancement has no impact here.

Impact to administering IMS

This enhancement has no impact here.

Impact to programming for IMS

This enhancement has no impact here.

Impact to troubleshooting for IMS

This enhancement has no impact here.

Impact to IMS reference information

Impact to commands

This enhancement has no impact here.

Impact to exit routines

This enhancement has no impact here.

Impact to utilities

This enhancement has no impact here.

Chapter 11. Fast Path enhancements

The enhancements to Fast Path in IMS Version 11 introduce a 64-bit buffer manager, new options to open Fast Path areas, and new serviceability options.

These topics describe the Fast Path enhancements for IMS Version 11.

Fast Path 64-bit buffer manager enhancement

The Fast Path 64-bit buffer manager autonomically controls the number and size of Fast Path buffer pools, including buffer pools for data entry databases (DEDBs), main storage databases (MSDBs), and system services. This autonomic control eliminates the need for users to manually set buffer pool specifications during system definition.

The Fast Path 64-bit buffer manager also places the DEDB buffer pools above the bar in 64-bit storage, which reduces the usage of ECSA storage. When the Fast Path 64-bit buffer manager is used, the following items continue to be managed in ECSA storage:

- Fast Path buffer pools for MSDB databases
- Buffers for inserting sequential dependent (SDEP) segments
- Buffers for system services
- Buffer headers
- Internal IMS work areas for FLD calls and MSDBs

When executing IMS Version 11 on z/OS V1R9, the Fast Path 64-bit buffer manager will use 64-bit private storage. When executing IMS Version 11 on z/OS V1R10, the Fast Path 64-bit buffer manager will use 64-bit common storage.

The existing mechanism for managing Fast Path buffer pools, which places all Fast Path buffer pools in 32-bit ECSA storage below the bar, requires the number and size of buffer pools to be set during system definition by using the DBBF, DBFX, and BSIZ execution parameters. After IMS is started, the number and size of the Fast Path buffer pools cannot be changed without stopping and restarting IMS.

The Fast Path 64-bit buffer manager is enabled by one parameter, FPBP64, in the <SECTION=FASTPATH> section of the DFSDFxxx PROCLIB member. When enabled, the Fast Path 64-bit buffer manager allocates additional buffer subpools when needed. Also, if a database is added to the online IMS system and none of the active buffer subpools can accommodate the CI size of the database, the Fast Path 64-bit buffer manager allocates a new buffer subpool of the appropriate size. If no DEDBs are defined for this IMS, a small subpool of 4 KB is allocated for system use.

Another parameter in the <SECTION=FASTPATH> section, FPBP64M=aaaaM, is required and establishes a maximum limit on how much 64-bit storage the Fast Path 64-bit buffer pool will use for DEDB data buffers.

Because the Fast Path 64-bit buffer manager places the DEDB buffer pools in 64-bit storage, more buffer pools can be allotted to each dependent region without

increasing the usage of valuable ECSA storage. The more buffers that a dependent region has available, the more work an application program can perform between checkpoints.

The number of buffers that can be allocated is not limited by the Fast Path 64-bit buffer manager. The maximum number of buffers is determined by the dependent region definition and the maximum number of dependent regions.

When the Fast Path 64-bit buffer manager is enabled:

- Database administrators can improve the performance of their DEDB databases by changing the CI size of databases, without having to adjust the buffer sizes to match. If no buffer subpools are active that can accommodate a new or changed CI size, the Fast Path 64-bit buffer manager automatically allocates a buffer subpool with the correct CI size.
- You can display statistics for Fast Path buffers by issuing the new IMS type-2 command QUERY POOL TYPE(FPBP64) SHOW(ALL).
- You can set a storage usage limit for the Fast Path 64-bit buffer manager by using the new UPDATE POOL TYPE(FPBP64) SET(LIMIT(xxxxx)) command.
- Multiple application programs can access the overflow buffers (specified with the OBA parameter) in parallel.
- You can enable dependent region statistics for Fast Path 64-bit buffer usage with the UPDATE IMS SET(LCLPARM(FPBP64STAT(N|Y))) command. The dependent region statistics for Fast Path 64-bit buffer usage per unit of work can be found in X'5945' log records, mapped by the DBFL5945 and DBFBPND6 macros.
- You can query Fast Path 64-bit buffer usage statistics logging setting for dependent region in an IMS system by issuing one of the following QUERY IMS commands:
  - QUERY IMS TYPE(LCLPARM) SHOW(ALL)
  - QUERY IMS TYPE(LCLPARM) SHOW(LOCAL)
  - QUERY IMS TYPE(ALL) SHOW(ALL)
  - QUERY IMS TYPE(ALL) SHOW(LOCAL)
  - QUERY IMS SHOW(ALL)
  - QUERY IMS SHOW(LOCAL)

Migration considerations

If your IMS installation did not use 64-bit storage prior to IMS Version 11, to use the Fast Path 64-bit buffer manager, you will need to make 64-bit storage available.

Coexistence considerations

The Fast Path 64-bit buffer manager only works with IMS Version 11.

Log record changes

This enhancement introduces the following new log records:

X'4081'
Snaps the current subpool information for use during warm and emergency restart.

X'4516'
Records all statistics that are associated with the Fast Path 64-bit buffer manager subpools.

X'5945'
Contains information about buffer use and buffer waits (using the Fast Path 64-bit buffer manager) for each UOW.

X'5960'
Records all creations and expansions of the subpools.

New and changed concepts

Overflow buffers are not single-threaded when the Fast Path 64-bit buffer manager is enabled. Any number of dependent regions can allocate overflow buffers in parallel by specifying the OBA parameter.

New and changed terms

The Fast Path 64-bit buffer manager does not introduce or change any terms.

Requirements

The Fast Path 64-bit buffer manager requires a minimum of 2.1 gigabytes of 64-bit storage. Also, if the FP 64-bit buffer manager is being 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.

Restrictions

For systems using Fast Database Recovery (FDBR), the buffer manager of the tracking system must be the same as the buffer manager of the active system.

Impact to installing and defining IMS

The system definition information is updated to describe:

- The DBBF, DBFX, and BSIZ execution parameters are now used for manually specifying Fast Path buffers. If you want IMS to manage the Fast Path buffers automatically, you can enable the Fast Path 64-bit buffer manager by specifying FPBP64=Y in the <SECTION=FASTPATH> section of the DFSDFxxx PROCLIB member.
- The required FPBP64M=aaaaM parameter in the <SECTION=FASTPATH> section of the DFSDFxxx PROCLIB member, which specifies a maximum limit on how much 64-bit storage the Fast Path 64-bit buffer pool will use for DEDB data buffers.
- The values specified on the overflow buffer allocation (OBA) parameter and on the normal buffer allocation (NBA) parameters affect the Fast Path 64-bit buffer manager. Combined, they determine the maximum number of buffers that the Fast Path 64-bit buffer manager can allocate to a dependent region.

Impact to administering IMS

The database administration information is updated to describe:

- How buffers are allocated when the Fast Path 64-bit buffer manager is enabled.
- That the DBBF, DBFX, or BSIZ execution parameters are not required when using the Fast Path 64-bit buffer manager.

- How adding the Fast Path 64-bit buffer manager might be a solution to the overflow buffer interlock's role in deadlocks.
- How the following topics only apply when the Fast Path 64-bit buffer manager is not used:
  - Monitoring DEDB overflow buffers usage
  - Monitoring the forced serialization of programs that concurrently need to use overflow buffers specified by the EXEC statement DBFX parameter

The system administration information is updated to describe:

- The use of the Fast Path 64-bit buffer manager, including how to enable it, how you no longer have to figure out the number and size of buffers yourself when you use it, and how it places DEDB buffers in 64-bit storage.
- In addition to the IMS Monitor reports, you can use the QUERY POOL TYPE(FPBP64) SHOW(ALL) command to view usage statistics for Fast Path buffer pools.

Impact to programming for IMS

This enhancement has no impact to programming for IMS.

Impact to troubleshooting for IMS

This enhancement introduces new message DFS3300I and abend 1024.

For a complete list of the new, changed, and deleted messages and abend for IMS Version 11, see Chapter 6, "New, changed, and deleted messages and abend codes," on page 109.

Impact to IMS reference information

Impact to commands

The following new IMS type-2 commands are added:

- QUERY POOL TYPE(FPBP64) SHOW(ALL)
- UPDATE POOL TYPE(FPBP64) SET(LIMIT(xxxxx))

The following existing IMS type-2 commands are enhanced:

- QUERY IMS TYPE(LCLPARM) SHOW(ALL)
- QUERY IMS TYPE(LCLPARM) SHOW(LOCAL)
- QUERY IMS TYPE(ALL) SHOW(ALL)
- QUERY IMS TYPE(ALL) SHOW(LOCAL)
- QUERY IMS SHOW(ALL)
- QUERY IMS SHOW(LOCAL)
- UPDATE IMS SET(LCLPARM(FPBP64STAT(N|Y)))

Impact to exit routines

This enhancement has no impact to exit routines.

Impact to utilities

This enhancement has no impact to utilities. The Fast Path utilities continue to use 31-bit buffers.

