IBM IMS Database Utility Solution for z/OS  
Version 2 Release 1

IMS High Availability Large Database Toolkit User's Guide

IBM
Second Edition (December 2019)

This edition applies to Version 2 Release 1 of IBM IMS Database Utility Solution for z/OS® IMS High Availability Large Database Toolkit (program number 5698-DUL) and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces SC27-8779-00.


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IBM® IMS Database Utility Solution for z/OS IMS High Availability Large Database Toolkit (formerly IBM IMS High Availability Large Database Conversion and Maintenance Aid for z/OS, and hereafter referred to as IMS HALDB Toolkit) provides application enabling features and system utilities for the improved management and operation of the IMS HALDB environment.

These topics provide instructions for using IMS HALDB Toolkit.

To use the procedures in this information, you must first install IMS HALDB Toolkit as described in the Program Directory for IMS Database Utility Solution for z/OS, GI13-4194, and then perform the postinstallation steps as described in the IMS Database Utility Solution: Overview and Customization, SC27-8778.

These topics are designed to help database administrators, system programmers, application programmers, and system operators perform the following tasks:

- Use IMS HALDB Toolkit to set up environments
- Define and process a conversion project
- Maintain IMS HALDB Toolkit
- Use the DBRC function for HALDBs
- Interpret reports issued by IMS HALDB Toolkit
- Troubleshoot IMS HALDB Toolkit problems

To use these topics, you should have a working knowledge of:

- The z/OS operating system
- ISPF

Always refer to the IMS Tools Product Documentation web page for complete product documentation resources:


The IMS Tools Product Documentation web page includes:

- Links to IBM Knowledge Center for the user guides ("HTML")
- PDF versions of the user guides ("PDF")
- Program Directories for IMS Tools products
- Recent updates to the user guides, referred to as "Tech docs" ("See updates to this information!")
- Technical notes from IBM Software Support, referred to as "Tech notes"
- White papers that describe product business scenarios and solutions
IBM IMS Database Utility Solution for z/OS IMS High Availability Large Database (HALDB) Toolkit (also referred to as IMS HALDB Toolkit) provides application enabling features and system utilities for the improved management and operation of the IMS HALDB environment.

**Topic:**

- Chapter 1, “IMS HALDB Toolkit overview,” on page 3
Chapter 1. IMS HALDB Toolkit overview

IMS HALDB Toolkit provides HALDB functions that can be used for HALDB maintenance and operation tasks. Product features include application enabling features and system utilities for the improved management and operation of the IMS HALDB environment.

A High Availability Large Database (HALDB) is a partitioned full-function DL/I database. The supported database organizations are PHDAM, PHIDAM, and PSINDEX.

IMS databases are escalating in size because of regulatory compliance requirements and because businesses are serving more customers and using more suppliers. IMS HALDB Toolkit can help reduce the time and minimize the skills that are required to perform application support tasks and provide IMS HALDB maintenance, modeling, and analysis.

IMS HALDB Toolkit helps you to maintain 24x7 data availability. The tool's application functions enable applications to make better use of the HALDB environment. The tool's system utilities provide capabilities that can help improve HALDB serviceability.

Topics:

• “What's new in IMS HALDB Toolkit” on page 3
• “IMS HALDB Toolkit features and benefits” on page 4
• “Usage and restrictions” on page 7
• “Considerations for the IMS management of ACBs” on page 7
• “Service updates and support information” on page 8
• “Product documentation and updates” on page 8
• “Accessibility features” on page 9

What's new in IMS HALDB Toolkit

This topic summarizes the technical changes for this edition.

New and changed information is indicated by a vertical bar (|) to the left of a change. Editorial changes that have no technical significance are not noted.

SC27-8779-01 (December 2019)

• A new parameter, GDGLIMIT, has been added to CONVERT and MAINTAIN functions (APAR PI99707). For more information, see the following topics:
  – “CONVERT command parameters” on page 48
  – “MAINTAIN command parameters” on page 79
• New parameters, UNLSPAC and UNLUNIT, have been added to CONVERT and MAINTAIN functions (PH00721). For more information, see the following topics:
  – “CONVERT command parameters” on page 48
  – “MAINTAIN command parameters” on page 79
• A post conversion step to remove dynamic allocation members has been added (APAR PH01710). For more information, see the following topics:
  – “Converting databases offline” on page 44
  – “Converting to HALDB using the ISPF user interface” on page 259
• The ANALYZEPART function has been enhanced to simulate HALDB conversion and report the structure of the converted DBD by printing DBD source (DBDGEN utility control statements). DBD source helps you understand the structure of the converted DBD and prevent unexpected conversion failure that may
occur during HALDB conversion (APAR PH04245). For more information, see “ANALYZEPART example: Generating DBD source” on page 38.

• IMS HALDB Toolkit has been enhanced to support the IMS management of ACBs for batch functions (APAR PH10937). For more information, see “Considerations for the IMS management of ACBs” on page 7.

• IMS HALDB Toolkit has been enhanced to support encrypted VSAM database data sets and encrypted image copy data sets (APAR PH11848). For more information, see the following topics:
  – “CONVERT command parameters” on page 48
  – “MAINTAIN command parameters” on page 79
  – “COPYDBRC command parameters” on page 118

• Information to learn the techniques for improving the performance of ANALYZEPART, CONVERT, and MAINTAIN function jobs have been added. For more information, see Chapter 29, “Performance tips and considerations,” on page 293.

IMS HALDB Toolkit features and benefits

IMS HALDB Toolkit helps to administer databases through a HALDB conversion with ease and efficiency. IMS HALDB Toolkit helps reduce administrative costs by easing the conversion from full-function to HALDB and assisting in transporting HALDBs to IMS test systems.

In addition, IMS HALDB Toolkit provides the following features and functions:

• Batch conversion and maintenance offline
  The database to be converted must have IMS dynamic allocation member (MDA) descriptions.

• Simulation of new partition settings and simulation of conversion from full-function database to HALDB

• JCL, created by DBDLIB conversion, to convert entire DBD libraries
  DBDLIB conversion uses batch conversion to create JCL for each primary database.

• Offline reorganization of PSINDEX databases, including index pointer healing and reclaiming of VSAM space

• PSINDEX records of deleted partitions removed (DELETE PARTITION)
  It is not necessary to rebuild the PSINDEX by scanning all partitions.

• Performance improvement because PSINDEX records are sorted and inserted sequentially (ADD PARTITION, using LOAD processing)

• Merge identical HALDBs and combine user-partitioned databases into one multi-partitioned HALDB (MERGE HALDB)

IMS HALDB Toolkit dynamically detects the existence of the following tools and uses the tools as needed:

• IMS High Performance Image Copy for z/OS
• IMS High Performance Load for z/OS
• IMS High Performance Pointer Checker for z/OS
• IMS High Performance Unload for z/OS
• IMS Library Integrity Utilities for z/OS

If any of these tools are unavailable on the system, IMS HALDB Toolkit replaces them with an appropriate IMS utility (if they are available).

Application support

IMS HALDB Toolkit provides the following support for applications:
**Dynamic DFSHALDB statement build**  
Dynamic management of the DFSHALDB statement is allowed by providing a key for the starting partition and a key for the ending partition.  

When you specify a key range, the utility transforms the key range into a starting and ending partition. Therefore, the application does not require a change when partitions are split or consolidated.

**Partition Selection API**  
A callable interface is provided to assign a key to a partition.  
This API allows applications to split their input on a partition boundary for parallel processing.  
The API returns the partition name and the partition number. The API does not require a DL/I environment.

**Converting to HALDB**  
IMS HALDB Toolkit supports the following functions to help you convert full-function databases to HALDBs:

**Simulate conversion to a HALDB**  
Before you convert the full-function database, simulate the HALDB partition settings to determine the most effective partition settings.

**Conversion to a HALDB**  
You can convert to HALDB using a single step batch process.  
You can alternatively convert to HALDB using the ISPF user interface to generate all required steps. Help panels are available for IMS HALDB Toolkit functions while you are in an ISPF session.

**Maintaining HALDBs**  
IMS HALDB Toolkit supports the following functions to help you maintain HALDBs:

**Simulate repartitioning of a HALDB**  
Before you consolidate or split partitions, simulate the new partitions to determine the most effective partition settings. This utility simulates the effect of the new partition settings with ease.

**Consolidate or split partitions**  
As the data grows or shifts, partitions grow or shrink. This utility allows you to consolidate or split partitions with ease.

**Index Pointer Healer**  
After reorganizing the primary database, all secondary index pointers require healing (the new self healing with HALDB). However, this task might demand extra resources that could impact performance during peak time.  
This utility heals the pointer offline and at a less expensive time.

**Load a single partition**  
Databases with secondary indexes must insert the secondary indexes in random sequence when loading. This utility delays the index insert to the end of the load process, then loads the indexes in sequence.  
This method improves the elapsed time.

**Delete a single partition**  
When a single partition is deleted, the secondary indexes must be rebuilt. This utility deletes all records from the secondary indexes that reference the deleted partition.  
The entire process is recoverable and fast.

**Merge HALDBs**  
When user partitioning (multiple identical databases on different key ranges) has been used, the conversion will first transform the databases to HALDB, and then merge them together using this process.
This task is necessary when you require secondary indexing and was not possible when using multiple databases.

**Add an empty partition to the end of a database**
This function is appropriate for growth that occurs mainly at the end of an existing database.

**DBRC handling**
IMS HALDB Toolkit supports the following functions for DBRC handling:

**Cloning DBRC definitions**
The clone function replicates HALDB DBRC definitions to other RECONs and allows you to exchange the high-level data set name qualifier.

**Copy a HALDB to a different IMS system**
The copy function transfers a production HALDB to a different IMS and allocates the target data set in that system, if the data set is not already available.

**Backup DBRC definitions**
The backup function saves database-related DBRC definitions. The definitions can be used as input for the batch DBRC utility (DSPURX00).

For more information, see Chapter 12, “HALDB without DBRC,” on page 177.

**HALDB Analyzer**
IMS HALDB Toolkit supports the HALDB Analyzer utility to help you analyze HALDBs:

**Analyze HALDB constructs**
This function analyzes the HALDB structure and verifies that all root keys are in the correct partition, that all ILKs are valid, and that all EPS pointers can find the correct ILE. Additionally, performance-related data is collected.

This utility can be used to check the health of a HALDB.

You can provide thresholds that trigger the utility to inform you when a maintenance function is required.

**Extract root keys**
This utility allows the extracting of all root keys to a sequential file. A record layout is provided.

**System utilities**
IMS HALDB Toolkit provides the following utilities to help you with database handling tasks:

**Split unload file**
This utility allows you to split an unload file into single partition unload files. The reloads then can run in parallel.

The single partition unload files are standard Hierarchical Direct (HD) unload files with header and trailer statistics.

Each file contains only records for the selected partition.

**Indirect list key (ILK) rebuild**
This utility enables you to rebuild all ILKs and their references, and allows you to resolve conflicting ILKs.

The databases must be offline for this activity.

**ACBLIB reference**
This utility provides a list of all PSBs that reference a given database, and assists in online changes by identifying which PSBs require change.

**Create DBD source**
This utility re-creates the DBD source statements from the DBDLIB.
Usage and restrictions

There are important usage and restrictions for the IMS HALDB Toolkit product.

Logical relationships and secondary indexes

IMS HALDB Toolkit converts databases and secondary indexes with the following logical relationships:

• Unidirectional logical relationships remain as unidirectional.
• Bidirectional logical relationships with physical pairing remain as bidirectional with physical pairing.
• Bidirectional logical relationships with virtual pairing are converted to bidirectional relationships with physical pairing.
• Shared secondary indexes are converted to single secondary indexes.
• Non-unique secondary indexes are converted to unique secondary indexes by adding the /SX field to the SUBSEQ parameters of the XDFLD.

A few installations have defined bidirectional logical relationships without any pairing even though this capability is not documented in the IMS product. IMS HALDB Toolkit does not support a conversion of these relationships to HALDB.

When running the CONVERT function as a batch job, DBDs with logical relationships (except for indexes) are not allowed. To convert DBDs with logical relationships, the ISPF interface must be used because the database and all logically related databases must be unloaded before the conversion can be done. Batch CONVERT does only one unload followed by one convert at a time. The ISPF interface can be used to construct the JCL such that all unloads are to be done before the conversion.

The CONVERT function does work for DBDs with logically related secondary indexes. The CONVERT function always converts the related non-HALDB Secondary Index to a HALDB Secondary Index (PSINDEX for example). This conversion from non-HALDB Secondary Index to a HALDB Secondary Index is so that the secondary index remains usable. If the secondary index is no longer required, one must remove it from the DBD and run DBDGEN again before running the CONVERT function.

Database limitations

The following limitations apply to IMS HALDB Toolkit database conversions:

• SHISAM, HSAM, and DEDB databases cannot be converted.
• HISAM databases are converted to PHIDAM.

The MAINTAIN function does not support HALDB M-V data sets.

The MAINTAIN function processes PSINDEXes only when the PSINDEXes are offline.

Considerations for the IMS management of ACBs

When the IMS management of ACBs is enabled, IMS HALDB Toolkit can refer to database definitions in the IMS catalog directory instead of the DBD library.