Fast Path usability and serviceability enhancements

The IMS Fast Path usability and serviceability enhancements provide IMS Version 11 additional ways to open DEDB areas by using UPDATE DB and UPDATE AREA type-2 commands.

By using the UPDATE commands, Fast Path customers can open DEDB areas even if the area is not registered to DBRC as PREOPEN. The DEDB area open process still requires DBRC authorization.

The serviceability enhancements enable both IMS customers and IMS Service to more efficiently resolve Fast Path problems:

- User abend U1026 (while using PROCOPT=GO) has been enhanced to provide diagnostic information in the Extended Partition Specification Table (EPST) segment work area.
- Messages DFS2555I and DFS2716I are no longer issued if MSDBs are not defined by using either dynamic resource definition (DRD) or the DBD macro.
- CPU usage has been enhanced. When an MPP is rescheduled, IMS releases the old segment work area and obtains a larger segment work area only when the size of the segment work area needs to be increased.

Migration considerations

Customers that have automated operations that are triggered when messages DFS2555I or DFS2716I are issued because no MSDBs are defined must modify their automated programs. If fallback becomes necessary, and automation programs were modified, customers must restore the original programs that were triggered by the messages.

Coexistence considerations

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 both IMS Version 11 and earlier version IMS systems, the parameter OPTION(OPEN) is processed only on IMS Version 11 systems; it is ignored on earlier-version IMS systems.

Log record changes

No log records are changed. However, the name of the DEDB area is now included in the Extended Partition Specification Table (EPST), which is associated with the dependent region PST (DPST) in log record X'6705'.

New and changed concepts

None.

New and changed terms

None.

Requirements

None.

Restrictions

None.

Impact to installing and defining IMS

No impact.

Impact to administering IMS

The database administration information is updated to mention that customers can open a DEDB area by using the UPDATE commands.

Impact to programming for IMS

No impact.

Impact to troubleshooting for IMS

Message DFS2716I is no longer issued and therefore is removed from the IMS information.

Impact to IMS reference information

Impact to commands

The following commands are affected by this enhancement:

- The OPTION(OPEN) keyword on the UPDATE DB command is enhanced to work with Fast Path DEDB areas. Previously, this keyword worked only with full-function databases.
- A new keyword, OPTION(OPEN), is added to the syntax and parameter descriptions of the UPDATE AREA command.

Impact to exit routines

No impact.

Impact to utilities

No impact.

Chapter 12. IMS Connect enhancements for IMS TM

IMS Version 11 enhances IMS Connect in a number of ways, including increased flexibility in IMS Connect support for the OTMA super member function, improved diagnostic support, improved error checking, support for returning user-defined messages, eliminating extraneous requirements, improved diagnostic information reliability, automatically re-established TCP/IP connections with IMS after a network failure, and allowing modification of input messages from TCP/IP before they are submitted to IMS Connect.

ACK timeout improvements

OTMA has expanded the ACK Timeout support in IMS Version 11 to include commit-then-send (CM0) output. When a CM0 timeout occurs, the message is placed on a default timeout queue (named DFS$$TOQ). IMS Connect allows customers to specify what the CM0 timeout queue should be named to override the default timeout queue name (HWS). This specification can be for the entire IMS Connect instance (on the HWS configuration statement) or for individual data stores (on the DATASTORE configuration statement or statements). The ability to differentiate CM0 timeout queues for various data stores allows you to more easily retrieve messages with other applications.

Connection improvements

1. A new function, KeepAlive, enables you to override the stack value of the TCP/IP KeepAlive parameter value on each port. After the specified period of inactivity is reached, TCP/IP sends a KeepAlive message to determine if the connected partner is still active. KeepAlive reduces the time it takes TCP/IP to determine when a socket has terminated without incurring additional network overhead for all TCP/IP applications.
2. The connection between the client application and IMS Connect can be disrupted, and at times, IMS Connect might not detect that the connection is lost. The client tries to re-establish connection with IMS Connect on the same port, usually with the same client ID, creating a duplicate client. A new function, Cancel Client ID, enables the client application to request a cancel client ID when establishing a new connection with IMS Connect using the same client ID. The previous session is discarded and the session continues without creating a duplicate client ID.
3. If the connection between IMS Connect and the TCP/IP client is interrupted, IMS Connect requires operator intervention to re-establish connection to the network. A new feature, TCP/IP Auto Reconnect, enables IMS Connect to continue to listen on the LISTEN SOCKET for the re-emergence of the network. When the network becomes active, IMS Connect re-establishes communication with TCP/IP without operator intervention.

Data store-level support for super member groups

IMS Connect client applications can share asynchronous output by using the OTMA super member function, which joins the tpipe queues of participating IMS Connect instances into a common shared super member group.

Prior to IMS Version 11, users could define only one OTMA super member group name for each instance of IMS Connect. All data store connections that belonged to an instance of IMS Connect were required to participate in the super member group defined for that instance of IMS Connect.

In IMS Version 11, users can create and manage super member groups at both the IMS Connect level and the data store level. The individual data stores of an instance of IMS Connect can use the super member group name that is defined for the IMS Connect instance, a super member group name shared with a subset of other data stores, or they can be defined so as not to participate in a super member group at all. Specifications for super member groups that are made at the data store level override the super member specification that are made at the IMS Connect instance level.

By using the data store-level specifications for super member groups, application architects can create one or more subgroups of data stores that share asynchronous IMS output within a single instance of IMS Connect. To create similar groups in IMS Version 10 and earlier versions, application architects had to use multiple instances of IMS Connect.

Diagnostic improvements

To help diagnose problems that might occur when IMS Connect frees storage used for buffers, IMS Version 11 adds the address of the buffer that is associated with the error to the existing message HWSP1410W.

Two changes are introduced to the recorder trace process.

- Extension of the Base Primitive Environment (BPE) External Trace facility. The extension, BPE Direct External Trace, enables BPE to write ad-hoc data of variable length directly to a copy buffer, instead of storing the BPE trace data in an incore trace table and then asynchronously copying the table entries to the BPE External Trace data set.
- Exploitation of the BPE Direct External Trace facility. The recorder trace exploits the BPE Direct External Trace facility by rerouting recorder trace data to the BPE external trace data set instead of writing recorder trace data to a separate fixed block data set. Rerouting recorder trace data circumvents the limitations of the fixed block data set and enables different types and greater quantities of data to be captured.

Error checking improvements

Prior to IMS Version 11, if users specified more than a single Secure Sockets Layer (SSL) port for an instance of IMS Connect, a failure could occur in the IBM Language Environment for z/OS. In IMS Version 11, IMS checks for the correct specification of SSL ports. If multiple SSL ports are specified, or if the SSL port specification exceeds 8 characters, IMS Connect issues a message and abends. If users need multiple SSL ports for their IMS Connect connections, they can transfer the management of the SSL ports from IMS Connect to the IBM z/OS Communications Server Application Transparent Transport Layer Security (AT-TLS).

Exit improvements

A new exit routine, IMS Connect Port Message Edit exit routine, is introduced to provide an exit between TCP/IP and IMS Connect in which you can modify the format of incoming and outgoing messages. The exit is specified on the IMS Connect port parameter so that you can use specialized exits on different ports as required by various IMS Connect clients. If a message coming from an IMS Connect client does not conform

to the standard IMS Connect message format, you can modify the message format (using an exit routine) before the message comes into IMS Connect and modify it again after IMS Connect finishes processing it. In this way, you can make messages compatible with both the client and IMS Connect.

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.

Information listing improvements
Summary versions of the VIEWHWS and QUERY MEMBER commands are provided to bypass listing each individual client for the ports. The data store name on the client output for the ports is added to indicate the IMS that the transaction was routed to. Both changes enable you to diagnose problems and monitor IMS Connect without flooding the console with excessive output.

Maximum sockets warning message
IMS Connect currently supports between 50 and 65 535 sockets. The maximum sockets that a particular instance of IMS Connect can support is specified in the MAXSOC parameter in the IMS Connect configuration member. When the number of sockets reaches the MAXSOC limit, IMS Connect refuses any new connections. A new parameter, WARNSOC, can be used to specify a percentage of the MAXSOC limit. When the number of sockets reaches this percentage of the maximum, IMS Connect issues a warning message.

OTMA resource monitoring utilization
IMS Connect utilizes this new OTMA function by processing the protocol messages, updating its data store entry, and recording new data store events for warning and severity status. IMS Connect clients and user exits can access this information and redirect the transaction requests to a different IMS as necessary.

Transaction expiration support
A new IMS Request Message (IRM) flag is added so that the transaction expiration time can be passed in the OTMA message prefix.

User-defined message support
Users can code the IMS Connect user message exit routines, HWSSMPL0, HWSSMPL1, or HWSJAVA0, to return user-defined messages. The user-defined messages can be used for anything that the installation requires. After it returns the message, IMS Connect can either keep the client connection open or terminate the connection.

Application programs that receive a user-defined message must be able to parse the character string to distinguish the user-defined message from any other type of message the application program might receive, such as a transaction response or DFS message.

WebSphere Application Server for distributed platforms improvements
IMS Connect can generate a client ID for the IMS TM resource adapter, thus eliminating the requirement to use different IMS Connect ports for instances of distributed WebSphere Application Server. IMS Connect can use the Generated Client ID to ensure the uniqueness of each socket and allow all instances of WebSphere Application Server to specify the same IMS Connect TCP/IP port.

Migration considerations

Consider the following items when planning to migrate IMS Connect support to IMS Version 11:

- To specify an OTMA super member at the data store level for IMS Connect, the IMS Connect DATASTORE configuration statements must be updated by adding 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 users have previously defined more than one SSL port in an IMS Connect configuration member they 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 the IBM z/OS Communications Server Application Transparent Transport Layer Security (AT-TLS) to manage SSL connections.
- If you want the recorder trace to exploit the BPE Direct External Trace facility, the BPE external trace facility is required prior to using the recorder trace. 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. Stop the recorder trace facility 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 new PORT parameter with the KEEPAV option on the TCP/IP configuration statement in the HWSCFG PROCLIB member to enable the KeepAlive function.
- Code the new PORT parameter with the EDIT option on the TCP/IP configuration statement to enable the Port Message Edit exit function. Also, an exit routine load module whose name coincides with 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.
- Reassemble and rebind the IMS Connect exit routines that use HWSEXPRM to pick up the changes that are added in IMS Version 11.

Coexistence considerations

The following considerations might apply when an IMS Version 11 IMS Connect coexists with the IMS Connect function in IMS Version 9 or IMS Version 10.

- The IMS Connect function of IMS Version 11 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 11 IMS Connect can coexist with an IMS Connect from Version 10 or Version 9 if that you adhere to the following IMS Connect coexistence considerations:

- Recorder trace from IMS Version 10 and earlier versions can coexist but cannot be used concurrently. Versions of recorder trace can be used serially, switching between versions without the need to stop the IMS Connect address space.
- 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 this 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 requested by your clients or create new versions of HWSIMSO0 and HWSIMSO1 from the samples that are provided as source (HWSSMPL0 and HWSSMPL1).

Log record changes

The IMS Connect enhancements do not introduce any log record changes.

New and changed concepts

Coding and returning user-defined messages in the HWSSMPL0, HWSSMPL1, or HWSJAVA0 IMS Connect user message exit routines is a new concept.

New and changed terms

The term *user-defined message* is new relative to IMS Connect. A user-defined message is a character string coded by the user to be returned by either the HWSSMPL0, HWSSMPL1, or HWSJAVA0 IMS Connect user message exit routines to an IMS Connect client application in response to criteria that are also defined by the user.

Requirements

The IMS Connect function requires the same hardware and software that IMS Version 11 requires.

Restrictions

User-defined messages are restricted to a maximum length of 128 characters.

Impact to installing and defining IMS

The system definition information is updated in the following ways:

- The new SMEMBER= parameter is added to the DATASTORE configuration statement and the HWS statement. The value specified on the SMEMBER parameter on the HWS configuration statement can be overridden by the value specified on the SMEMBER parameter on the DATASTORE configuration statement.
- The description of the SSLPORT parameter is modified to reflect the fact that users cannot specify more than a single SSL port on the SSLPORT keyword.
- Information is also added that describes:

- How to set the BPE Direct External Trace option when creating the trace table definition
- How to define the Recorder Trace table (RCTR) after enabling the BPE Direct External Trace option
- How to define the Port Message Edit exit and the KeepAlive option in the HWSCFG PROCLIB member on the TCP/IP configuration statement, utilizing the PORT parameter

Impact to administering IMS

The following connections and communications information is added or modified to support the IMS Connect enhancements:

- New concept and task topics are added that describe how to create and return to the client user-defined messages. Information about maintaining the connection after returning the user-defined message to the client is added.
- The topic that discusses how IMS Connect supports the IMS TM resource adapter is updated to:
  - Describe how IMS Connect creates a unique client ID for any message received from the IMS TM resource adapter that either contains a blank client ID or is a duplicate of an existing client ID.
  - Explain how IMS Connect automatically reconnects to the TCP/IP network when a network failure occurs.
- Information is added that:
  - Describes the new exit routine support for creating and returning user-defined messages to the client.
  - Describes the new cancel client ID function that allows the client to request to cancel the client ID at connection time to avoid duplicate client conditions.
  - Lists the KeepAlive value along with the existing list of TCP/IP settings.
  - Describes the new Port Message Edit exit routine and also describes how to configure IMS Connect to call this exit routine.
  - Describes the MAXSOC warning message (HWSS0772W) that appears when the number of sockets increases to a certain percentage of the MAXSOC limit.

The operations and automation information is updated to describe how to create and alter automation programs that examine the VIEWHWS and VIEWPORT command output.

Impact to programming for IMS

These enhancements does not affect programming for IMS.

Impact to troubleshooting for IMS

The BPE trace information is enhanced to describe the BPE Direct External Trace facility.

The following messages are modified to support these enhancements: HWSC0001I, HWSP1410W, and HWSX0909E.

The following messages are added to support these enhancements:

HWSS0743W
A previous instance of a session having the same client ID was terminated.

HWSS0772W
The number of sockets are nearing the MAXSOC limit.

HWSS0773W
The number of sockets has decreased below the warning level to the reset level.

HWSX0908
The exit specified is not supported.

For a complete list of the new, changed, and deleted messages and abends for IMS Version 11, see Chapter 6, "New, changed, and deleted messages and abend codes," on page 109.

Impact to IMS reference information

Impact to commands

The information pertaining to the output of the following commands is modified to include information about the SUPER MEMBER NAME field:

- QUERY DATASTORE
- QUERY MEMBER
- VIEWDS
- VIEWHWS

The VIEWHWS and QUERY MEMBER commands are updated to support summaries instead of listing each individual client for the ports. The data store name on the client output for the ports is added to indicate the IMS that the transaction was routed to.

Impact to exit routines

The existing information about the HWSSMPL0, HWSSMPL1, and HWSJAVA0 exit routines is modified to include information about the ability to code user-defined messages.

A new topic is added that contains the reference information associated with the new Port Message Edit exit routine.

Impact to utilities

These enhancements do not affect utilities.

Chapter 13. Open Database enhancements

Distributed Java application programs in TCP/IP environments can use the new IMS Universal drivers to access any database that is managed by IMS DB on any logical partition (LPAR) in an IMSplex. User-written IMS Connect client application programs and user-written Open Database Manager (a new Common Service Layer address space) client application programs can access these databases.

Java application programs can access databases that are managed by IMS DB by using any one of three new drivers:

- The IMS Universal Database resource adapter - A JCA-compliant API that provides all the services that the JEE platform provides, including connection, transaction, and security management
- The IMS Universal JDBC driver - A JDBC driver that supports access to IMS data by using SQL calls
- The IMS Universal DL/I driver - An IMS-specific Java application programming interface (API) for DL/I that can access IMS data by using Java methods that are based on IMS DL/I semantics

All of the IMS Universal drivers support type-4 connectivity: the drivers can run on any platform that supports TCP/IP and a Java Virtual Machine (JVM).

Type-2 connectivity (access from the z/OS platform and runtime environments on the same logical partition - LPAR) is delivered through the IMS service process. The IMS type-2 Universal drivers are a set of SMP/E-installable Java drivers and are built on industry standards and open specifications. Java applications that use the IMS type-2 Universal drivers must reside on the same logical partition (LPAR) as the IMS subsystem.