IMS catalog definition is retrieved from either:

• The IMS Catalog Definition exit routine (DFS3CDX0) in the STEPLIB concatenation.
• The DFSDFxxx PROCLIB member specified by the DFSDF(xxx) parameter in IHCSYSIN and the PROCLIB DD statement.

The following conditions must be satisfied to use IMS managed ACBs:

• IBM IMS Tools Base for z/OS, Version 1 Release 6 or later must be installed.
• The IMS catalog database must be registered to the RECON data sets.
• The name of the IMS catalog database must be defined in the RECON record with the following DBRC command: CHANGE RECON CATALOG(name).

• If the DFSMDA member with the TYPE=CATDSHLQ statement is used to specify the high-level qualifier of the IMS catalog system data sets, the library that contains the DFSMDA member must be in the STEPLIB concatenation of the IMS HALDB Toolkit job.

The following functions do not support the IMS management of ACBs:
• Batch functions: CONVERT, IHCUDBD, IHCWPSBL, HALDBLOAD and a function to load logical children
• HALDB without DBRC
• All ISPF functions

The following restrictions apply when the IMS catalog database is specified on the DBD parameter:
• The IMS catalog is supported only by the ANALYZEPART function and the MAINTAIN function. No other function supports the IMS catalog.
• IMS DD must be specified.

For more information, see “MAINTAIN example: Maintaining a database when the IMS management of ACBs is enabled” on page 106.

Service updates and support information

Service updates and support information for this product, including software fix packs, PTFs, frequently asked questions (FAQs), technical notes, troubleshooting information, and downloads, are available from the web.

To find service updates and support information, see the following website:
IBM Support: IMS Database Utility Solution for z/OS

Product documentation and updates

IMS Tools information is available at multiple places on the web. You can receive updates to IMS Tools information automatically by registering with the IBM My Notifications service.

Information on the web

Always refer to the IMS Tools Product Documentation web page for complete product documentation resources:


The IMS Tools Product Documentation web page includes:
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4. Click Continue to specify the types of updates that you want to receive.
5. Click Submit to save your profile.

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Accessibility features

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

The major accessibility features in IMS HALDB Toolkit enable users to perform the following activities:

• Use assistive technologies such as screen readers and screen magnifier software. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.
• Customize display attributes such as color, contrast, and font size.
• Operate specific or equivalent features by using only the keyboard. See the following publications for information about accessing ISPF interfaces:
  – z/OS ISPF User's Guide, Volume 1
  – z/OS TSO/E Primer
  – z/OS TSO/E User's Guide

These guides describe how to use ISPF, including the use of keyboard shortcuts or function keys (PF keys), include the default settings for the PF keys, and explain how to modify their functions.
Part 2. Simulating HALDBs

By using the ANALYZEPART function, you can simulate HALDB partition settings to determine the effective partition settings.

The ANALYZEPART function is supported in batch mode and it can be used for offline databases.

With the ANALYZEPART function, you can:

• Simulate the HALDB partition settings before you convert a full-function database to a HALDB with the CONVERT function
• Simulate the new partition settings before you perform maintenance on HALDB partitions with the MAINTAIN function

Topic:

• Chapter 2, “Simulating HALDB using ANALYZEPART,” on page 13
Chapter 2. Simulating HALDB using ANALYZEPART

Use the **ANALYZEPART** command to simulate the effect of new partition settings or conversion from a full-function database to a HALDB in batch mode.

**Topics:**
- “ANALYZEPART data flow” on page 13
- “Simulating conversion to a HALDB” on page 14
- “Simulating repartitioning of a HALDB” on page 15
- “Simulating conversion or repartitioning using unloaded data sets as input” on page 16
- “ANALYZEPART DD statements” on page 17
- “ANALYZEPART command parameters” on page 20
- “ANALYZEPART examples” on page 31

**ANALYZEPART data flow**

The following figure shows the data flow for the ANALYZEPART function.

*Figure 1. ANALYZEPART data flow*
The simulation result is written to the Collect DBDs report in the IHCLIST data set.

- If you request to generate DBRC commands, the DBRC commands are written to the data set pointed to from the `dbrcout` DD statement.
- If you request to generate DBD source, DBDGEN utility control statements are written to the data set pointed to from the `dbdsources` DD statement.

### Simulating conversion to a HALDB

You can simulate conversion from a full-function database to a HALDB offline by using the **ANALYZEPART** command.

#### About this task

By simulating the effect of the HALDB partition settings, you can determine the most effective partition settings before you convert a full-function database to a HALDB by using the **CONVERT** command.

For a database with logical relationships, only the database that is specified on the DBD parameter is simulated. All the logically related databases are not simulated.

#### Procedure

1. Locate the sample JCL members in the SIHCSAMP file, members IHCEMAIx.
2. Specify the JCL DD statements.
   
   For a list of DD statements, see “**ANALYZEPART DD statements**” on page 17.
3. Specify the **ANALYZEPART** command parameters.
   
   For a list of **ANALYZEPART** command parameters, see “**ANALYZEPART command parameters**” on page 20.

The following table lists some of the common scenarios and **ANALYZEPART** parameters for simulating HALDB partition settings:

<table>
<thead>
<tr>
<th>Scenario</th>
<th><strong>ANALYZEPART</strong> parameters</th>
<th>KEYSIN input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulate conversion to a HALDB that has four partitions</td>
<td><code>ANALYZEPART DBD(ddd) - PARTNUM(4)</code></td>
<td>Not applicable</td>
</tr>
<tr>
<td>Simulate conversion to a HALDB that has 512 MB size partitions</td>
<td><code>ANALYZEPART DBD(ddd) - PARTSIZE(512)</code></td>
<td>Not applicable</td>
</tr>
<tr>
<td>Simulate conversion to a HALDB using your own key boundaries</td>
<td><code>ANALYZEPART DBD(ddd) - KEYS(KEYSIN)</code></td>
<td><code>//KEYSIN DD * smaller-high-key middle-high-key last-high-key</code></td>
</tr>
</tbody>
</table>

You can also refer to the following examples to code **ANALYZEPART** JCL statements and command parameters:

- “**ANALYZEPART example: Specifying the number of partitions**” on page 32
- “**ANALYZEPART example: Specifying the partition size**” on page 32
- “**ANALYZEPART example: Specifying the key ranges for partitions**” on page 33
- “**ANALYZEPART example: Generating DBRC commands**” on page 34
- “**ANALYZEPART example: Using unloaded data sets as input**” on page 36
Simulating repartitioning of a HALDB

You can simulate repartitioning of a HALDB offline by using the **ANALYZEPART** command.

### About this task

By simulating the effect of the new partition settings, you can determine the most effective partition settings before you consolidate or split partitions by using the **MAINTAIN** command.

For a database with logical relationships, only the database that is specified on the DBD parameter is simulated. All the logically related databases are not simulated.

### Procedure

1. Locate the sample JCL members in the SIHCSAMP file, members IHCEMAIx.
2. Specify the JCL DD statements.
   - For a list of DD statements, see “ANALYZEPART DD statements” on page 17.
3. Specify the ANALYZEPART command parameters.
   - For a list of ANALYZEPART command parameters, see “ANALYZEPART command parameters” on page 20.

The following table lists some of the most common functions and ANALYZEPART parameters:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>ANALYZEPART parameters</th>
<th>KEYSIN input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulate consolidation of two partitions into one using PARTNUM</td>
<td>ANALYZEPART DBD(xxxx) - PARTLIST(part1,part2) - PARTNUM(1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Simulate splitting of one partition into two using PARTNUM</td>
<td>ANALYZEPART DBD(xxxx) - PARTITION(part1) - PARTNUM(2)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Simulate splitting of one large partition into 2048 MB size partitions using PARTSIZE</td>
<td>ANALYZEPART DBD(xxxx) - PARTITION(bigpart1) - PARTSIZE(2048)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Simulate splitting of one partition into three using your own key boundaries</td>
<td>ANALYZEPART DBD(xxxx) - PARTITION(part1) - KEYS(KEYSIN)</td>
<td>//KEYSIN DD * smaller-high-key middle-high-key last-high-key</td>
</tr>
<tr>
<td>Simulate repartitioning with 2048 MB size partitions for all the partitions using PARTSIZE</td>
<td>ANALYZEPART DBD(xxxx) - PARTITION(*) - PARTSIZE(2048)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
You can also refer to the following examples to code ANALYZEPART JCL statements and command parameters:

- “ANALYZEPART example: Specifying the number of partitions” on page 32
- “ANALYZEPART example: Specifying the partition size” on page 32
- “ANALYZEPART example: Specifying the key ranges for partitions” on page 33
- “ANALYZEPART example: Generating DBRC commands” on page 34
- “ANALYZEPART example: Using unloaded data sets as input” on page 36
- “ANALYZEPART example: Generating DBD source” on page 38

**Related reference**

Performance tips and considerations

Use this information to learn the techniques for improving the performance of ANALYZEPART, CONVERT, and MAINTAIN function jobs.

---

**Simulating conversion or repartitioning using unloaded data sets as input**

You can use unloaded data sets of a full-function database to simulate conversion from a full-function database to a HALDB, or unloaded data sets of a HALDB to simulate repartitioning of a HALDB.

**About this task**

Instead of supplying a full-function database or a HALDB as input for the ANALYZEPART function, you can supply unloaded data sets of a full-function database or of a HALDB and simulate the effect of database conversion or repartitioning.

**Restriction:** When you simulate conversion from a full-function database to a HALDB by supplying unloaded data sets as input, the ANALYZEPART function processes only the primary DBD that is specified on the DBD parameter. It does not process any secondary index databases. If DBD source generation is requested, IMS HALDB Toolkit generates DBD source for secondary index databases as well as for the primary DBD.

**Procedure**

1. Prepare the unloaded data sets. If you already have unloaded data sets, make sure your unloaded data sets satisfy the following requirements:
   - The ANALYZEPART function reads all data in the unloaded data sets that you specify on the DFSUINPT DD statement. If your unloaded data sets contain all the data of a HALDB and you want the ANALYZEPART function to process only some partitions, you must split the unloaded data sets so that the unloaded data sets that you specify on the DFSUINPT DD statement contain only the data of partitions that you want to process. You can do so by using the split unload file utility. For more information, see “Example 4: Split unloaded data sets and simulate repartitioning of a HALDB” on page 37.
   - If the data in the unloaded data sets is masked and the original database uses unique keys, you must mask the unloaded data sets by using different unique values. The ANALYZEPART function does not check for duplicate keys. If duplicate keys exist in the unloaded data sets, the result of simulation might not be as expected.
   - If the database contains compressed segments (in other words, if the SEGM statements of the DBDGEN utility has a COMPRTN keyword), use the FABHURG1 utility of IBM IMS High Performance Unload for z/OS to create the unloaded data sets. You must specify the DECN control statement for the FABHURG1 utility to create unloaded data sets that the ANALYZEPART function can read. For more information, see the topic “FABHURG1 unload utility” in the **IMS High Performance Unload User’s Guide**.

2. Locate the sample JCL members in the SIHCSAMP file, members IHCEMAIx.

3. Specify the JCL DD statements.
For a list of DD statements, see “ANALYZEPART DD statements” on page 17.

a) Specify a DFSUINPT DD statement and code the names of all the unloaded data sets on the statement.

b) Specify other JCL DD statements.

4. Specify the ANALYZEPART command parameters.

For a list of ANALYZEPART command parameters, see “ANALYZEPART command parameters” on page 20. For examples, see “ANALYZEPART example: Using unloaded data sets as input” on page 36 and “ANALYZEPART example: Generating DBD source” on page 38.

a) Specify the INPUT(UNLOAD) parameter. This parameter requests the ANALYZEPART function to read data from unloaded data sets.

b) If the unloaded data sets contain data from a HALDB, specify the partitions to simulate with the PARTLIST parameter or the PARTITION parameter. The ANALYZEPART function does not check the consistency of partitions against the unloaded data sets specified on the DFSUINPT DD statement. If there is inconsistency between the partitions and data in the unloaded data sets, the result of simulation might not be as expected.

c) Specify other ANALYZEPART command parameters.

Restriction: When unloaded data sets are provided as input, the ANALYZEPART function ignores the following parameters:

- Parameters related to secondary index databases (INDPART, INDPRIM, INDSIZE)
- READINT parameter

Related reference
Performance tips and considerations
Use this information to learn the techniques for improving the performance of ANALYZEPART, CONVERT, and MAINTAIN function jobs.

ANALYZEPART DD statements

DD statements are used to identify the source of input and the placement of output information. The following table shows DD statements and record format for the ANALYZEPART command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>original_dbds</td>
<td>Input</td>
<td>Depends on database organization</td>
<td>Optional</td>
</tr>
<tr>
<td>DFSUINPT</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Conditionally required</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>
### Table 3. DD statements and record format for the ANALYZEPART command (continued)

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHCLIST</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```plaintext
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation
PROCLIB
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDF(ddd) member exists in the IMS.PROCLIB data set.

RECON
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

Attention: If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

original_ddbs
This statement is optional if the database to be processed is not a HALDB. This statement defines the database data set. One statement of this type must be present for each data set in the DBD that describes this database. The DD name must match the DD name in the DBD.