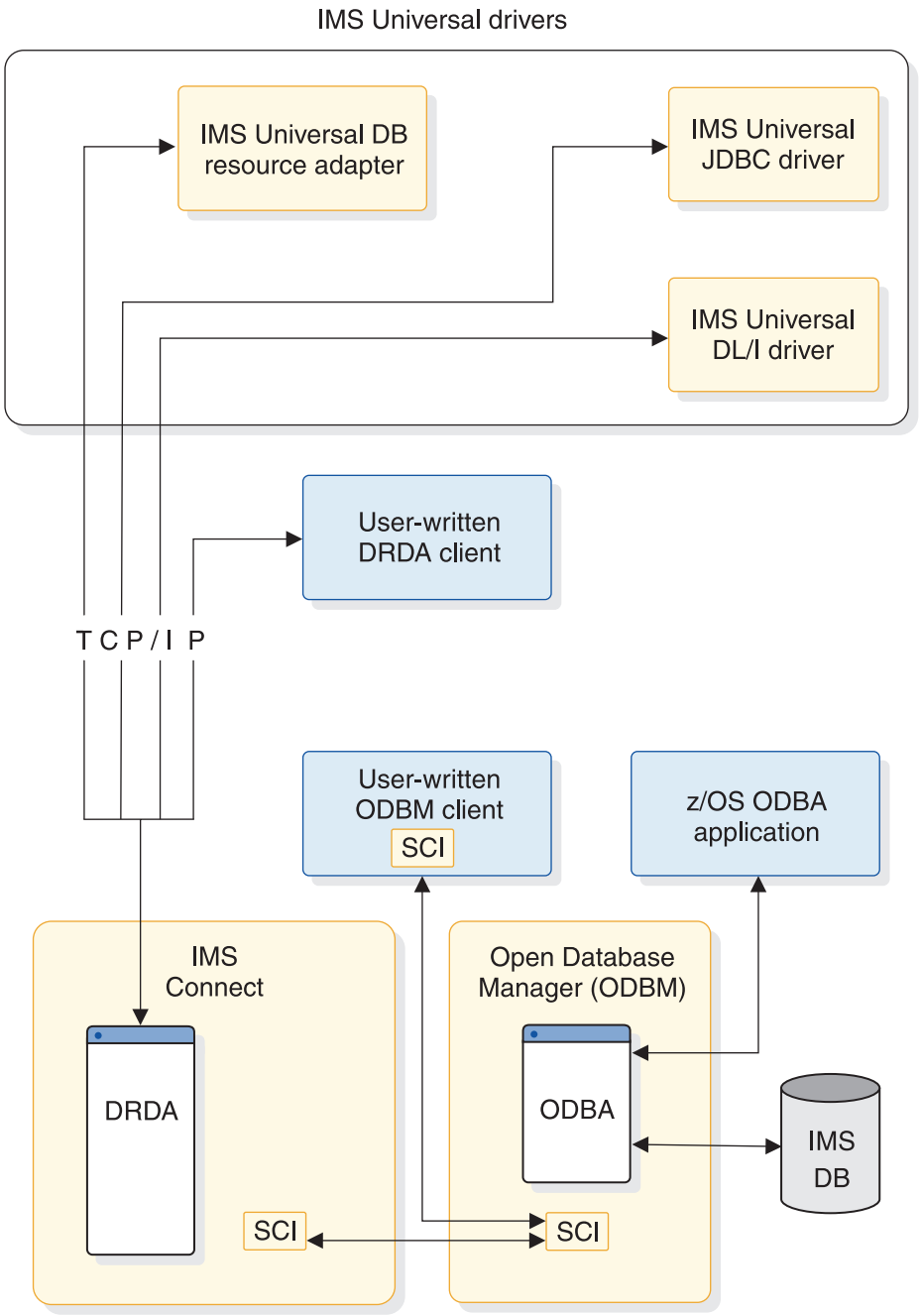
In addition to type-2 connectivity, the 2_CTX connectivity type is supported by the IMS Universal Database resource adapter running on WebSphere Application Server for z/OS. With 2_CTX connectivity, applications using the IMS Universal Database resource adapter do not issue commit or rollback calls. Instead, transaction processing is managed by WebSphere Application Server for z/OS.

Support for Java applications that run on IBM CICS Transaction Server for z/OS that access IMS databases by using type-2 connectivity is delivered by APAR/PTF PM38666/UK73379.

The new drivers access IMS from TCP/IP-enabled environments through IMS Connect. This connection is based on the open standard Distributed Relational Database Architecture (DRDA) specification and the distributed data management (DDM) Architecture commands. While the use of DRDA and DDM is not exposed to users of the IMS Universal drivers, other users (such as independent software vendors) can write their own IMS Connect client applications by using DRDA and DDM.

Because the new IMS Universal drivers are built on widely used open-standard technologies, they can help speed application development and, along with IMS Connect and the new CSL Open Database Manager (ODBM), they can simplify connecting to and accessing IMS databases from many different operating environments.

The following figure shows the relationships between the Open Database components.



IMS Connect, which previously provided access to only IMS Transaction Manager (IMS TM), through Open Transaction Manager Access (OTMA), now also provides access to IMS Database Manager (IMS DB), through ODBM.

IMS Connect can also provide workload distribution by routing database connection requests to ODBM based on an alias name that is submitted by the client application program. To the client application, the alias name represents the IMS system, or data store, to which the application program connects. Depending on the value of the alias name submitted, IMS Connect either routes the incoming

connection request to a specific ODBM instance or distributes the incoming connection request to any available instance of ODBM in an IMSplex.

ODBM routes the database connection requests received from IMS Connect to the IMS systems that are managing the requested database. Before establishing the connection to the IMS system, ODBM translates the incoming database requests from the DDM protocol submitted by the IMS-provided connectors and user-written DRDA applications into the DL/I calls expected by IMS. When ODBM returns the IMS output to the client, ODBM translates the response to the DDM protocol.

From the ODBM perspective, application programs that interact directly with ODBM, such as IMS Connect, are ODBM clients. Users can create their own ODBM clients by using the new ODBM CSLDMI API. ODBM client application programs can access databases that are managed by IMS DB on any LPAR in an IMSplex.

Existing ODBA applications (applications that use the AERTDLI interface) can also use ODBM to protect IMS from abends that are caused by the unexpected termination of the ODBA applications during DL/I processing. ODBM support for ODBA application programs requires no changes to the application program, but does require minor changes to the DFSPRP macro, which defines the connections to IMS DB, and a recompile and rebinding of the DFS*xxxx*0 load module.

IMS Connect and ODBM support for the IMS Universal drivers and user-written IMS Connect DRDA client applications includes support for single-phase commit processing and two-phase commit processing.

In addition to the IMS Universal drivers, the IMS Java dependent region resource adapter can be used. This resource adapter provides the following functionality for Java applications running in JMP and JBP regions:

- Message queue access to read and write messages
- Program-to-program switching
- GSAM access
- CHKP-XRST support
- DB2 for z/OS interoperability

Migration considerations

You can modify your existing ODBA application servers to use ODBM by adding the IMSPLEX and ODBMNAME keywords to the DFSPRP macro. After adding these keywords, you must recompile and rebind the DFS*xxxx*0 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.

To use ODBM with WebSphere Application Server for z/OS applications, you must use the new IMS Universal Database resource adapter.

For more information about migrating Java applications to use the new IMS Universal drivers, see "Java class libraries for IMS migration considerations" on page 69.

Coexistence considerations

The IMS Universal drivers can be used by distributed Java applications that access IMS Version 9 or IMS Version 10 databases as long as the IMS Version 9 or IMS Version 10 systems are part of a mixed-version IMSplex that includes an IMS Version 11 system (along with its ODBM and IMS Connect address spaces) and the appropriate coexistence APARs/PTFs are installed. The coexistence APARs/PTFs are:

- IMS Version 9: PK66020/UK42176
- IMS Version 10: PK66022/UK42410

IMS Version 9 or IMS Version 10 ODBA applications can use the IMS Version 11 ODBA interface as long as the aforementioned coexistence APARs/PTFs are installed on the IMS Version 9 or IMS Version 10 system. Optionally, the IMS Version 9 and 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.

Log record changes

None.

New and changed concepts

IMS Connect now provides access to both IMS TM (through OTMA) and IMS DB (through ODBM). Prior to IMS Version 11, IMS Connect provided access only to IMS TM.

Users can write client applications for IMS Connect that use the DRDA specification.

New and changed terms

Open Database Manager (ODBM)
A CSL address space that manages connections to databases in an IMSplex that are managed by IMS DB in DBCTL and DB/TM IMS systems.

IMS Universal drivers
A set of Java class libraries delivered with IMS Version 11 that support database access using the open standard Distributed Relational Database Architecture (DRDA) specification and the Distributed Data Management (DDM) Architecture commands.

Requirements

- The Open Database enhancements require the following IMS components:
  - The following Common Service Layer (CSL) components:
    - Operations Manager (OM)
    - Structured Call Interface (SCI)

- Open Database Manager (ODBM)
  - IMS Connect
- If the IMS Universal drivers will be used in managed mode, an application development environment is required, such as IBM Rational Developer for System z or later.
- Java application programs that use the IMS Universal drivers require IBM 31-bit SDK for z/OS, Java 2 Technology Edition, Version 5 (JDK 5.0), as well as a tool to generate the IMS database metadata, such as the IMS Enterprise Suite DLIModel utility plug-in.
- The software requirements for application programs that use the IMS Universal drivers and the other IMS solutions for Java development are discussed in "Java application program support in IMS Version 11" on page 31.

Restrictions

The following restrictions apply to the IMS Universal drivers:

DriverType=2

- BeanManaged beans where commit and rollback calls are made through the PSB, Connection, or LocalTransaction interfaces are not supported.
- The UserTransaction interface is not supported.
- XA is not supported.

DriverType=2_CTX

- Application programs cannot issue local commit and rollback calls through either the JDBC Connection interface or the CCI LocalTransaction interface.
- XA is not supported.

Impact to installing and defining IMS

The IMS Installation Verification Program (IVP) is enhanced in the following ways:

- New sample applications are delivered with the IMS IVP.
- The general variables are updated.
- The O series of steps for the Common Service Layer are updated to include the new Open Database Manager (ODBM) address space.