For a HIDAM database, DD statements must also exist for the data sets that represent the index. The DD statements that relate to the index must contain DD names specified in the DBD for the index database.

The data sets, if specified, must reside on DASD. If you use dynamic allocation, do not code the DD statement for the database data sets.

Attention:
- You must not specify the DD statements for HALDB data sets because HALDB data sets are registered in RECON and are always allocated dynamically.
- If the DD statement is coded, do not code DCB=BUFNO=n or AMP='BUFND=n' to request access method buffers for database data sets because HSSR Engine of IMS HP Unload allocates its own buffer pools.

DFSUINPT
This statement is required when you supply unloaded data sets as input. The statement specifies one or more data sets that contain unloaded data of a full-function database or of a HALDB.

The supported format of the unloaded data sets is HD unload format. The ANALYZEPART function processes all the data sets that are specified on this DD statement and all the data inside the data sets.

For more information about supplying unloaded data sets as input, see the following topics:
- “Simulating conversion or repartitioning using unloaded data sets as input” on page 16
- “ANALYZEPART example: Using unloaded data sets as input” on page 36

IHCSYSIN
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “ANALYZEPART command parameters” on page 20.

SYSPRINT
This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

MSGPRINT
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.
The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**IHCLIST**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for reports. For more information about the reports generated in this data set, see “IHCLIST data set” on page 280.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**

This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

### ANALYZEPART command parameters

The following parameters are available to use with **ANALYZEPART** command simulation tasks.

IMS HALDB Toolkit ignores any parameters that are unavailable for the requested process.

Subsections:

- “ANALYZEPART command parameters” on page 20
- “ANALYZEPART command parameters for generating DBRC commands” on page 25
- “ANALYZEPART command parameters for generating DBD source” on page 31

### ANALYZEPART command parameters

Use the following parameters to define the conditions for simulating the database.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies which DBD is to be simulated. If you specify a HALDB DBD, the value must be a HALDB master name and it cannot be a partition name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(dbdname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>DFSDF</td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met: • IMS manages the ACBs (ACBMGMT=CATALOG). • The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog. <strong>Format</strong> <em>(ddd)</em>  <strong>Default value</strong> None.</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine. <strong>Format</strong> <em>(nnnn)</em> <strong>Default value</strong> If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
<tr>
<td>INDPART</td>
<td>Optional</td>
<td>Specifies the number of index partitions. This parameter is effective only when you simulate conversion from a full-function database to a HALDB. Cannot be used with INDSIZE. <strong>Format</strong> <em>(1-999)</em> <strong>Default value</strong> None.</td>
</tr>
<tr>
<td>INDPREM</td>
<td>Optional</td>
<td>Specifies whether a secondary index is partitioned the same as the primary database. This parameter is effective only when you simulate conversion from a full-function database to a HALDB. The following restrictions apply: • The index key must be the root segment key. • The primary database must be partitioned using the KEYS parameter. <strong>Format</strong> *(Y</td>
</tr>
</tbody>
</table>
### Table 4. ANALYZEPART command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
|INDSIZE    | Optional    | Specifies the size of each index partition. This parameter is effective only when you simulate conversion from a full-function database to a HALDB. IND SIZE cannot be used with INDPART.  
**Format**  
(1 - 4095)  
**Default value**  
1024 |
| INPUT     | Optional    | Specifies that the input is unloaded data sets. Code the DFSUINPT DD to specify the unloaded data sets.  
**Format**  
(UNLOAD)  
**Default value**  
None. |
| KEYLEN    | Optional    | Specifies the length of the subkey when IHCPSEL0 is used. For example, to partition by country, using a country code that is 3 characters in position 7-9 of your key, specify the following parameters and values:  

   KEYLEN(3) KEYOFF(6)  

**Format**  
(nnn) where nnn is 1 to root keylen - 1  
**Default value**  
None. |
| KEYOFF    | Optional    | Specifies the offset within the root segment key to use when IHCPSEL0 is specified as PARTSEL. The offset must be at least 1. Offset 0 does not need a partition selection exit. For example, to partition by country, using a country code that is 3 characters in position 7-9 of your key, specify the following parameters and values:  

   KEYLEN(3) KEYOFF(6)  

**Format**  
(nnn) where nnn is 1 to root keylen - 1  
**Default value**  
None. |
### Table 4. ANALYZEPART command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEYS</td>
<td>Optional</td>
<td>Specifies a DD statement that contains records for the high keys. KEYS cannot be used with PARTNUM or PARTSIZE. The KEYS parameter can be specified as a character or hexadecimal. Specifying KEYS results in as many partitions as there are keys specified in the file. The specifications are analyzed to determine whether the requested partitioning is feasible. If the number of partitions has been specified, IMS HALDB Toolkit verifies that no partition is larger than 4 GB. If the high keys are created during analysis, there must be at least as many database records as there are requested partitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.</td>
</tr>
<tr>
<td>PARTITION</td>
<td>Optional</td>
<td>Specifies which partition is to be simulated. Either specify a partition name, or specify an asterisk (*) to simulate all the partitions. Either the PARTITION or the PARTLIST parameter must be provided when you simulate repartitioning of a HALDB. PARTITION and PARTLIST are mutually exclusive parameters. Do not specify this parameter when you simulate conversion from a full-function database to a HALDB.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*(partition_name</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>PARTLIST</td>
<td>Optional</td>
<td>Specifies which partitions are to be simulated. You can specify multiple partition names. Either the PARTITION or the PARTLIST parameter must be provided when you simulate repartitioning of a HALDB. PARTITION and PARTLIST are mutually exclusive parameters. Do not specify this parameter when you simulate conversion from a full-function database to a HALDB.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(part1,part2,...,partn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
</tbody>
</table>
Table 4. ANALYZEPART command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNUM</td>
<td>Optional</td>
<td>Specifies the number of partitions to create. PARTNUM cannot be used with PARTSIZE or KEYS. Specifying the PARTNUM parameter causes IMS HALDB Toolkit to find the high keys. The specifications are analyzed to determine whether the requested partitioning is feasible. PARTNUM might not result in the exact number of partitions specified because a root segment and all of its dependent segments must be written to the same partition. Therefore, fewer than PARTNUM partitions might be created so that hierarchical integrity is preserved. If the number of partitions has been specified, IMS HALDB Toolkit verifies that no partition is larger than 8 GB. If the high keys are created during analysis, there must be at least as many database records as there are requested partitions. <strong>Format</strong> (1 - 999) <strong>Default value</strong> If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.</td>
</tr>
<tr>
<td>PARTSEL</td>
<td>Optional</td>
<td>Specifies a partition selection routine to use. The PARTSEL parameter must be specified with the KEYS parameter. IMS HALDB Toolkit provides an exit routine for partition selection (IHCPSEL0). When you use the IHCPSEL0 exit routine, the database is partitioned using a subset of the key. If you use the IHCPSEL0 exit routine, you must also select the KEYOFF and KEYLEN parameters. <strong>Format</strong> (partition_selection_routine) <strong>Default value</strong> None.</td>
</tr>
</tbody>
</table>
| PARTSIZE  | Optional    | Specifies the size of partitions to create. PARTSIZE cannot be used with PARTNUM or KEYS. Specifying this parameter causes IMS HALDB Toolkit to find the high keys. The specifications are analyzed to determine whether the requested partitioning is feasible. **Format** (1 - 8191) **Default value** If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.
Table 4. ANALYZEPART command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| READINT   | Optional    | Specifies that the ANALYZEPART function reads the database with read integrity (PROCOPT=G).

This parameter is effective only when IMS HALDB Toolkit dynamically detects the existence of IMS High PerformanceUnload for z/OS.

Specify READINT(N) to simulate HALDB partitions of a database that is used by an online IMS system and that allows update access (ACCESS=UP). When READINT(N) is used, the ANALYZEPART function reads the database without read integrity (PROCOPT=GO).

**Attention:**

- When you specify READINT(N), IMS does not check the ownership of the segments returned. Therefore, the ANALYZEPART function might get a segment that had been updated by another program. Such a segment might cause data integrity problems, resulting in an IMS user abend, system loop, or system abend. To learn more about read without integrity, see the topic "Read without integrity" in *IMS Application Programming*.

- If the database is a PSINDEX that is used by an online IMS system with ACCESS=UP, READINT(N) cannot be used because the ANALYZEPART function reads the PSINDEX with read integrity (PROCOPT=G) even if you specify READINT(N). In this case, the job terminates with a database authorization failure.

**Format**

(Y | N)

**Default value**

Y

---

**ANALYZEPART command parameters for generating DBRC commands**

Use the following additional parameters to control the Database Recovery Control (DBRC) commands that IMS HALDB Toolkit generates. If you do not need to generate DBRC commands, do not use these parameters. These parameters are effective only when the DBRCOUT parameter, which specifies to generate DBRC commands, is specified.

Table 5. ANALYZEPART command parameters for generating DBRC commands

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONST</td>
<td>Optional</td>
<td>Used as a substitute for the DBD name when building partition names. See also DBDPATT, INDPATT, and FIRSTPART parameters.</td>
</tr>
</tbody>
</table>

**Format**

(constant)

**Default value**

None.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBDPATT</td>
<td>Optional</td>
<td>Creates a partition name from the DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(cccccccc) where (c) is an asterisk (*) or a period (.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can use a maximum of 6 asterisks (*) to identify the position in the DBD name. The default is 6 asterisks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When 6 positions are specified, only 1 character is used for the partition name, creating a limit of 36 partitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If fewer than 6 positions are specified, 1 - 3 characters are used for the partition name depending on the FIRSTPART parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can also use periods (.) to specify that certain characters of the DBD name are ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(*******..**)</td>
</tr>
<tr>
<td>DBRCOUT</td>
<td>Required</td>
<td>Specifies the name of the DD to which IMS HALDB Toolkit prints DBRC commands.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specify this parameter to generate DBRC commands. You must also specify the <code>dbrcout</code> DD statement in the JCL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ddname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>DSNDBD</td>
<td>Optional</td>
<td>Specifies the suffix portion of the new data set name that you are using.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A total of 37 characters are allowed for the entire data set name, which includes the characters used for the DSNPREF prefix and the characters used for the DSNDBD suffix.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(DBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DBD</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add the DBD name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PART</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add the partition name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DBDPART</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add the DBD name and the partition name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DBD</td>
</tr>
</tbody>
</table>
Table 5. ANALYZEPART command parameters for generating DBRC commands (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNPREF</td>
<td>Conditionally required</td>
<td>Specifies a high-level data set name to use when building new partition data set names.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The DBRC DSNPREFX parameter is created from this specification and is appended with the DBD name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The final data set name is then appended by DBRC with the DBD file letter and the partition name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When you simulate conversion from a non-HALDB to a HALDB, you must specify this parameter. When you simulate repartitioning of a HALDB, this parameter is optional.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (dsnprefix)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> If omitted, the default is to copy from the existing DSNPREF.</td>
</tr>
<tr>
<td>FBFF</td>
<td>Optional</td>
<td>Specifies a new free block frequency factor (FBFF) to use when defining a partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (0 - 99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> If omitted, the default is to copy from the existing FBFF.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| FIRSTPART | Optional    | Identifies the partition name extension to be added to the name "stub" created by the DBDPATT and INDPATT parameters. The "stub" and the extension cannot exceed 7 characters. **Format**

(ccc)

ccc defines the character string that is used, where:

0
- Defines a string from 0-9,A-Z. The partition number is used as an index. It creates a 1-character extension.

A
- Defines a string from A-Z,0-9. The partition number is used as an index. It creates a 1-character extension.

1
- Defines a string from 1-9,A-Z. The partition number is used as an index. It creates a 1 character extension.

01
- Creates a 2-character numeric extension from 01-99. The partition number is used for the extension.

AA
- Creates a 2-character extension from AA to 99. For example, AA,...,AZ,A0,...,A9,BA,....

001
- Creates a 3-character numeric extension from 001-999. The partition number is used for the extension.