The IMS system definition information is updated in the following ways:

- An ODBM BPE configuration PROCLIB member is added. This PROCLIB member defines the BPE execution environment settings for ODBM, such as tracing, language, and statistics time interval settings.
- An ODBM BPE exit list PROCLIB member is added. This PROCLIB member defines the ODBM user exit routines to BPE.
- The new CSLDIxxx ODBM initialization member is added. This PROCLIB member specifies parameters that relate to initializing the ODBM address space, such as:
  - Whether the z/OS Automatic Restart Manager (ARM) is used to restart the ODBM address space after an abend
  - Whether ODBM registers with z/OS Recovery Resource Services (RRS) and uses the ODBA API or does not register with RRS and uses the DRA API instead
  - The name for the ODBM address space

  - The suffix (xxx) for the ODBM configuration PROCLIB member
  - The IMSplex name
- The new CSLDCxxx ODBM configuration member is added. This PROCLIB member specifies the data store initialization parameters, which are either global and local.
  - The global parameters specify:
    - The number of times ODBM will attempt to connect to an IMS data store
    - The number of concurrent active threads
    - The time (in seconds) between attempts by ODBM to establish a connection to an IMS data store
    - The number of Fast Path normal buffer allocation (NBA) and overflow (OBA) buffers
  - The local parameters specify:
    - The name of the ODBM address space
    - The name of the IMS data store
    - The name of the alias for the IMS data store
    - Other optional parameters that override certain global parameters
- The new CSLODBM procedure is added.
- The new ODBM execution parameters are added. These execution parameters specify:
  - The name for the ODBM BPE configuration PROCLIB member
  - The name of the module that contains the ODBM start up values
  - The suffix for the ODBM initialization parameters PROCLIB member
  - Whether or not z/OS ARM should restart the ODBM address space after an abend
  - Whether ODBM is to use the ODBA or the DRA interface
  - The name of the ODBM address space
  - The suffix for the ODBM configuration PROCLIB member
- The ODACCESS statement is added to the IMS Connect configuration member (HWSCFGxx). In this statement, you can specify the DRDA ports, whether or not IMS Connect will register with current and future ODBM address spaces in the IMSplex, a timeout value to wait for an ODBM response, and the IMSplex to use for communicating with ODBM.
- The DFSPRP macro is updated to include the new IMSPLEX and ODBMNAME parameters.
- The sequence for starting CSL address spaces is updated.

For more information about the IVP, see the *IMS Version 11 Installation*.

For more information about system definition, see the *IMS Version 11 System Definition*.

Impact to administering IMS

The following communications and connections topics are updated with information about the Open Database enhancements:

- Overview of IMS Connect
- IMS Connect client support
- External Java environment connections

- The Java class libraries for IMS
- The IMS Universal drivers: configuring connections to IMS
- IMS Connect exit routines
- IMS Connect support for IMSplex and shared queues
- IMS Connect support for IMSplex
- IMSplex support environment
- Installing IMSplex support
- Message structures and IMS Connect user message exit routines
- IMS Connect two-phase commit support
- IMS Connect protocols
- Accessing IMS databases through the ODBA interface

The following operations and automation topics are updated with information about the Open Database enhancements:

- Starting or restarting IMS
- Starting the CSL address spaces
- Using the z/OS Automatic Restart Manager
- Shutting down IMS
- Stopping the CSL Manager address spaces
- Reconnecting CCTLs or ODBA application programs

The following system administration topics are updated with information about the Open Database enhancements:

- IMSplex overview
- IMS components and system services that are part of an IMSplex
- Defining and tailoring an IMSplex
- Common Service Layer overview
- CSL managers
- Configuring an IMSplex with CSL
- CSL administration
- CSL ODBM administration
- Starting the CSL
- Shutting down the CSL
- Using the z/OS Automatic Restart Manager with the CSL
- Updating the IBM-supplied Program Properties Table
- Modifying and controlling system resources

Impact to programming for IMS

The following application programming topics are updated to support the Open Database enhancements:

- Comparison of programmatic approaches for accessing IMS databases
- Introduction to the Java class libraries for IMS
- Application programming for IMS DB
- Java application programming for IMS
- Your program's view of the data
- Accessing databases with your IMS application program

  - Accessing IMS data by using DRDA DDM commands
  - Accessing IMS data by using the IMS Universal Database resource adapter
  - Accessing IMS data with SQL calls that use the IMS Universal JDBC driver data
  - Accessing IMS data with the IMS Universal DL/I driver by using Java methods that are based on IMS DL/I semantics
- Batch processing online: batch-oriented BMPs
- Testing an IMS application program
- Writing an ODBA application program
- Testing an ODBA application program

Impact to troubleshooting for IMS

Many new messages are added that support the Open Database enhancements.

For a complete list of the new, changed, and deleted messages and abends for IMS Version 11, see Chapter 6, "New, changed, and deleted messages and abend codes," on page 109.

Impact to IMS reference information

The following reference topics are updated to support the Open Database enhancements:

Impact to commands

The following IMS Connect commands are new:

SETOAUTO
: Sets the auto connection function on or off. This option can also be specified in the IMS Connect configuration member (HWSCFGxx).

STARTOD *odbmname*
: Starts the connection to the specified ODBM.

STOPOD *odbmname*
: Stops the connection to the specified ODBM.

STOPOD *odbmname*
: Sets the specified alias to "active" so that IMS Connect can route work to it.

STOPIA *aliasname odbmname*
: Sets the specified alias to "not active" so that IMS Connect will not route work to it.

VIEWIA *aliasname odbmname*
: Displays a list of aliases known to IMS Connect and also displays their status.

The following type-2 IMS commands are new:

QUERY ALIAS NAME() ODBMNAME**()**
: Displays a list of aliases known to IMS Connect and also displays their status.

QUERY ODBM TYPE**(***option***)**
: Displays information about an ODBM, such as:

- An ODBM data store alias and its status
- The CSLDCxxx configuration PROCLIB member
- An ODBM data store and its associated resources
- An ODBM client
- ODBM threads
- ODBM traces

UPDATE ALIAS NAME() ODBMNAME() START(ROUTE)
: Sets the specified alias to "active" so that IMS Connect can route work to it.

UPDATE ALIAS NAME() ODBMNAME() STOP(ROUTE)
: Sets the specified alias to "not active" so that IMS Connect will not route work to it.

UPDATE MEMBER TYPE(IMSCON) SET(OAUTO(ON|OFF))
: Sets the auto connection function on or off. This option can also be specified in the IMS Connect configuration member (HWSCFGxx).

UPDATE ODBM NAME(odbmname) START(COMM)
: Starts the connection to the specified ODBM.

UPDATE ODBM NAME(odbmname) STOP(COMM)
: Stops the connection to the specified ODBM.

UPDATE ODBM START(TRACE)
: Starts an ODBM trace.

UPDATE ODBM STOP(TRACE)
: Stops an ODBM trace.

UPDATE ODBM START(CONNECTION)
: Starts data store or alias connections to ODBM.

UPDATE ODBM STOP(CONNECTION)
: Stops data store or alias connections to ODBM.

UPDATE ODBM TYPE(CONFIG)
: Updates the current ODBM configuration.

The following type-1 IMS Connect commands are updated:

VIEWDS *odbmname*
: Displays the status of a specific ODBM.

VIEWHWS
: Displays the ODACCESS configuration values and the status of the ODBMs to which IMS Connect is connected.

VIEWPORT *portname*
: Displays information about a specific port.

Impact to exit routines

The following exit routines are new to IMS Connect:

IMS Connect DB Routing user exit routine (HWSROUT0)
: Overrides the ODBM target that IMS Connect selected to send a message.

IMS Connect DB Security user exit routine (HWSAUTH0)
: Performs the authentication of the user ID.

New event records that relate to the Open Database enhancements are added to IMS Connect. These event records can be processed by the IMS Connect Event Recorder exit routine (HWSTECL0).

The following IMS exit routines are new:

CSL ODBM Initialization and Termination user exit routine
Called when an ODBM address space or IMSplex initializes or terminates.

CSL ODBM Input user exit routine
Called when ODBM receives a call to the ODBM callable interface.

CSL ODBM Output user exit routine
Called when ODBM returns the results from a call to the ODBM callable interface.

CSL ODBM Client Connect and Disconnect user exit routine
Called when a client registers to or de-registers from ODBM.

Impact to utilities

None.

Chapter 14. OTMA CM0 timeout enhancement

The OTMA CM0 timeout enhancement enables the detection of a hang condition in OTMA transaction pipe and the rerouting of commit mode 0 (commit-then-send) transactions to a timeout message queue so that the remainder of the I/O PCB output on the transaction pipe can continue to flow normally.

If a TCP/IP client programming error or a network failure occurs, the expected acknowledgement of an OTMA output message might not be received by IMS. If a client application receives a commit-then-send (CM0) output message from an OTMA transaction pipe (Tpipe) and fails to respond with an acknowledgement message (ACK), the Tpipe in IMS hangs and the subsequent output cannot be delivered. In IMS Version 11, IMS detects this hang condition and reroutes the CM0 output message on the hung Tpipe to a timeout message queue. After the message is rerouted, messages on the Tpipe can continue to flow without hanging.

The CM0 ACK timeout action can vary, and is based on the type of OTMA clients:

- For an OTMA client that does not support the hold queue (such as WebSphere MQ), the timed-out CM0 output message is moved to a timeout Tpipe that can be specified during the OTMA client bid request. If a name is not specified, the message is moved to the default timeout Tpipe, DFS$$TOQ.
- For an OTMA client that supports the hold queue (such as IMS Connect), the timed-out CM0 output message is rerouted to a Tpipe hold queue. If the input CM0 message specifies a reroute Tpipe name, OTMA reroutes the timed-out message to the specified reroute Tpipe hold queue. If the input CM0 message does not specify a reroute Tpipe name, OTMA reroutes the message to the hold queue of the timed-out Tpipe if specified in the client bid request. If the input CM0 message does not specify a name, OTMA reroutes the default timeout Tpipe, DFS$$TOQ.