**Default value**
- 0, if six asterisks (*) are specified on the DBDPATT parameter or the DBDPATT parameter is not specified.
- AA, if five asterisks are specified on the DBDPATT parameter.

| FSPF | Optional | Specifies a new free space percentage value for each interval or block (FSPF) to use when defining a partition. **Format**

(0 - 99)

**Default value**
- If omitted, the default action is to copy from the existing FSPF.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| **INDPATT** | Optional | Creates a partition name "stub" from the DBD name of a secondary index.  
This parameter is effective only when you simulate conversion from a full-function database to a HALDB.  
**Format**  
(cccccccc) where c is an asterisk (*) or a period (.)  
This parameter is similar to DBDPATT. The "**" positions of the DBD name are kept to create the "name stub."  
You can use a maximum of 6 asterisks (*) to identify the position. The default is 6 asterisks.  
**Default value**  
DBDPATT is used. If neither DBDPATT nor INDPATT is specified, the default is (******..). |
| **INITPART** | Optional | DDNAME in JCL that allows parameters that are not currently specified by the product to be added to the DBRC INIT.PART command.  
IMS HALDB Toolkit uses the defaults for GENMAX, DFLTJCL, ICJCL, OICJCL, RECOVJCL, RECOVPD, RECVJCL, and NOREUSE.  
Any DBRC statements that you specify on the `initpart_dd` DD statement are included in the statements that are generated by the product. DBRC statements coded on the `initpart_dd` DD statement must conform to the syntax of the INIT.PART command. For the syntax rules, see the topic "INIT.PART command" in IMS Commands.  
**Format**  
(`initpart_dd`)  
**Default value**  
None. |
Table 5. ANALYZEPART command parameters for generating DBRC commands (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| KEYSORDR  | Optional    | This parameter is effective only for HALDBs. IMS HALDB Toolkit ignores this parameter if this parameter is specified for a non-HALDB.  
When KEYS(ddname) is specified, IMS HALDB Toolkit reads the high-key values from the KEYS(ddname) and then assigns them to partitions in ascending partition number order by issuing CHANGE.PART commands to DBRC. When KEYSORDR is also specified, IMS HALDB Toolkit subsequently reassigns the high-keys to the partitions, in both their individual ascending EBCDIC order, by issuing CHANGE.PART commands again.  
The CHANGE.PART commands that are issued when reassigning the high-keys are in ascending EBCDIC order of partition name, which is the same order as is presented by a DBRC LIST.DB command. KEYSORDR processing is done whether adding or deleting partitions, or changing partitions' attributes.  
This option can also be used for the single purpose of reorganizing partitions' high-keys, which is accomplished by placing unchanged high-keys in the KEYS(ddname).  
When the KEYSORDR option is specified, PARTITION(*) is also required.  
**Format**  
(Y | N)  
**Default value**  
N |
| OSAM      | Optional    | This parameter is effective only for non-HALDBs. IMS HALDB Toolkit ignores this parameter if this parameter is specified for a HALDB.  
Converts VSAM to OSAM.  
**Format**  
(Y | N)  
**Default value**  
N |
| RAAINCR   | Optional    | Increases HDAM root addressable area (RAA) by a specified number of blocks.  
**Format**  
(0 - 26777215)  
**Default value**  
None. |
| RAPS      | Optional    | Specifies new PHDAM root anchor points (RAPs).  
**Format**  
(1 - 255)  
**Default value**  
If omitted, the default is to copy from the existing RAPs. |
ANALYZEPART command parameters for generating DBD source

Use the following additional parameters to generate DBD source. DBD source, which are a series of DBDGEN utility statements, help you understand the structure of the converted database and prevent unexpected failures that may occur during HALDB conversion. If you do not need to generate DBD source, do not use these parameters. These parameters are effective only when the DBDSOURCE parameter, which specifies to generate DBD source, is specified.

The parameters in the following table are effective only for non-HALDBs. If any of these parameters are specified for a HALDB, IMS HALDB Toolkit ignores these parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBDSOURCE</td>
<td>Required</td>
<td>Generates the DBD source for the converted HALDB and places it in the specified library. You must also specify the dbdsource DD statement in the JCL. The data set that you specify for dbdsource DD must be a partitioned data set (PDS) or a partitioned data set extended (PDSE) with LRECL=80 and RECFM=F. SYSOUT=* cannot be specified for this data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (ddname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>DBDSRCONLY</td>
<td>Optional</td>
<td>Generates the DBD source without simulating HALDB conversion. No reports are generated in the IHCLIST data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> N</td>
</tr>
<tr>
<td>DSG1</td>
<td>Optional</td>
<td>Changes a database with multiple data set groups into a database with a single data set group.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> N</td>
</tr>
<tr>
<td>OSAM</td>
<td>Optional</td>
<td>Converts VSAM to OSAM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> N</td>
</tr>
</tbody>
</table>

ANALYZEPART examples

Use the following examples to learn what you can do with the ANALYZEPART function.

- “ANALYZEPART example: Specifying the number of partitions ” on page 32
- “ANALYZEPART example: Specifying the partition size” on page 32
ANALYZEPART example: Specifying the number of partitions

If you know how many partitions you want to split the database into, you can use the PARTNUM parameter to specify this number.

To specify the number of partitions, use the sample member IHCEMAI1. The following example simulates splitting a database into two partitions:

```plaintext
//ANAPART   JOB CLASS=A,MSGCLASS=X
//*-------------------------------------------------------------------
//*           Create partition boundary report
//*           read database and report on 2 partitions
//*-------------------------------------------------------------------
//S2     EXEC PGM=IHCHALDB,DYNAMNBR=999,
//       REGION=80M
//STEPLIB  DD DISP=SHR,DSN=your.SIHCLOAD
//         DD DISP=SHR,DSN=your.SDFSRESL
//         DD DISP=SHR,DSN=your.SHPSLMD0
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//IMS      DD DISP=SHR,DSN=your.DBDLIB
//IMSDALIB DD DISP=SHR,DSN=your.MDALIB
//TRACE    DD DUMMY
//MSGPRINT DD SYSOUT=*  
//IHCLIST  DD SYSOUT=*  
//IHCSYSIN DD *
ANALYZEPART DBD(xxx) - PARTNUM(2)
```

Figure 2. Sample JCL (IHCEMAI1) for batch using PARTNUM

If the database that you specify for the DBD parameter is a HALDB database, you must specify the PARTITION or the PARTLIST parameter. If the DBD parameter specifies a non-HALDB database, do not specify the PARTITION or the PARTLIST parameter.

For example, if you want to split a HALDB database into four partitions, change the PARTNUM value to 4 and specify the PARTITION parameter.

```plaintext
//IHCSYSIN DD *
ANALYZEPART DBD(xxx) - PARTNUM(4) - PARTITION(*)
```

ANALYZEPART example: Specifying the partition size

If you know how large you want each partition to be, you can use the PARTSIZE parameter to specify this number.

To specify the size of partitions, use the member IHCEMAI2. The following example simulates splitting a database into partitions each with a size of 1500 MB.

```plaintext
//IHCSYSIN DD *
ANALYZEPART DBD(xxx) - PARTNUM(*)
```

If the database that you specify for the DBD parameter is a HALDB database, you must specify the PARTITION or the PARTLIST parameter. If the DBD parameter specifies a non-HALDB database, do not specify the PARTITION or the PARTLIST parameter.

For example, if you want to repartition two partitions of a HALDB database into partitions each with a size of 2000 MB, change the PARTSIZE value to 2000 and specify the PARTLIST parameter.

**ANALYZEPART example: Specifying the key ranges for partitions**

If you want to assign specific key ranges to partitions, you can use the KEYS parameter to specify an input data set containing the keys. The KEYS parameter specifies the high key boundaries for each partition.

To specify the ranges for partitions, use the member IHCEMAI3. The following example simulates splitting a database into 13 partitions with each partition containing the keys up to the specified high key boundary.
//ANAPART JOB CLASS=A,MSGCLASS=X  
//** Create partition boundary report for HALDB  
//** read database and report on specific key boundaries  
//S2 EXEC PGM=IHCHALDB,DYNAMNBR=999,  
// REGION=80M  
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD  
// DD DISP=SHR,DSN=your.SDFSRESL  
// DD DISP=SHR,DSN=your.SHPSLMD0  
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL  
//IMS DD DISP=SHR,DSN=your.DBDLIB  
//IMSDALIB DD DISP=SHR,DSN=your.MDALIB  
//TRACE DD DUMMY  
//MSGPRINT DD SYSOUT=*  
//IHCLIST DD SYSOUT=*  
//****************************************  
//*KEYSIN DD * (documentation only)  
//* your first high-order key for partition1  
//* your second high-order key for partition2 and so on...  
//* your highest key for last partition  
//****************************************  
//KEYSIN DD *  
A999999999  
B999999999  
C999999999  
D999999999  
E999999999  
F999999999  
G999999999  
H999999999  
I999999999  
J999999999  
K999999999  
L999999999  
M999999999  
//IHCSYSIN DD *  
ANALYZEPART DBD(xxx) PARTITION(*) - 
KEYS(KEYSIN)  

Figure 4. Sample JCL (IHCEMAI3) for batch using KEYS

If the database that you specify for the DBD parameter is a HALDB database, you must specify the PARTITION or the PARTLIST parameter. If the DBD parameter specifies a non-HALDB database, do not specify the PARTITION or the PARTLIST parameter.

ANALYZEPART example: Generating DBRC commands

When you simulate repartitioning of a HALDB or conversion to a HALDB by using the ANALYZEPART command, you can optionally specify the DBRCOUT parameter to generate a set of DBRC commands for the Database Recovery Control (DBRC) utility (DSPURX00).

If you use the CONVERT or the MAINTAIN command to make changes to a database, IMS HALDB Toolkit automatically updates information in RECON data sets so that the changes made to the database are reflected in the RECON data sets. However, if you plan to do this without using these commands, manual tasks typically involve unloading data from the database, updating the information in RECON data sets, and reloading data back to the database. If you use the ANALYZEPART command, IMS HALDB Toolkit will generate a set of DBRC commands that you can use to update the information in RECON data sets.

To generate DBRC commands, add the DBRCOUT parameter to the ANALYZEPART command and the dbrcout DD statement, as shown in the following example:

//dbrcout DD SYSOUT=*  
//IHCSYSIN DD *  
ANALYZEPART DBD(xxxx) - 
PARTLIST(part1,p ant2) - 
PARTNUM(3) - 
DBRCOUT(dbrcout)
The DBRCOUT parameter value (dbrcout) specifies the name of the DD to which IMS HALDB Toolkit writes the DBRC commands.

Example 1

If you want the DBRC commands printed in EBCDIC order based on the high-keys specified in the KEYSIN DD, specify the KEYSORDR(Y) parameter, the PARTITION(*) parameter, and the KEYSIN DD statement, as shown in the following example:

```plaintext
//DBRCOUT DD SYSOUT=*  
//KEYSIN DD *  
A999999999
B999999999
C999999999
D999999999
//IHCSYSIN DD *  
ANALYZEPART DBD(****) -  
     PARTITION(*) -  
     KEYS(KEYSIN) -  
     KEYSORDR(Y) -  
     DBRCOUT(DBRCOUT)
```

Example 2

If you want the DBRC commands include specific DBRC keyword values, specify the parameter values. The following parameters are supported: CONST, DBDPATT, DSNDBD, DSNPREF, FBFF, FIRSTPART, FSPF, INITPART, RAAINCR, RAPS. For more information about these parameters, see “ANALYZEPART command parameters for generating DBRC commands” on page 25.

The following example specifies specific DBRC keyword values for FBFF, FSPF, and RAPS keywords.

```plaintext
//DBRCOUT DD SYSOUT=*  
//IHCSYSIN DD *  
ANALYZEPART DBD(****) -  
     PARTITION(*) -  
     PARTNUM(3) -  
     FBFF(10) -  
     FSPF(20) -  
     RAPS(5) -  
     DBRCOUT(DBRCOUT)
```

Example 3

In the following example:
- //DBRCOUT DD SYSOUT=* specifies to print the DBRC commands to the SYSOUT stream.
- The KEYSIN DD statement and the KEYSORDR(Y) parameter specify to print the DBRC commands in EBCDIC order of the keys.
- The DBDPATT, FIRSTPART, DSNPREF, and DSNDBD parameters specify the DBRC command keyword values to be used in the DBRC commands.

```plaintext
//DBRCOUT DD SYSOUT=*  
//KEYSIN DD *  
A999999999
B999999999
C999999999
D999999999
//IHCSYSIN DD *  
ANALYZEPART DBD(****) -  
     PARTITION(*) -  
     KEYS(KEYSIN) -  
     KEYSORDR(Y) -  
     DBRCOUT(DBRCOUT)
```
The resulting DBRC commands will look like the following example.

```
CHANGE.PART DBD(TESTDB01) PART(TEST001)                              -
   KEYSTRNG(A999999999) -
   BLOCKSZE(8192) -
   FBFF(10) -
   FSPF(20) -
   DSNPREFIX(DBSMS.DB.TEST001)
CHANGE.PART DBD(TESTDB01) PART(TEST002)                              -
   BLOCKSZE(8192) -
   FBFF(10) -
   FSPF(20) -
   DSNPREFIX(DBSMS.DB.TEST002)
INIT.PART DBD(TESTDB01) PART(TEST003)                                -
   KEYSTRNG(B999999999) -
   BLOCKSZE(8192) -
   FBFF(10) -
   FSPF(20) -
   DSNPREFIX(DBSMS.DB.TEST003)
```

**ANALYZEPART example: Using unloaded data sets as input**

If you want to use unloaded data sets as input for the ANALYZEPART function, specify the unloaded data sets on the DFSUINPT DD statement and specify the INPUT(UNLOAD) parameter.

Subsections:

- “Example 1: Simulate conversion to a HALDB” on page 36
- “Example 2: Simulate repartitioning of a HALDB (all partitions)” on page 36
- “Example 3: Simulate repartitioning of a HALDB (one partition)” on page 37
- “Example 4: Split unloaded data sets and simulate repartitioning of a HALDB” on page 37

**Example 1: Simulate conversion to a HALDB**

To simulate conversion of a full-function database to a HALDB, add the DFSUINPT DD statement and the INPUT(UNLOAD) parameter.

In this example:

- DFSUINPT DD statement specifies the unloaded data set.
- INPUT(UNLOAD) parameter specifies to read input data from the unloaded data set.
- PARTNUM(3) parameter specifies to convert the database into a HALDB with three partitions.

```
//DFSUINPT DD DISP=SHR, DSN=your.hd.unload.dataset
//IHCSYSIN DD *
ANALYZEPART DBD(xxxx) -
   INPUT(UNLOAD) -
   PARTNUM(3)
```

**Example 2: Simulate repartitioning of a HALDB (all partitions)**

To simulate repartitioning of all the partitions in a HALDB, use the following example.

In this example:

- DFSUINPT DD statement specifies the unloaded data set. The unloaded data set contains all the data from all the partitions.
- INPUT(UNLOAD) parameter specifies to read input data from the unloaded data set.
- PARTITION(*) parameter specifies to process all the partitions in the HALDB.
- PARTSIZE(2048) specifies to create partitions each with a size of 2048 MB.
- DBRCOUT parameter and dbrcout DD specify to generate DBRC commands for repartitioning.

```
//DFSUINPT DD DISP=SHR, DSN=your.hd.allpart.unload.dataset
//dbrcout DD SYSOUT=* 
//IHCSYSIN DD *
ANALYZEPART DBD(xxxx) -
   INPUT(UNLOAD) -
   PARTITION(*)
```

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Example 3: Simulate repartitioning of a HALDB (one partition)

To simulate repartitioning of one partition into two partitions, use the following example.

In this example:
- DFSUINPT DD statement specifies the unloaded data set. The unloaded data set contains all the data of the partition.
- INPUT(UNLOAD) parameter specifies to read input data from the unloaded data set.
- PARTLIST(part1) specifies to process only one partition.
- PARTNUM(2) specifies to simulate repartitioning into two partitions.

Example 4: Split unloaded data sets and simulate repartitioning of a HALDB

If you have an unloaded data set that contains data of all partitions and you want to simulate only some partitions, split the unloaded data set by using the split unload file utility before you simulate repartitioning with the ANALYZEPART function.

In this example, you have an unloaded data set that contains all the data from a HALDB that has three partitions (part1, part2, and part3). You want to simulate repartitioning of two partitions (part1 and part2).

Step 1: Splitting unloaded data set

Use the split unload file utility to split the unloaded data set into multiple unloaded data sets. This utility splits unloaded data sets into single partition unloaded data sets. For more information about the split unload file utility, see Chapter 8, “Splitting an unload file into single partition files,” on page 151.

The following JCL example is for the split unload file utility. In this example:
- DFSUINPT DD statement specifies the unloaded data set that contains all the data of a HALDB that has three partitions.
- part1Z, part2Z, and part3Z DD statements specify the output data sets, which are single partition unloaded data set for each partition.
Step 2: Simulate repartitioning of two partitions

Specify the unloaded data sets for part1 and part2 generated by the split unload file utility and run the ANALYZEPART function.

In this example:
- your.hd.part1.unload.dataset on the DFSUINPT DD contains unloaded data of partition part1.
- your.hd.part2.unload.dataset on the DFSUINPT DD contains unloaded data of partition part2.
- INPUT(UNLOAD) parameter specifies to read input data from the unloaded data sets.
- PARTLIST(part1,part2) specifies to process two partitions.
- PARTNUM(3) specifies to simulate repartitioning into three partitions.

ANALYZEPART example: Generating DBD source

When you simulate conversion to a HALDB by using the ANALYZEPART command, you can optionally specify the DBDSOURCE parameter to generate a set of DBD sources for the Database Description (DBD) Generation (DBDGEN) utility.

If you also specify the DBDSRCONLY(Y) parameter, you can generate a set of DBD sources without simulating HALDB conversion. When DBDSRCONLY(Y) is specified, IMS HALDB Toolkit ignores all the parameters that are not used for generating the DBD source and creates no reports in the IHCLIST data set.

To generate DBD source, add the DBDSOURCE parameter to the ANALYZEPART command and the dbdsource DD statement, as shown in the following example:

```
//DBDSRC DD DISP=(,CATLG),DSN=your.DBDSRC,
//                  UNIT=SYSDA,SPACE=(TRK,(3,1,5)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//IHCSYSIN DD *
ANALYZEPART DBD(xxxx) -
PARTNUM(3) -
DBDSOURCE(DBDSRC)
```

The DBDSOURCE parameter value (dbdsource) specifies the name of the DD to which IMS HALDB Toolkit writes the DBD sources.

Example 1

If you want to generate DBD source without simulating HALDB conversion, specify the DBDSRCONLY(Y) parameter, as shown in the following example:

```
//DBDSRC DD DISP=(,CATLG),DSN=your.DBDSRC,
//                  UNIT=SYSDA,SPACE=(TRK,(3,1,5)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//IHCSYSIN DD *
ANALYZEPART DBD(xxxx) -
DBDSRCONLY(Y) -
DBDSOURCE(DBDSRC)
```
Example 2

If you want to change a database with multiple data set groups into a database with a single data set group and convert VSAM to OSAM, specify DSG1(Y) and OSAM(Y).

For more information about these parameters, see “ANALYZEPART command parameters for generating DBD source” on page 31.

```
//DBDSRC DD DISP=(,CATLG),DSN=your.DBDSRC,
//          UNIT=SYSDA,SPACE=(TRK,(3,1,5)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//IHCSYSIN DD *
ANALYZEPART DBD(xxxx) -
   PARTNUM(3) -
   DSG1(Y) -
   OSAM(Y) -
   DBDSOURCE(DBDSRC)
```

Example 3

If you want to use an unload data set as input and generate DBD source, specify the INPUT(UNLOAD) and the DBDSOURCE parameters, as shown in the following example:

```
//DFSUINPT DD DISP=SHR,DSN=your.hd.unload.dataset
//DBDSRC DD DISP=(,CATLG),DSN=your.DBDSRC,
//          UNIT=SYSDA,SPACE=(TRK,(3,1,5)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//IHCSYSIN DD *
ANALYZEPART DBD(xxxx) -
   INPUT(UNLOAD) -
   PARTNUM(3) -
   DBDSOURCE(DBDSRC)
```
Part 3. Converting to a HALDB

In batch mode, you can convert to HALDB in a single step by using the `CONVERT` command. Alternatively, you can use the ISPF user interface to perform the same task.

**Topic:**

- Chapter 3, “Converting to HALDB using CONVERT,” on page 43
Chapter 3. Converting to HALDB using CONVERT

Use the CONVERT command to convert a database in batch mode. New data set allocations use the same System Managed Storage (SMS) constructs or the same volume serial when running outside of SMS.

Topics:
• “CONVERT data flow” on page 43
• “Converting databases offline” on page 44
• “CONVERT DD statements” on page 45
• “CONVERT command parameters” on page 48
• “CONVERT examples” on page 68

CONVERT data flow

The following figure shows the data flow for the CONVERT function.

The CONVERT function performs all of the following processes in a single job step:
• Unload
• Change DBD
• Define HALDB
• Allocate HALDB
• Initialize HALDB
• Reload
• Backup
Converting databases offline

You can convert full-function databases offline by using the CONVERT command.

About this task

Databases must be offline to use this method. You must manually /DBR your databases before running the conversion job.

Restriction: Databases with logical relationships (except for indexes) are not supported.

Procedure

1. Locate the sample JCL for this task in the SIHCSAMP file, member IHCECVTN.
2. Specify the JCL DD statements.
   For a list of DD statements, see “CONVERT DD statements” on page 45.
3. Specify the CONVERT command parameters.
   For a list of CONVERT command parameters, see “CONVERT command parameters” on page 48.
   Specify the ONLINE parameter as ONLINE(N). ONLINE(N) is the default if you do not specify this parameter. The following parameters are required to perform offline conversion:

   ```
   //IHCSYSIN DD *
   CONVERT DBD(xxx) ONLINE(N)...
   ```

   You can also refer to the following examples to code CONVERT JCL statements and command parameters:
   • “CONVERT example: Specifying the number of partitions ” on page 68
   • “CONVERT example: Specifying the partition size” on page 69
   • “CONVERT example: Specifying the key ranges for partitions” on page 70
4. Manually /DBR your databases before running the conversion job.
5. After the conversion process is complete and you are certain that you will not need to revert the database to its non-HALDB state:
   • You can delete any DFSMDA members for the old database.
   • If the Integrity Checker utility of IMS Library Integrity Utilities is active in your environment, you can delete the RDE for the old database by using the LICON utility.

Example

The following example shows the sample JCL for batch offline conversion:
**JOBNAME**   JOB NAME,000,CLASS=A,MSGCLASS=X

//********************************************************************
//*     SAMPLE JCL FOR CONVERT ONLINE(N) - "OFFLINE BATCH MODE"
//*
//* Your databases must be registered to DBRC
//* Your databases must be db'd/stopped prior to executing this job
//********************************************************************
//S2     EXEC PGM=IHCHALDB,DYNAMNBR=999,REGION=80M
//STEPLIB  DD DISP=SHR,DSN=
//         DD DISP=SHR,DSN=
//         DD DISP=SHR,DSN=
//DFSRESLB DD DISP=SHR,DSN=
//MACLIB   DD DISP=SHR,DSN=
//IMS      DD DISP=SHR,DSN=
//SYSPRINT DD SYSOUT=*  
//MSGPRINT DD SYSOUT=*  
//DBDPRINT DD SYSOUT=*  
//LNKPRINT DD SYSOUT=*  
//AMSPRINT DD SYSOUT=*  
//SYSDUMP  DD SYSOUT=*  
//IHCLIST  DD SYSOUT=*  
//IHCSYSIN DD *
CONVERT  ONLINE(N) -
   DBDPATT(*****...) DSNPREF(DBSMS.DB) -
   DBD(xxxx) -
   PARTNUM(2) -
   * -
   ICMID(3) -
   ICHLQ(DBSMS.DB.IC) -
   ICTRLR(2) -
   IC.COMP(Y) -
   IC.COMPRTN(FABJCM2) -
   PTRCHECK(Y)

Figure 6. Sample JCL (IHCECVTN) for batch conversions (Online(N))

**Related reference**
Performance tips and considerations
Use this information to learn the techniques for improving the performance of ANALYZEPART, CONVERT, and MAINTAIN function jobs.

**CONVERT DD statements**

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the **CONVERT** command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>MACLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input/Output</td>
<td>Same as IMS</td>
<td>Require when ACBGEN(Y)</td>
</tr>
<tr>
<td>PSBLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td></td>
</tr>
</tbody>
</table>
Table 7. DD statements and record format for the CONVERT command (continued)

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSACB</td>
<td>Output</td>
<td>Same as IMS</td>
<td>Required when ACBGEN(Y)</td>
</tr>
<tr>
<td>original_dbds</td>
<td>Input</td>
<td>Depends on database organization</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCLIST</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>DBDPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Required</td>
</tr>
<tr>
<td>LNKPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Required</td>
</tr>
<tr>
<td>AMSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Required</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```
//STEPLIB DD DISP=SHR,DSN=ihcload
//    DD DISP=SHR,DSN=imstools
//    DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**MACLIB**

This statement is required. The statement specifies the MACLIB data set for DBDGEN.

**IMS**

This statement is required. The statement describes the library that contains the DBDs of the database that you are processing.
This data set must reside on DASD.

**IMSDALIB**
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**RECON**
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

⚠️ **Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**original_ddbs**
This statement is optional. This statement defines the database data set. One statement of this type must be present for each data set in the DBD that describes this database. The DD name must match the DD name in the DBD.

For a HIDAM database, DD statements must also exist for the data sets that represent the index. The DD statements that relate to the index must contain DD names specified in the DBD for the index database.

The data sets, if specified, must reside on DASD. If you use dynamic allocation, do not code the DD statement for the database data sets.

⚠️ **Attention:** If this DD statement is coded, do not code DCB=BUFNO=\(n\) or AMP=‘BUFND=\(n\)’ to request access method buffers for database data sets because HSSR Engine of IMS HP Unload allocates its own buffer pools.

**IHCSYSIN**
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “CONVERT command parameters” on page 48.

**SYSPRINT**
This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

**MSGPRINT**
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**IHCLIST**
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for reports. For more information about the reports generated in this data set, see “IHCLIST data set” on page 280.
The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**DBDPRINT**
This statement is required. The statement defines the output data set for the assemble step of DBDGEN.

The data set can reside on DASD, or it can be routed through the output job.

**LNKPRINT**
This statement is required. The statement defines the output data set for the link step of DBDGEN.

The data set can reside on DASD, or it can be routed through the output job.

**AMSPRINT**
This statement is required. The statement defines the output data set for the IDCAMS utility.

The data set can reside on DASD, or it can be routed through the output job.

**TRACE**
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

**IMSACB**
This statement is required when ACBGEN(Y). The statement describes the staging ACBLIB where IMS HALDB Toolkit generates the new ACBs for the converted DBDs.

This data set must reside on DASD.

**PSBLIB**
This statement is required when ACBGEN(Y). The statement describes the PSB library to rebuild all PSBs in the ACB library that reference the DBD to be converted.

### CONVERT command parameters

The following parameters are available to use with CONVERT command conversions.