  Output messages that are queued to a hold queue can be retrieved by a Resume TPIPE call from a client. After a client retrieves an OTMA CM0 output message from a hold queue, the client must return an acknowledgement message to OTMA. Failure to send the acknowledgement for the hold queue output also triggers a timeout action.

  If a timeout occurred on a ACK or NAK of a Resume TPIPE output, the output is rerouted based on the reroute tpipe name specified or the default DFS$$TOQ Tpipe. Subsequent messages for the Resume TPIPE are not sent until a new Resume TPIPE request is received.

This timeout function is enabled automatically when the IMS system is started, with the default timeout value of 120 seconds. To change the timeout value, you can use the /START TMEMBER TIMEOUT command, modify the OTMA descriptor member DFSYDTx, or use the client bid request to specify a timeout value. An input CM0 transaction message can also specify a message-level timeout value for the CM0 output message. Both the /START TMEMBER TIMEOUT command and the OTMA descriptor member, DFSYDTx, can be used to disable the timeout function.

Migration considerations

No impact.

Coexistence considerations

No impact.

Log record changes

No impact.

New and changed concepts

No impact.

New and changed terms

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

Overview and guidance topics that discuss this enhancement are added to the communications and connections information. For details, see Timeout interval for acknowledgments to OTMA messages.

Impact to programming for IMS

This enhancement does not affect programming for IMS.

Impact to troubleshooting for IMS

Message DFS1284E is updated to include an explanation of a hung Tpipe and a possible reason for a delayed ACK/NAK sent to a timeout Tpipe.

The following two new informational messages are added:

DFS3494E
OTMA xxxx/yyy has timed out and output has been moved to zzzz.

DFS3495W
OTMA xxxx/yyyy has been waiting for an acknowledgement message (ACK) for more than zzzz seconds.

For a complete list of new, changed, and deleted messages, codes, and abends for IMS Version 11, see Chapter 6, “New, changed, and deleted messages and abend codes,” on page 109.

Impact to IMS reference information

Impact to commands

This enhancement does not affect commands.

Impact to exit routines

This enhancement does not affect exit routines.

Impact to utilities

This enhancement does not affect utilities.

Chapter 15. Transaction expiration enhancements

These enhancements enable you to set expiration values for transactions so that IMS can avoid processing transactions whose response is no longer needed.

In versions of IMS earlier than IMS Version 11, when IMS does not have the resources to process a transaction in the allotted time frame, the client application might time out the transaction call. This transaction request, however, might have been received by IMS, but by the time the transaction is processed and a reply is sent, the client application no longer requires the response message. IMS Version 11 provides the ability to specify a transaction expiration value for transactions, thus providing relief from having to process these unnecessary messages.

If an expiration value is set for a transaction, the value is checked in the following manner:

- For locally-processed messages, the expiration value on all messages is checked against the current time by IMS when an application issues its first Get Unique (GU) call to the IOPCB for each unit of work. If the time specified in the expiration value has passed, IMS discards the transaction. If the expiration time has not passed, the transaction is processed and the expiration value is not checked again.

  Two additional expiration checks are performed for transaction messages that come through OTMA: when OTMA first receives the message from the OTMA client (through XCF) and before OTMA enqueues the message to IMS.
- For messages, including OTMA messages, processed at a remote MSC location, the expiration value, as specified on the TRANSACT macro, the CREATE TRAN command, or the UPDATE TRAN command, is used for expiration checking when an application issues its first Get Unique (GU) call to the IOPCB for each unit of work. MSC compares the expiration value against the time when the message arrived at the remote MSC system. If the time specified in the expiration value has passed, MSC discards the transaction.

The transaction expiration value can be specified in the following ways:

- In the message prefix (for OTMA messages only)
- By using the following type-2 commands:

  CREATE TRAN

  CREATE TRANDESC

  UPDATE TRAN

  UPDATE TRANDESC
- At system definition time by specifying the EXPRTIME parameter in TRANSACT macro
- By using the Destination Creation exit routine (DFSINSX0) to include an expiration time in transactions it creates

The transaction expiration value that is specified in the OTMA message prefix has priority over the value specified by type-2 commands, which has priority over the value specified on the TRANSACT macro. If no value is specified for transaction expiration, there is no expiration checking for the transaction.

IMS Connect is enhanced to take advantage of the OTMA transaction expiration enhancement. For more information, see Chapter 12, “IMS Connect enhancements for IMS TM,” on page 143.

Migration considerations

For OTMA clients, such as IMS Connect that operates with IMS Version 10 and earlier, that do not specify the transaction expiration time in the OTMA prefix, only limited OTMA transaction monitoring can be activated in IMS Version 11. 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 TRANS or UPDATE TRANS SET(EXPRTIME(*seconds*)) commands.

Coexistence considerations

If the transaction expiration function is activated by OTMA clients, you must ensure that the target IMS is running IMS Version 11. If the target IMS is IMS Version 10 or earlier, the expiration request is ignored by IMS.

Log record changes

The transaction expiration time attribute, EXPRTIME, is logged in the X'22' log record for the CREATE and UPDATE commands so that it can be recovered across a warm and emergency restart, and also propagated to the XRF alternate system.

New and changed concepts

These enhancements do not introduce any new concepts.

New and changed terms

These enhancements do not introduce any new terminology.

Requirements

None.

Restrictions

The transaction expiration checking will not be performed at the GU time for Fast Path transactions, IMS conversational transactions, and program-to-program switch transactions.

Impact to installing and defining IMS

The new EXPRTIME keyword is added to the TRANSACT macro keywords and the equivalent, EXPRTIME(number), is added to the CREATE and UPDATE command keywords used in dynamic resource definition (DRD).

Impact to administering IMS

The communications and connections information is updated to include the two new flags that can be set in the state data prefix that pertain to transaction expiration.

Impact to programming for IMS

No impact.

Impact to troubleshooting for IMS

No impact.

Impact to IMS reference information

Impact to commands

The following commands are updated to include the new transaction attribute, EXPRTIME:

- CREATE TRAN
- CREATE TRANDESC
- QUERY TRAN
- QUERY TRANDESC
- UPDATE TRAN
- UPDATE TRANDESC

Impact to exit routines

The Destination Creation exit routine (DFSINSX0) is updated to be able to include an expiration time in transactions it creates.

Impact to utilities

No impact.

Chapter 16. IMS TM command enhancements

IMS Version 11 introduces nine new IMS type-2 commands that support IMS TM in general.

The new type-2 commands affect two areas of IMS: IMS TM in general and OTMA specifically. Like the other existing IMS type-2 commands, these new commands must be issued through the Operations Manager (OM) API or the REXX SPOC API, using a single point of control (SPOC) application, such as the Batch SPOC, the TSO SPOC, the IMS Control Center, or user-written SPOC.

Four of the new commands extend the functionality of existing type-1 commands to logical terminal, node, user, and user ID resources in an IMSplex environment. Five of the new commands provide users with the ability to monitor the workload of OTMA messages and dynamically change the routing of messages without an IMS restart.

New IMS TM type-2 commands

The new IMS TM type-2 QUERY commands are an alternative, not a replacement, for existing type-1 commands. The new commands enable you to manage your IMSplex environment more efficiently.

The new IMS TM type-2 QUERY commands and their usage are:

- QUERY LTERM - used to query logical terminal (LTERM) information
- QUERY NODE - used to query VTAM node or terminal information
- QUERY USER - used to query ETO user or ISC subpool information
- QUERY USERID - used to query user ID information

The diagnostic information that can be generated by using a single IMS TM type-2 command is comparable to the diagnostic information that can be generated by consolidating the output of several existing type-1 commands. In general, equivalent type-1 and type-2 commands operate in the same manner.

If IMS sysplex terminal management is not enabled (STM=NO is specified in the DFSDCxxx PROCLIB member), command processing is local for each system and the results of type-1 and type-2 commands are similar.

If IMS sysplex terminal management is enabled (STM=YES is specified in the DFSDCxxx PROCLIB member), type-1 and type-2 command processing is similar when displaying local information, but the commands differ in how they display global information:

- For type-1 /DISPLAY commands with IMS sysplex terminal management enabled, the command master displays information from either the resource structure or the local system, but not both. If the resource being displayed is not owned by any system or is owned by the command master, the command master displays the global resource. However, if the resource is owned by a system other than the command master, the command master displays only the local resource, and the owning system is responsible for displaying the global resource.
- For type-2 QUERY commands with IMS sysplex terminal management enabled, the command master is the only system that displays global resource

information, regardless of whether the resource is owned. In addition, the command master displays local resource information. All other IMS systems that process the command display local resource information only. This approach allows more flexibility in displaying all information in an IMSplex.

New OTMA type-2 commands

The five new OTMA type-2 commands and their usage are:

- QUERY OTMATI - used to monitor OTMA message workload.
- CREATE OTMADESC - used to create a new OTMA message routing descriptor.
- UPDATE OTMADESC - used to modify an existing destination routing descriptor.
- DELETE OTMADESC - remove an existing destination routing descriptor.
- QUERY OTMADESC - used to display the characteristics of a specific destination routing descriptor.