IMS HALDB Toolkit ignores any parameters that are unavailable for the requested process.

**Table 8. CONVERT command parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACBGEN</td>
<td>Optional</td>
<td>Specifies to run the ACBGEN process during the takeover phase.</td>
</tr>
</tbody>
</table>

**Format**
(Y | N)

**Default value**
N
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTELIM</td>
<td>Optional</td>
<td>Specifies a new maximum-insert-byte for the DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (1 - 16777215)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> If omitted, the default action is to copy from the existing DBD.</td>
</tr>
<tr>
<td>CONST</td>
<td>Optional</td>
<td>Used as a substitute for the DBD name when building partition names. See also DBDPATT, INDPATT, and FIRSTPART parameters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (constant)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>DATACLAS</td>
<td>Optional</td>
<td>Specifies the name of the data class for the new SMS-managed databases and image copy data sets that IMS HALDB Toolkit dynamically allocates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (dataclass)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> • For database data sets: If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For image copy data sets: None.</td>
</tr>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies which full-function database is to be converted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (dbdname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>DBDBACKUP</td>
<td>Optional</td>
<td>Backs up the existing DBD to a specified library.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This parameter includes a DDNAME that must be included in the JCL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (ddname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>DBDCOPY</td>
<td>Optional</td>
<td>Copies the new DBD to your DBD library.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If NEWDBD is not specified, DBDCOPY is set to Y.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> Y</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>DBDPATT</td>
<td>Optional</td>
<td>Creates a partition name from the DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can use a maximum of 6 asterisks (*) to identify the position in the DBD name. The default is 6 asterisks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When 6 are specified, only 1 character is used for the partition name, which creates a limit of 36 partitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If fewer than 6 positions are specified, 1 - 3 characters are used for the partition name depending on the FIRSTPART parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can also use periods(.) to ignore certain characters of the DBD name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>DBDSOURCE</td>
<td>Optional</td>
<td>Generates the DBD source for the converted HALDB and places it in the specified library.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This parameter includes a DDNAME that must be included in the JCL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The data set that you specify for dbdsoure DD must be a partitioned data set (PDS) or a partitioned data set extended (PDSE) with LRECL=80 and RECFM=F. SYSOUT=* cannot be specified for this data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>DBRCBACK</td>
<td>Optional</td>
<td>Backs up the existing DBRC to a specified library.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This parameter includes a DDNAME that must be included in the JCL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The data set that you specify for dbrcback DD must be a partitioned data set (PDS) or a partitioned data set extended (PDSE) with LRECL=80 and RECFM=F. SYSOUT=* cannot be specified for this data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>DSG1</td>
<td>Optional</td>
<td>Changes a database with multiple data set groups into a database with a single data set group.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
</tbody>
</table>
Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNDBD</td>
<td>Optional</td>
<td>Specifies the suffix portion of the new data set name that you are using.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A total of 37 characters are allowed for the entire data set name, which includes the characters used for the DSNPREF prefix and the characters used for the DSNDBD suffix.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(DBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DBD</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add the DBD name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PART</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add the partition name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DBDPART</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add the DBD name and the partition name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DBD</td>
</tr>
<tr>
<td>DSNPREF</td>
<td>Required</td>
<td>Specifies a high-level data set name to be used when building new partition data set names.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The DBRC DSNPREFX parameter is created from this specification and appended with the DBD name. The final data set name is then appended by DBRC with the DBD file letter and the partition number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dsnprefix)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>FBFF</td>
<td>Optional</td>
<td>Specifies a new free block frequency factor (FBFF) to be used when defining a partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0 - 99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from the existing FBFF.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>FIRSTPART</td>
<td>Optional</td>
<td>Identifies the partition name extension to be added to the name &quot;stub&quot; created by the DBDPATT and INDPATT parameters. The &quot;stub&quot; and the extension cannot exceed 7 characters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ccc)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ccc defines the character strings that are used, where:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>001</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 0, if six asterisks (*) are specified on the DBDPATT parameter or the DBDPATT parameter is not specified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• AA, if five asterisks are specified on the DBDPATT parameter.</td>
</tr>
<tr>
<td>FSPF</td>
<td>Optional</td>
<td>Specifies a new free space percentage value per interval or block (FSPF) to be used when defining a partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0 - 99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from the existing FSPF.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>GDGLIMIT</td>
<td>Optional</td>
<td>Specifies the maximum number of GDG (generation data group) data sets that can be associated with the GDG. This value is used only when the GDG base does not exist and a GDG is created during the job. IMS HALDB Toolkit uses the value specified for this parameter when a GDG is requested for image copy data sets. If you specify one of the following parameters, the existence of a GDG base is verified before the image copy data set is allocated: • ICTRLR(1) to request that image copy data sets are GDGs • &amp;GDG is specified on the IC1DSN or IC2DSN parameter to request that image copy data sets are GDGs If a GDG base does not exist, IMS HALDB Toolkit automatically defines one using the GDGLIMIT parameter value to control the number of generations to keep. <strong>Format</strong> (1 - 255) <strong>Default value</strong> 20</td>
</tr>
<tr>
<td>IC.COMP</td>
<td>Optional</td>
<td>Used for IMS High Performance Image Copy processing. This parameter specifies whether compression is used. If the copy is a standard image copy, this parameter is ignored. <strong>Format</strong> (Y</td>
</tr>
<tr>
<td>IC.COMPRTN</td>
<td>Optional</td>
<td>Used for IMS High Performance Image Copy processing. If IC.COMP(Y) is used, this parameter specifies the name of a compression routine. If the copy is a standard image copy, this parameter is ignored. <strong>Format</strong> (comprtn) <strong>Default value</strong> FABJCMP1</td>
</tr>
<tr>
<td>IC.VIC</td>
<td>Optional</td>
<td>Specifies whether a virtual image copy is taken. Specify Y to activate IC.VIC and suppress the creation of image copies for all PSINDEXes. A NOTIFY.UIC is used instead. <strong>Format</strong> (Y</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| IC.VICDSN  | Optional    | Activated only when IC.VIC(Y) is also specified. Specifies a string of up to 44 characters that are used as UDATA for the NOTIFY.UIC. The string must conform to z/OS and IMS data set name rules.  
**Format**  
(dsname)  
**Default value** | None. |
Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC1DSN</td>
<td>Optional</td>
<td>This parameter provides an alternative to using the ICHLQ, ICID, ICMID, and ICTRLR parameters to specify the data set name for an image copy.</td>
</tr>
</tbody>
</table>

**Format**

\[(dsname)\]

The data set name can contain variables. To specify a variable, use an ampersand (&). The following variables are supported:

- **&JOBNAME**
  - Name of this job.

- **&DBD**
  - The DBD name. This value changes to the first partition name when not all partitions are processed.

- **&DDNAME**
  - The DD name of the database data set.

- **&DATE1**
  - This variable is substituted as Dyyyyddd.

- **&DATE2**
  - This variable is substituted as Ddddyyyy.

- **&DATE3**
  - This variable is substituted as Dddmmyy.

- **&DATE4**
  - This variable is substituted as Dmmdyy.

- **&DATE5**
  - This variable is substituted as Dyymmd.

- **&TIME1**
  - This variable is substituted as Thhmmss.

- **&TIME2**
  - This variable is substituted as Thhmm.

- **&GDG**
  - The identifier for the GDG data set.

  If specified, &GDG must be the last value on the IC1DSN parameter.

where:

- \( yyyy \) is the 4-digit year
- \( yy \) is the last 2 digits of the year
- \( mm \) is the month
- \( ddd \) is the day of the year
- \( dd \) is the day of the month
- \( hh \) is the hour (24-hour clock) local time
- \( mm \) is the minute
- \( ss \) is the second

**Default value**

None.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| IC2DSN    | Optional    | Specifies the secondary image copy data set name. To create the data set name, use the same method that is described for the IC1DSN keyword. You must specify a unique data set name.  
**Format**  
(dsname)  
**Default value**  
None. |
| ICHLQ     | Optional    | Specifies the high-level qualifier for the image copy data sets.  
**Format**  
(ichlq)  
**Default value**  
If omitted, the action defaults to DSNPREF. |
| ICID      | Optional    | Used to override the default (IC1 or IC2) for the suffix qualifier for dual image copy data sets.  
**Format**  
(1 | 2) or (Y | N)  
Y is equivalent to 1, and N is equivalent to 2.  
**Default value**  
1 |
| ICMID     | Optional    | Specifies the mid-level data set qualifier for image copy data sets.  
**Format**  
(1 - 4)  
The ICMID parameter specifications render the following mid-level data set qualifiers:  
ICMID(1)  
dbdname.ddname.  
ICMID(2)  
dbdname.  
ICMID(3)  
ddname.  
ICMID(4)  
None.  
**Default value**  
3 |
| ICNUM     | Optional    | Specifies single or dual image copies.  
**Format**  
(1 | 2)  
**Default value**  
1 |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICOFF</td>
<td>Optional</td>
<td>Specifies that no image copies are to be taken, and turns off the ICNEEDED parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>ICTRLR</td>
<td>Optional</td>
<td>Specifies whether to use another final suffix qualifier for image copy data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1 - 6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ICTRLR parameter specifications render the following final suffix qualifiers:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(1)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GDG</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(2)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyyymmd. Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(3)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dmmddyy. Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(4)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dddmmyy. Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(5)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(6)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyyddd. Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>Specifies the IMS ID to use when updating the IMS Library Integrity Utilities partition description.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nnnn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default is obtained from the current SDFSRESL (DFSVC000).</td>
</tr>
<tr>
<td>INDPART</td>
<td>Optional</td>
<td>Specifies the number of index partitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cannot be used with INDSIZE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1 - 999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| INDPATT   | Optional    | Creates a partition name "stub" from the DBD name of a secondary index.  
  **Format**  
  (cccccccc) where c is an asterisk (*) or a period (.)  
  This parameter is similar to DBDPATT. The "**" positions of the DBD name are kept to create the "name stub."  
  You can use a maximum of 6 asterisks (*) to identify the position. The default is 6 asterisks.  
  **Default value**  
  DBDPATT is used. If neither DBDPATT nor INDPATT is specified, the default is (**....**). |
| INDPRIIM  | Optional    | Specifies whether a secondary index is partitioned the same as the primary database.  
  The following restrictions apply:  
  • The index key must be the root segment key.  
  • The primary database must be partitioned using the KEYS parameter.  
  **Format**  
  (Y | N)  
  **Default value**  
  N |
| INDSIZE   | Optional    | Specifies the size of each index partition.  
  Cannot be used with INDPART.  
  **Format**  
  (1 - 4095)  
  **Default value**  
  1024 |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITDB</td>
<td>Optional</td>
<td>DDNAME in JCL that allows parameters to be added to the DBRC INIT.DB command, which are not currently specified by the product.                                                                                           This parameter can be specified in stream or in a data set. If no parameters are added, the defaults for the Global Service Group (GSG) are used. If specified, this parameter requires a DDNAME which must be included in the JCL. Any DBRC statements that you specify on the initdb_dd DD statement are included in the statements that are generated by the product. DBRC statements coded on the initdb_dd DD statement must conform to the syntax of the INIT.DB command. For the syntax rules, see the topic &quot;INIT.DB command&quot; in IMS Commands. Format (initdb_dd) Default value None.</td>
</tr>
<tr>
<td>INITPART</td>
<td>Optional</td>
<td>DDNAME in JCL that allows parameters to be added to the DBRC INIT.PART command, which are not currently specified by the product.                                                                                      IMS HALDB Toolkit uses the defaults for GENMAX, DFLTJCL, ICJCL, OICJCL, RECOVJCL, RECOVPD, RECVJCL, and NOREUSE. Any DBRC statements that you specify on the initpart_dd DD statement are included in the statements that are generated by the product. DBRC statements coded on the initpart_dd DD statement must conform to the syntax of the INIT.PART command. For the syntax rules, see the topic &quot;INIT.PART command&quot; in IMS Commands. Format (initpart_dd) Default value None.</td>
</tr>
<tr>
<td>KEYLABEL</td>
<td>Optional</td>
<td>Specifies the encryption key label for encrypting dynamically allocated database data sets and image copy data sets. The key label can be up to 64 bytes.                                                                                                                       Format (keylabel) Default value None.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| KEYLEN    | Optional    | Specifies the length of the subkey when IHCPSEL0 is used. For example, to partition by country, using a country code that is 3 characters in position 7-9 of your key, specify the following: 

```
KEYLEN(3) KEYOFF(6)
```

**Format**

`(nnn)` where `nnn` is 1 to root keylen -1

**Default value**

None.

| KEYOFF    | Optional    | Specifies the offset within the root segment key to be used when IHCPSEL0 has been specified as PARTSEL. The offset must be at least 1. Offset 0 does not need a partition selection exit. For example, to partition by country, using a country code that is 3 characters in position 7-9 of your key, specify the following: 

```
KEYLEN(3) KEYOFF(6)
```

**Format**

`(nnn)` where `nnn` is 1 to root keylen -1

**Default value**

None.

| KEYS      | Optional    | Specifies a DD statement which contains records for the high keys; cannot be used with PARTNUM or PARTSIZE. This parameter can be specified as a character or hexadecimal. Specifying KEYS results in as many partitions as there are keys specified in the file. The specifications are analyzed to determine whether the requested partitioning is feasible. If the number of partitions has been specified, IMS HALDB Toolkit verifies that no partition is larger than 4 GB. If the high keys are created during analysis, there must be at least as many database records as there are requested partitions. 

**Format**

`(ddname)`

**Default value**

If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.
### Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| MGMTCLAS  | Optional    | Specifies a new SMS management class.  
**Format**  
\((\text{mgmtclasc})\)  
**Default value**  
- For database data sets: If omitted, the default action is to copy from existing data sets.  
- For image copy data sets: None. |
| NEWDBD    | Optional    | Specifies the DDNAME of the data set that contains the changed HALDB DBDs. This parameter is a DDNAME, which must be included in the JCL.  
If NEWDBD is not specified, a temporary data set is used. DBDCOPY is then reset to Y.  
**Format**  
\((\text{ddname})\)  
**Default value**  
None. |
| ONLINE    | Optional    | Specifies whether the batch conversion is to be performed while the databases remain online.  
ONLINE(Y) is not supported by IMS Database Utility Solution.  
**Format**  
\((\text{Y | N})\)  
**Default value**  
N |
| OSAM      | Optional    | Converts VSAM to OSAM.  
**Format**  
\((\text{Y | N})\)  
**Default value**  
N |
| OVFLINCR  | Optional    | Increases HDAM overflow area by a number of blocks.  
**Format**  
\((0 - 9999999)\)  
**Default value**  
None. |
### Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNUM</td>
<td>Optional</td>
<td>Specifies the number of partitions to be created. PARTNUM cannot be used with PARTSIZE or KEYS. Specifying this parameter causes IMS HALDB Toolkit to find the high keys. The specifications are analyzed to determine whether the requested partitioning is feasible. PARTNUM might not result in the exact number of partitions specified because a root segment and all of its dependent segments must be written to the same partition. Therefore, fewer than PARTNUM partitions might be created so that hierarchical integrity is preserved. If the number of partitions has been specified, IMS HALDB Toolkit verifies that no partition is larger than 4 GB. If the high keys are created during analysis, there must be at least as many database records as there are requested partitions. <strong>Format</strong> (1 - 999) <strong>Default value</strong> None. If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.</td>
</tr>
<tr>
<td>PARTSEL</td>
<td>Optional</td>
<td>Specifies a partition selection routine to be used. This parameter must be used with the KEYS parameter. IMS HALDB Toolkit provides an exit for partition selection (IHCPSEL0). When you use this exit, the database is partitioned using a subset of the key. If you use IHCPSEL0, you must also select the KEYOFF and KEYLEN parameters. <strong>Format</strong> (partition_selection_routine) <strong>Default value</strong> None.</td>
</tr>
</tbody>
</table>
| PARTSIZE  | Optional    | Specifies the size of partitions that are created. PARTSIZE cannot be specified with PARTNUM or KEYS. Specifying the PARTSIZE parameter causes IMS HALDB Toolkit to find the high keys. The specifications are analyzed to determine whether the requested partitioning is feasible. **Format** (1 - 8191) • For a VSAM, 1 - 4095. • For a VSAM with the OSAM(Y) parameter, 1 - 8191. • For an OSAM, 1 - 8191. **Default value** If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| PTRCHECK     | Optional    | Performs pointer checking during image copy.  
This parameter is ignored when using the standard IMS image copy.  
**Format**  
(Y | N)  
**Default value**  
N |
| RAAINCR      | Optional    | Increases HDAM root addressable area (RAA) by a specified number of blocks.  
**Format**  
(0 - 26777215)  
**Default value**  
None. |
| RAPS         | Optional    | Specifies new PHDAM root anchor points (RAPs).  
**Format**  
(1 - 255)  
**Default value**  
If omitted, the default action is to copy from the existing RAPs. |
| RELOAD.DBIOS | Optional    | Used for IMS High Performance Load processing. Specifies the number of tracks for the access method (VSAM or BSAM) buffers that are used for one database data set group when the database is read or written to.  
If the load is a standard HD Load, this parameter is ignored.  
For details, see the *IMS High Performance Load User's Guide*.  
**Format**  
(1 - 999)  
**Default value**  
30 |
| RELOAD.DBRLS | Optional    | Used for IMS High Performance Load processing. Specifies the number of database buffers (the number of tracks) to be used for one database data set group when the database is read or written to.  
If the load is a standard HD Load, this parameter is ignored.  
For details, see the *IMS High Performance Load User's Guide*.  
**Format**  
(1 - 999)  
**Default value**  
45 |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELOAD.FRSPC</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether IMS HP Load secures free space according to the specification of the FRSPC parameter in DBD. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> *(YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> YES</td>
</tr>
<tr>
<td>RELOAD.HPIO</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether IMS HP Load uses the High Performance I/O Driver for output database data sets. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> *(YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> YES</td>
</tr>
<tr>
<td>RELOAD.OADSPR</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether IMS HP Load reduces the usage of data space when processing the overflow area by using the High Performance I/O driver or by using an OVERFLOW DD. This specification is valid only for HDAM or PHDAM databases. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> *(YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> NO</td>
</tr>
<tr>
<td>RELOAD.RAAFORMAT</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether IMS HP Load is to format HDAM or PHDAM RAA blocks regardless of the number of blocks used. Once the overflow area is used, this parameter is ignored and the entire RAA is formatted. This specification is valid only for HDAM or PHDAM databases. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> *(YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> YES</td>
</tr>
</tbody>
</table>
Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| RELOAD.SEARCH   | Optional    | Used for IMS High Performance Load processing. Specifies the limit value for a space search algorithm that finds a segment that does not fit in its home block. This specification is valid for HDAM or PHDAM databases.  
If the load is a standard HD Load, this parameter is ignored.  
For details, see the *IMS High Performance Load User's Guide*.  
**Format**  
(0 - 999)  
**Default value**  
0                                                           |
| RELOAD.SORT     | Optional    | Used for IMS High Performance Load processing. Specifies whether to run the physical sequential sort processing before loading. This specification is valid only for HDAM and PHDAM databases.  
If the load is a standard HD Load, this parameter is ignored.  
For details, see the *IMS High Performance Load User's Guide*.  
**Format**  
(YES | NO)  
**Default value**  
NO                                                          |
| RELOAD.USEREXIT | Optional    | Used for IMS High Performance Load processing. Specifies whether IMS HP Load invokes a user exit routine.  
If the load is a standard HD Load, this parameter is ignored.  
For details, see the *IMS High Performance Load User's Guide*.  
**Format**  
(user_exit)  
**Default value**  
None.                                                       |
| STORCLAS        | Optional    | Specifies the name of the storage class for the new SMS-managed databases and image copy data sets that IMS HALDB Toolkit dynamically allocates.  
**Format**  
(storclas)  
**Default value**  
• For database data sets: If omitted, the default action is to copy from existing data sets.  
• For image copy data sets: None.                           |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAKEOVER.FILE</td>
<td>Optional</td>
<td>Saves the takeover statements (DBRC and IDCAMS) to a specified data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>UNLSPAC</td>
<td>Optional</td>
<td>Specifies a 4-digit numeric space allocation value for temporary data set allocations, for example, the unload file. Specify a numeric value for the number of cylinders to allocate to each temporary data set. If the number of cylinders to allocate to each temporary data set is omitted, IMS HALDB Toolkit determines the optimal value. The number of data sets that are allocated is determined by IMS HALDB Toolkit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(0 - 3000)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>UNLUNIT</td>
<td>Optional</td>
<td>Specifies any valid direct-access 8-character unit name for temporary data set allocations, for example, the unload file. These files are temporary files that default to SYSALLDA, unless otherwise specified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(unitname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SYSALLDA</td>
</tr>
</tbody>
</table>
Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLALLO</td>
<td>Optional</td>
<td>Used to override the space allocation when creating the database data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>((nn, pppp, ssss))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If (nn) is greater than 1, candidate volumes are defined. If (nn) is zero, VOLALLO is ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pppp)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ssss)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (nn): 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (pppp): 300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (ssss): 300</td>
</tr>
<tr>
<td>VOLALLOL</td>
<td>Optional</td>
<td>Used to override the space allocation when creating the ILDS data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>((nn, pppp, ssss))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If (nn) is greater than 1, candidate volumes are defined. If (nn) is zero, VOLALLOL is ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pppp)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ssss)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (nn): 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (pppp): None.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (ssss): None.</td>
</tr>
</tbody>
</table>
Table 8. CONVERT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLALLOX</td>
<td>Optional</td>
<td>Used to override the space allocation when creating the primary index data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$(nn,pppp,ssss)$</td>
</tr>
<tr>
<td>$nn$</td>
<td></td>
<td>The number of volumes to be used. This parameter is for SMS controlled allocations. If $nn$ is greater than 1, candidate volumes are defined. If $nn$ is zero, VOLALLOX is ignored.</td>
</tr>
<tr>
<td>$pppp$</td>
<td></td>
<td>The number of cylinders for the primary allocation.</td>
</tr>
<tr>
<td>$ssss$</td>
<td></td>
<td>The number of cylinders for the secondary allocation.</td>
</tr>
</tbody>
</table>

**Default value**
- $nn$: 0
- $pppp$: None.
- $ssss$: None.

**CONVERT examples**

Use the following examples to learn what you can do with the CONVERT function.

- “CONVERT example: Specifying the number of partitions” on page 68
- “CONVERT example: Specifying the partition size” on page 69
- “CONVERT example: Specifying the key ranges for partitions” on page 70

**CONVERT example: Specifying the number of partitions**

If you know how many partitions you intend to convert to, you can use the PARTNUM parameter to specify this number.

To specify the number of partitions, use the sample member IHCECVT1. The following example converts a database into two partitions:
CONVERT example: Specifying the partition size

If you know how large you want each partition to be, you can use the PARTSIZE parameter to specify this number.

To specify the size of partitions, use the member IHCECVT2. The following example converts a database into partitions each with a size of 2048 MB.
**CONVERT example: Specifying the key ranges for partitions**

If you want to assign specific key ranges to partitions, you can use the KEYS parameter to specify an input data set containing the keys. The KEYS parameter specifies the high key boundaries for each partition.

To specify the ranges for partitions, use the member IHCECVT3. The following example converts a database into two partitions with each partition containing the keys up to the specified high key boundary.
// JOBNAME   JOB NAME,000,CLASS=A,MSGCLASS=X
//*************************************************************************
//**   SAMPLE JCL FOR CONVERT - using KEYS method
//**
//**   Your databases must be registered to DBRC
//**   You must /db your databases prior to executing this job
//*************************************************************************
//S2 EXEC PGM=IHCHALDB,DYNAMNBR=999,REGION=80M
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD <<< your hcma loadlib
// DD DISP=SHR,DSN=your.SDFSRESL <<< ims reslib
// DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL <<< ims reslib
//MACLIB DD DISP=SHR,DSN=your.SDFSMAC <<< ims maclib
// IMS DD DISP=SHR,DSN=your.dbdlib <<< ims dbdlib
//IMSDALIB DD DISP=SHR,DSN=your.mdalib <<< ims mdalib
//SYSPRINT DD SYSOUT=* 
//MSGPRINT DD SYSOUT=* 
//DBDPRINT DD SYSOUT=* 
//LNKPRINT DD SYSOUT=* 
//SYSPRINT DD SYSOUT=* 
//MSGPRINT DD SYSOUT=* 
//DBDPRINT DD SYSOUT=* 
//LNKPRINT DD SYSOUT=* 
//SYSPRINT DD SYSOUT=* 
//MACLIB DD DISP=SHR,DSN=your.SDFSMAC <<< ims maclib
// IMS DD DISP=SHR,DSN=your.dbdlib <<< ims dbdlib
//IMSDALIB DD DISP=SHR,DSN=your.mdalib <<< ims mdalib
//KEYSIN   DD * (documentation only)
//** your first high-order key for partition1
//** your second high-order key for partition2 and so on...
//** your highest key for last partition
//*************************************************************************
//KEYSIN DD * 
M999999999 
Z999999999 
//IHCSYSIN DD *
//CONVERT ONLINE(N) -
// KEYS(KEYSIN) -
// DBDPATT(*****...) DSNPREF(DBSMS.DB) -
// DBD(xxxx) -
// ICMD(3) -
// ICHL(DBSMS.DB.IC) -
// ICTRLR(2) -
// IC.COMP(Y) -
// IC.COMPRTN(FABJCMP2) -
// PTRCHECK(Y)

Figure 9. Sample JCL (IHCECVT3) for batch using KEYS
In batch mode, you can perform maintenance on HALDB partitions by using the `MAINTAIN` command. Use the `MAINTAIN` command to consolidate, split, and reorganize partitions.

Instead of using the `MAINTAIN` command in batch mode, you can alternatively use the ISPF user interface to perform the same tasks.

By using batch mode, you can:

- Merge two HALDBs into one, which provides the capability to resolve user partitioning
- Provide a way to delete single partitions without rebuilding secondary indexes

**Topic:**
- Chapter 4, “Maintaining HALDB using MAINTAIN,” on page 75
Chapter 4. Maintaining HALDB using MAINTAIN

Use the MAINTAIN command to perform maintenance tasks on a database in batch mode.