The OTMA type-2 QUERY OTMATI command for monitoring workload enables you to view a summary of the number of messages in the OTMA send-then-commit (CM1) message queue. You can retrieve this information by issuing the command QUERY OTMATI and include parameters to filter the result information. If the SHOW parameter is used, the individual characteristics of each transaction instance block are displayed. You can view the length of time that a transaction instance has been in existence and the correlation ID of the input message. This information can help you determine if there are problems in processing OTMA input messages.

Prior to IMS Version 11, if you wanted to make changes to the destination routing descriptors you had to wait for a scheduled outage or for IMS to be restarted. The OTMA type-2 commands for destination routing descriptors allow you to change the descriptors dynamically without interruption to a running IMS instance. You can dynamically add, update, delete and query destination routing descriptors while IMS is actively running by issuing these commands: CREATE OTMADESC, UPDATE OTMADESC, DELETE OTMADESC, and QUERY OTMADESC.

Recommendation: Update the descriptors in the DFSYDTx PROCLIB member with any changes or additions that are made online with the CREATE or UPDATE commands. The online changes are retained across IMS warm starts and emergency restarts, but not across a cold starts. The changes made by the type-2 commands are not automatically stored in the DFSYDTx PROCLIB member.

In IMS Version 10, the definition of destination routing descriptors in the DFSYDTx PROCLIB member data set had to be entered in a specific order. In IMS Version 11, you no longer have to be concerned with order. You can input the entries in any order.

Migration considerations

Because the new type-2 commands require some form of an IMSplex configuration, if your existing IMS is not configured as an IMSplex, you must configure it in this way before you can use these commands. If you are moving to an IMSplex configuration, you also must plan for how you are going to issue the type-2 commands because they must be issued from an automated operator application program, such as the TSO single point of control (SPOC) that is shipped with IMS.

Coexistence considerations

The new type-2 commands work only with IMS Version 11.

The IMS TM type-2 QUERY commands are alternatives, not replacements, for several existing type-1 commands. Both type-1 and type-2 commands are supported in IMS Version 11 and can coexist each other. No changes are made to the existing type-1 commands.

Log record changes

The OTMA type-2 commands introduces the following new log records: X'221B' (for create, update, and delete records) and X'4035' (for checkpoint records).

New and changed concepts

No impact

New and changed terms

No impact

Requirements

Issuing type-2 commands requires a Common Service Layer with a minimum of an OM and SCI.

Restrictions

No impact

Impact to installing and defining IMS

The system definition information is updated to describe how OTMA type-2 commands can be used to dynamically create, delete, update, and query destination routing descriptors.

Impact to administering IMS

The communications and connections information is updated to discuss using the new QUERY commands to manage LTERMs, nodes, users, and user IDs in the context of ETO and VTAM.

Information is added to the operations and automation information that describes:

- The new RACF definitions that are needed in OM for each of the new QUERY commands.
- How the QUERY OTMATI command can be used to analyze performance in OTMA message routing.

The system administration information is updated to include topics that describe using the new QUERY commands to monitor an IMSplex.

Impact to programming for IMS

These enhancements do not affect programming for IMS.

Impact to troubleshooting for IMS

The diagnostic information is updated to describe the following new log records: X'221B' (for create, update, and delete records) and X'4035' (for checkpoint records).

Impact to IMS reference information

Impact to commands

Reference and usage information is added for the following new type-2 commands:

- CREATE OTMADESC - used to create a new OTMA message routing descriptor.
- DELETE OTMADESC - used to remove an existing destination routing descriptor.
- QUERY LTERM - used to query logical terminal (LTERM) information.
- QUERY NODE - used to query VTAM node or terminal information.
- QUERY OTMADESC - used to display the characteristics of a specific destination routing descriptor.
- QUERY OTMATI - used to monitor OTMA message workload.
- QUERY USER - used to query ETO user or ISC subpool information.
- QUERY USERID - used to query user ID information.
- UPDATE OTMADESC - used to modify an existing destination routing descriptor.

Impact to exit routines

These enhancements do not affect exit routines.

Impact to utilities

These enhancements do not affect utilities.

Chapter 17. User exit enhancements

Before IMS Version 11, when exit routines needed to be modified or brought online, IMS had to be stopped and restarted before it would recognize the changed or new exit routines. The user exit enhancements solve this problem for certain exit types with the new REFRESH USEREXIT command. User exit enhancements also include the new QUERY USEREXIT command (to query information about exit routines). In addition, three new exit routine types (with sample exit routines) are delivered through the IMS Version 11 service process.

The user exit enhancements include the following new functions in IMS Version 11:

- A way to refresh certain exit routines online by using the new REFRESH USEREXIT command.

  Use the type-2 REFRESH USEREXIT command to bring new or modified exit routines online (and delete the old exit routines) without stopping and restarting IMS. After the new or modified exit routines are online, any subsequent calls to those exit types will result in the execution of the new or modified exit routines. Only exit types that are specified on the TYPE parameter in the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set are eligible for refreshing.

  As part of processing the REFRESH USEREXIT command, IMS loads the new or modified exit routines and brings them online before deleting the old exit routines. If there is a failure in processing the command, the old exit routines remain online and are not deleted.
- A way to query information about certain exit routines by using the new QUERY USEREXIT command.

  Use the type-2 QUERY USEREXIT command to display information about the exit routines that are defined in the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set. Information about exit routines that are not specified in the <USER_EXITS> section of the DFSDFxxx member is not displayed in the output of the QUERY USEREXIT command.

  The output from this command can show:
  - A completion code for the line of output.
  - The IMSplex member name that built the output line.
  - The exit routine type, as requested in the command.
  - The exit routine module name.
  - The number of active instances of the exit routine.
  - The number of calls to the exit routine since the last refresh.
  - The entry point for the exit routine.
  - The total time the exit routine was used since the last refresh.
  - The load point of the exit routine.
  - The time that the exit routine module was last refreshed.
  - The hexadecimal size of the exit routine.
  - 32 bytes from this exit routine module (starting at offset +04 from the entry point) that is translated into EBCDIC. This location is a common place for module identification information.
- Three new exit types:

Initialization/Termination exit type
The Initialization/Termination exit type is called early in IMS initialization, during normal and abnormal IMS termination, and after the successful refresh of a user exit type. This exit type is available for the following IMS control region types: DB/DC, DBCTL, DCCTL, and FDBR. A sample Initialization/Termination exit routine is shipped with IMS Version 11.

IMS CQS Event exit type
The IMS CQS Event exit type is called when IMS processes a CQS event. This exit type is available to an IMS control region that registers with CQS, which can be in either a DB/DC or DCCTL configuration. A sample CQS Event exit routine is shipped with IMS Version 11.

IMS CQS Structure Event exit type
The IMS CQS Structure Event exit type is called when IMS processes a CQS structure event after IMS is notified about the event from a CQS-driven Structure Event exit routine. This exit type is available to an IMS control region that registers with CQS, which can be in either a DB/DC or DCCTL configuration. A sample IMS-driven CQS Structure Event exit routine is shipped with IMS Version 11.

- The ability to define multiple exit routines for the three new exit types, as well as the Restart Exit type that was introduced in IMS Version 10.
- Enhancements to the standard user exit parameter list (SXPL).

  The SXPL is enhanced with new fields that contain a pointer to:
  - A 256-byte static work area that is assigned to each exit routine.
  - A 4-byte field that contains the version of IMS that is calling the exit routine.
  - A 4-byte field that contains the 4-character IMS ID.
  - A 4-byte field that contains the 8-character recoverability resource name (RSENAME) as set in the DFSHSBxx member of the IMS PROCLIB data set (if one is specified).
  - A 4-byte field that contains a byte in storage that indicates if the next exit routine should be called.
  - A 4-byte field that contains the address of a word in storage that is used for communication to the user exit.
- A new X'17' subcode that contains relevant data about the new exit routines is added to the X'45' statistics log record.

Migration considerations

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 these enhancements by using the new version of the SXPL and by being specified on the EXITDEF parameter.

If an exit routine is using a specific version of the SXPL in order to use a particular function provided in that version, the exit routine should be modified to use 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 use an SXPL version of 5 or higher, rather than explicitly use a version 5 SXPL.

Coexistence considerations

There are no coexistence considerations. The functions introduced by these enhancements can be used only by IMS Version 11 systems.

Log record changes

A new X'17' subcode that contains relevant data about the new exit routines is added to the X'45' statistics log record.

New and changed concepts

None.

New and changed terms

None.

Requirements

Before issuing the new REFRESH USEREXIT or QUERY USEREXIT commands, the exit routines that these commands work with must be listed in the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set.

Exit routines must ensure that the SXPL is version 6 or later before they use the new fields.

Restrictions

None.

Impact to installing and defining IMS

The following exit types are added to the TYPE= parameter of the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set:

INITTERM
: Initialization/Termination exit type

ICQSEVNT
: IMS CQS event exit type

ICQSSTEV
: IMS CQS structure event exit type

PPUE Partner Product exit type

Impact to administering IMS

Information is added about providing security for the two new type-2 commands: QUERY USEREXIT and REFRESH USEREXIT.

Impact to programming for IMS

These enhancements do not affect application programming for IMS.

Impact to troubleshooting for IMS

The new X'17' subcode that contains relevant data about the new exit routines is added to the X'45' statistics log record. The new log record is mapped in the DFSL4517 macro.

Messages DFS4570E and DFS4571E are changed as a result of these enhancements.

New messages DFS4572E, DFS4573E, and DFS4574E are introduced by these enhancements.

Abend code 0017 is enhanced with information that pertains to these enhancements.

For a complete list of the new, changed, and deleted messages and abends for IMS Version 11, see Chapter 6, "New, changed, and deleted messages and abend codes," on page 109.

Impact to IMS reference information

Impact to commands

The new type-2 QUERY USEREXIT command is added, which enables users to display information about the exit routines that are specified in the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set. The output from this command can show:

- A completion code for the line of output.
- The IMSplex member name that built the output line.
- The exit routine type, as requested in the command.
- The exit routine module name.
- The number of active instances of the exit routine.
- The number of calls to the exit routine since the last refresh.
- The entry point for the exit routine.
- The total time the exit routine was used since the last refresh.
- The load point of the exit routine.
- The time that the exit routine module was last refreshed.
- The hexadecimal size of the exit routine.
- 32 bytes from this exit routine module (starting at offset +04 from the entry point) that is translated into EBCDIC. This location is a common place for module identification information.

The new type-2 REFRESH USEREXIT command is added, which enables you to bring new or modified exit routines online without requiring to stop and restart IMS. The only exit routines that are eligible for this refresh function are those that are specified in the <USER_EXITS> section of the DFSDFxxx member of the IMS PROCLIB data set.

Impact to exit routines

A table is added that describes the new Version 6 standard user exit parameter list (SXPL), which has new fields that contain a pointer to:

- A 256-byte static work area that is assigned to each exit routine.

- A 4-byte field that contains the version of IMS that is calling the exit routine.
- A 4-byte field that contains the 4-character IMS ID.
- A 4-byte field that contains the 8-character recoverability resource name (RSENAME) as set in the DFSHSBxx member of the IMS PROCLIB data set (if one is specified).
- A 4-byte field that contains a byte in storage that indicates if the next exit routine should be called.
- A 4-byte field that contains the address of a word in storage that is used for communication to the user exit.

The following three new exit routines are added:

Initialization/Termination exit
The Initialization/Termination exit type is called early in IMS initialization, during normal and abnormal IMS termination, and after the successful refresh of a user exit type. This exit type is available for the following IMS control region types: DB/DC, DBCTL, DCCTL, and FDBR.

IMS CQS Event exit
The IMS CQS Event exit type is called when IMS processes a CQS event. This exit type is available to an IMS control region that registers with CQS, which can be in either a DB/DC or DCCTL configuration.

IMS CQS Structure Event exit
The IMS CQS Structure Event exit type is called when IMS processes a CQS structure event after IMS is notified about the event from a CQS-driven Structure Event exit routine. This exit type is available to an IMS control region that registers with CQS, which can be in either a DB/DC or DCCTL configuration.

The attributes of the Product Partner exit (DFSPPUE0) are changed.

Impact to utilities

The KBLA utilities do not support the new X'17' subcode of the X'45' statistics log record.

Part 3. IBM DB2 and IMS Tools support for IMS Version 11

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 11.

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 11.

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 18. 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 210
- "IBM IMS High Performance Image Copy for z/OS, V4.2" on page 187
- "IBM IMS High Performance Load for z/OS, V2.1" on page 210
- "IBM IMS High Performance Pointer Checker for z/OS, V3.1" on page 211
- "IBM IMS High Performance Prefix Resolution for z/OS, V3.1" on page 211
- "IBM IMS High Performance Unload for z/OS, V1.2" on page 211
- "IBM IMS Index Builder for z/OS, V3.1" on page 187
- "IBM IMS Library Integrity Utilities for z/OS, V2.1" on page 212

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 187
- "IBM IMS Library Integrity Utilities for z/OS, V2.1" on page 212

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 197
- "IBM IMS Performance Analyzer for z/OS, V4.3" on page 198
- "IMS Problem Investigator for z/OS, V2.3" on page 198

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 187
- "IBM IMS Index Builder for z/OS, V3.1" on page 187

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 19. 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 not abend 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 20. 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 187
- "IBM IMS Index Builder for z/OS, V3.1" on page 187

Program number: 5655-V86

Chapter 21. 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

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 22. 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 increases 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 23. 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, V9.5

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-Datacom and CA-IDMS databases all without mainframe programming.

Program number 5655-R52

InfoSphere IMS Replication for z/OS, V10.1

IBM InfoSphere IMS Replication for z/OS helps increases 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 24. 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 197
- "IBM IMS Performance Analyzer for z/OS, V4.3" on page 198
- "IMS Problem Investigator for z/OS, V2.3" on page 198

Program number: 5655-S42

Chapter 25. 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 26. 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 27. 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

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:

Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS

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

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:

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 28. 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 29. 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 to 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 182 (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 210
- "IBM IMS High Performance Image Copy for z/OS, V4.2" on page 187
- "IBM IMS High Performance Load for z/OS, V2.1" on page 210
- "IBM IMS High Performance Pointer Checker for z/OS, V3.1" on page 211
- "IBM IMS High Performance Prefix Resolution for z/OS, V3.1" on page 211
- "IBM IMS High Performance Unload for z/OS, V1.2" on page 211
- "IBM IMS Index Builder for z/OS, V3.1" on page 187
- "IBM IMS Library Integrity Utilities for z/OS, V2.1" on page 212

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 187
- "IBM IMS Library Integrity Utilities for z/OS, V2.1" on page 212

Program number: 5655-W14

Chapter 30. Miscellaneous IBM tools that support IMS

Miscellaneous IBM tools that support IMS

The following IMS tools also support IMS Version 11:

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 11

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 31. 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 V11, see the IMS Enterprise Suite software requirement topic.

Related reference:

"IMS Enterprise Suite software requirements" on page 38

Chapter 32. IMS solutions for Java development

The IMS solutions for Java development allow you to write Java application programs that work with IMS. IMS Version 11 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 more information about how the three new IMS Universal drivers fit into the overall Open Database enhancements delivered with IMS Version 11, see Chapter 13, “Open Database enhancements,” on page 151.

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 33. 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.

In IMS Version 11, the IMS TM resource adapter has two main enhancements. The first is to take advantage of the Generated Client ID in IMS Connect, which ensures the uniqueness of each socket. The second is to add Message Format Services (MFS) Business Process Execution Language (BPEL) support.

Part 5. Appendixes

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Bibliography

This bibliography lists all of the publications in the IMS Version 11 library, supplemental publications, publication collections, and accessibility titles cited in the IMS Version 11 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 11 library

Title	Acronym	Order number
IMS Version 11 Application Programming	APG	SC19-2428
IMS Version 11 Application Programming APIs	APR	SC19-2429
IMS Version 11 Commands, Volume 1: IMS Commands A-M	CR1	SC19-2430
IMS Version 11 Commands, Volume 2: IMS Commands N-V	CR2	SC19-2431
IMS Version 11 Commands, Volume 3: IMS Component and z/OS Commands	CR3	SC19-2432
IMS Version 11 Communications and Connections	CCG	SC19-2433
IMS Version 11 Database Administration	DAG	SC19-2434
IMS Version 11 Database Utilities	DUR	SC19-2435
IMS Version 11 Diagnosis	DGR	GC19-2436
IMS Version 11 Exit Routines	ERR	SC19-2437
IMS Version 11 Installation	INS	GC19-2438
IMS Version 11 Licensed Program Specifications	LPS	GC19-2439
IMS Version 11 Master Index and Glossary	MIG	SC19-2440
IMS Messages and Codes, Volume 1: DFS Messages	MC1	GC18-9712
IMS Messages and Codes, Volume 2: Non-DFS Messages	MC2	GC18-9713
IMS Messages and Codes, Volume 3: IMS Abend Codes	MC3	GC18-9714
IMS Messages and Codes, Volume 4: IMS Component Codes	MC4	GC18-9715
IMS Version 11 Operations and Automation	OAG	SC19-2441
IMS Version 11 Release Planning	RPG	GC19-2442
IMS Version 11 System Administration	SAG	SC19-2443
IMS Version 11 System Definition	SDG	GC19-2444
IMS Version 11 System Programming APIs	SPR	SC19-2445
IMS Version 11 System Utilities	SUR	SC19-2446

Supplementary publications

Title	Order number
IMS and SOA Executive Overview	GC19-2516
Program Directory for Information Management System Transaction and Database Servers V11.0	GI10-8788
IMS Version 11 Fact Sheet	GC19-2451
IRLM Messages and Codes	GC19-2666

Publication collections

Title	Format	Order number
IMS Version 11 Product Kit	CD	SK5T-7375

Accessibility titles cited in the IMS Version 11 library

Title	Order number
z/OS TSO/E Primer	SA22-7787
z/OS TSO/E User's Guide	SA22-7794
z/OS ISPF User's Guide Volume 1	SC34-4822

Index

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F

G

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I

J

K

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M

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U

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X

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