Topics:
- “MAINTAIN data flow” on page 75
- “Maintaining databases offline” on page 76
- “MAINTAIN DD statements” on page 77
- “MAINTAIN command parameters” on page 79
- “How the MAINTAIN function works when adding, deleting, and naming partitions” on page 98
- “MAINTAIN examples” on page 102

MAINTAIN data flow

The following figure shows the data flow for the MAINTAIN function.

Figure 10. MAINTAIN data flow

The MAINTAIN function performs all of the following processes in a single job step:
- Unload
- Define new partition settings
- Allocate DBDS
- Initialize partitions
- Reload
- Backup
Maintaining databases offline

You can maintain HALDBs offline by using the **MAINTAIN** command and the batch process.

**About this task**

Alternatively, you can use the ISPF user interface to perform the same offline maintenance tasks.

**Restriction:** Databases with logical relationships (except for indexes) are not supported.

**Procedure**

1. Take the databases offline manually.
   
   Databases must be offline before beginning any maintenance task.

2. Specify the JCL DD statements.
   
   For a list of DD statements, see “**MAINTAIN DD statements**” on page 77.

3. Specify the MAINTAIN command parameters.
   
   For a list of MAINTAIN command parameters, see “**MAINTAIN command parameters**” on page 79.

You can perform several functions by using the **MAINTAIN** command. The following table lists some of the most common functions:

<table>
<thead>
<tr>
<th>Scenario</th>
<th><strong>MAINTAIN</strong> parameters</th>
<th><strong>KEYSIN</strong> input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consolidate two partitions into one</td>
<td><strong>MAINTAIN</strong> DBD(xxxx) - PARTLIST(part1,part2) - PARTNUM(1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>using PARTNUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolidate all partitions into one</td>
<td><strong>MAINTAIN</strong> DBD(xxxx) - PARTITION(*) - KEYS(keysin)</td>
<td>//KEYSIN DD * highest-key</td>
</tr>
<tr>
<td>using one key (highest key)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split one partition into two</td>
<td><strong>MAINTAIN</strong> DBD(xxxx) - PARTITION(part1) - PARTNUM(2)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>using PARTNUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split one large partition into 2048 MB</td>
<td><strong>MAINTAIN</strong> DBD(xxxx) - PARTITION(bigpart2) - PARTSIZE(2048)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>size partitions using PARTSIZE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split one partition into three</td>
<td><strong>MAINTAIN</strong> DBD(xxxx) - PARTITION(part1) - KEYS(KEYSIN)</td>
<td>//KEYSIN DD * smaller-high-key</td>
</tr>
<tr>
<td>using your own key boundaries</td>
<td></td>
<td>middle-high-key</td>
</tr>
<tr>
<td></td>
<td></td>
<td>last-high-key-part1</td>
</tr>
<tr>
<td>Add, change, or delete partitions</td>
<td><strong>MAINTAIN</strong> DBD(xxxx) PARTITION(*) - KEYS(KEYSIN) KEYSORDR(Y)</td>
<td>//KEYSIN DD * A999 G999 M999</td>
</tr>
<tr>
<td>such that four partitions result,</td>
<td></td>
<td>Z999</td>
</tr>
</tbody>
</table>
Table 9. Common MAINTAIN functions (continued)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>MAINTAIN parameters</th>
<th>KEYSIN input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorganize one partition without any changes</td>
<td>MAINTAIN DBD(xxxx) - PARTITION(part3) - PARTNUM(1)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

You can also refer to the following examples to code MAINTAIN JCL statements and command parameters:

- “MAINTAIN example: Specifying the number of partitions” on page 102
- “MAINTAIN example: Specifying the partition size” on page 103
- “MAINTAIN example: Specifying the key ranges for partitions” on page 104
- “MAINTAIN example: Maintaining a database when the IMS management of ACBs is enabled” on page 106

Related reference
Performance tips and considerations
Use this information to learn the techniques for improving the performance of ANALYZEPART, CONVERT, and MAINTAIN function jobs.

MAINTAIN DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the MAINTAIN command.

Table 10. DD statements and record format for the MAINTAIN command

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input/Output</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCLIST</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>AMSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Required</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

STEPLIB
This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:
• IMS HALDB Toolkit load library
• IMS utilities that are available for IMS HALDB Toolkit
• IMS RESLIB library
• Any other libraries

The libraries can appear in any order.

```
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

• `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
• `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
• `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**
This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

Even if IMS High Performance Load modules are found in the combined load library of IMS solution pack in the STEPLIB concatenation, when the MAINTAIN function processes PSINDEXes, the function uses DFSURGL0 (HD Reorganization Reload utility) in this library to reload PSINDEXes.

**IMS**
This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

**RECONx**
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.
Attention: If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

IHCSYSIN
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “MAINTAIN command parameters” on page 79.

SYSPRINT
This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

MSGPRINT
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

IHCLIST
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for reports. For more information about the reports generated in this data set, see “IHCLIST data set” on page 280.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

AMSPRINT
This statement is required. The statement defines the output data set for the IDCAMS utility.

The data set can reside on DASD, or it can be routed through the output job.

TRACE
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

MAINTAIN command parameters
The following parameters are available to use with MAINTAIN command maintenance tasks.
IMS HALDB Toolkit ignores any parameters that are unavailable for the requested process.
### Table 11. MAINTAIN command parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTELIM</td>
<td>Optional</td>
<td>Specifies a new maximum-insert-byte for the DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1 - 16777215)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from the existing DBD.</td>
</tr>
<tr>
<td>CONST</td>
<td>Optional</td>
<td>Used as a substitute for the DBD name when building partition names. See also DBDPATT and FIRSTPART parameters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(constant)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>DATACLAS</td>
<td>Optional</td>
<td>Specifies the name of the data class for the new SMS-managed databases and image copy data sets that IMS HALDB Toolkit dynamically allocates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dataclass)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For database data sets: If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For image copy data sets: None.</td>
</tr>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies which HALDB DBD is to be maintained.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The value must be a HALDB master name and it cannot be a partition name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dbdname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>DBDPATT</td>
<td>Optional</td>
<td>Creates a partition name from the DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(cccccccc) where c is an asterisk (*) or a period (.).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can use a maximum of 6 asterisks (*) to identify the position in the DBD name. The default is 6 asterisks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When 6 positions are specified, only 1 character is used for the partition name, creating a limit of 36 partitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If fewer than 6 positions are specified, 1 - 3 characters are used for the partition name depending on the FIRSTPART parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can also use periods (.) to specify that certain characters of the DBD name are ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(******..)</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| DFSDF     | Optional    | Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met:  
  • IMS manages the ACBs (ACBMGMT=CATALOG).  
  • The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.  
  **Format**  
  (ddd)  
  **Default value**  
  None. |
| DSNDBD    | Optional    | Specifies the suffix portion of the new data set name that you are using.  
  A total of 37 characters are allowed for the entire data set name, which includes the characters used for the DSNPREF prefix and the characters used for the DSNDBD suffix.  
  **Format**  
  (DBD | PART | DBDPART)  
  **DBD**  
  Add the DBD name to DSNPREF.  
  **PART**  
  Add the partition name to DSNPREF.  
  **DBDPART**  
  Add the DBD name and the partition name to DSNPREF.  
  **Default value**  
  DBD |
| DSNPREF   | Required    | Specifies a high-level data set name to use when building new partition data set names.  
  The DBRC DSNPREFX parameter is created from this specification and is appended with the DBD name.  
  The final data set name is then appended by DBRC with the DBD file letter and the partition name.  
  **Format**  
  (dsnprefx)  
  **Default value**  
  None. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBFF</td>
<td>Optional</td>
<td>Specifies a new free block frequency factor (FBFF) to use when defining a partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0 - 99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default is to copy from the existing FBFF.</td>
</tr>
<tr>
<td>FIRSTPART</td>
<td>Optional</td>
<td>Identifies the partition name extension to be added to the name &quot;stub&quot; created by the DBDPATT parameter. The &quot;stub&quot; and the extension cannot exceed 7 characters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ccc)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>ccc defines the character string that is used, where:</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>0</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defines a string from 0-9,A-Z. The partition number is used as an index. It creates a 1-character extension.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>A</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defines a string from A-Z,0-9. The partition number is used as an index. It creates a 1-character extension.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>1</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defines a string from 1-9,A-Z. The partition number is used as an index. It creates a 1 character extension.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>01</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creates a 2-character numeric extension from 01-99. The partition number is used for the extension.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>AA</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creates a 2-character extension from AA to 99. For example, AA,...,AZ,A0,...,A9,BA,...,Z9,0A,...</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>001</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creates a 3-character numeric extension from 001-999. The partition number is used for the extension.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>• 0, if six asterisks (</em>) are specified on the DBDPATT parameter or the DBDPATT parameter is not specified.*</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>• AA, if five asterisks are specified on the DBDPATT parameter.</em></td>
</tr>
<tr>
<td>FSPF</td>
<td>Optional</td>
<td>Specifies a new free space percentage value for each interval or block (FSPF) to use when defining a partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0 - 99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from the existing FSPF.</td>
</tr>
</tbody>
</table>
### Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| GDGLIMIT  | Optional    | Specifies the maximum number of GDG (generation data group) data sets that can be associated with the GDG. This value is used only when the GDG base does not exist and a GDG is created during the job. IMS HALDB Toolkit uses the value specified for this parameter when a GDG is requested for image copy data sets. If you specify one of the following parameters, the existence of a GDG base is verified before the image copy data set is allocated:  
  - ICTRLR(1) to request that image copy data sets are GDGs  
  - &GDG is specified on the IC1DSN or IC2DSN parameter to request that image copy data sets are GDGs  
If a GDG base does not exist, IMS HALDB Toolkit automatically defines one using the GDGLIMIT parameter value to control the number of generations to keep.  
**Format**  
(1 - 255)  
**Default value**  
20 |
| IC.COMP   | Optional    | Used for IMS High Performance Image Copy processing. This parameter specifies whether compression is used. If the copy is a standard image copy, this parameter is ignored.  
**Format**  
(Y | N)  
**Default value**  
N |
| IC.COMPRTN| Optional    | Used for IMS High Performance Image Copy processing. If IC.COMP(Y) is used, this parameter specifies the name of a compression routine. If the copy is a standard image copy, this parameter is ignored.  
**Format**  
(comprtn)  
**Default value**  
FABJCMP1 |
| IC.VIC    | Optional    | Specifies whether a virtual image copy is taken. Specify Y to activate IC.VIC and suppress the creation of image copies for all PSINDEXes. A NOTIFY.UIC is used instead.  
**Format**  
(Y | N)  
**Default value**  
N |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC.VICDSN</td>
<td>Optional</td>
<td>Activated only when IC.VIC(Y) is also specified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specifies a string of up to 44 characters that is used as UDATA for the NOTIFY.UIC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The string must conform to z/OS and IMS data set name rules.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(dsname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
</tbody>
</table>


### Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC1DSN</td>
<td>Optional</td>
<td>This parameter provides an alternative to using the ICHLQ, ICID, ICMID, and ICTRLR parameters to specify the data set name for an image copy.</td>
</tr>
</tbody>
</table>

**Format**

(dsnname)

The data set name can contain variables. To specify a variable, use an ampersand (&). The following variables are supported:

- **&JOBNAME**
  Name of this job.

- **&DBD**
  The DBD name. This value changes to the first partition name when not all partitions are processed.

- **&DDNAME**
  The DD name of the database data set.

- **&DATE1**
  This variable is substituted as Dyyyyddd.

- **&DATE2**
  This variable is substituted as Dddyyyy.

- **&DATE3**
  This variable is substituted as Ddddyy.

- **&DATE4**
  This variable is substituted as Dmmddyy.

- **&DATE5**
  This variable is substituted as Dyyyy.

- **&TIME1**
  This variable is substituted as Thhmmss.

- **&TIME2**
  This variable is substituted as Thhmm.

- **&GDG**
  The identifier for the GDG data set.

  If specified, &GDG must be the last value on the IC1DSN parameter.

where:

- yyyy is the 4-digit year
- yy is the last 2 digits of the year
- mm is the month
- dddd is the day of the year
- dd is the day of the month
- hh is the hour (24-hour clock) local time
- mm is the minute
- ss is the second

**Default value**

None.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| IC2DSN | Optional | Specifies the secondary image copy data set name. To create the data set name, use the same method that is described for the IC1DSN keyword. You must specify a unique data set name.  
**Format**  
(dsname)  
**Default value**  
None. |
| ICHLQ | Optional | Specifies the high-level qualifier (HLQ) for the image copy data sets.  
**Format**  
(ichlq)  
**Default value**  
If omitted, defaults to DSNPREF. |
| ICID | Optional | Used to override the default (IC1 or IC2) for the suffix qualifier for dual image copy data sets.  
**Format**  
(1 | 2) or (Y | N)  
Y is equivalent to 1, and N is equivalent to 2.  
**Default value**  
1 |
| ICMID | Optional | Specifies the mid-level data set qualifier for image copy data sets.  
**Format**  
(1 - 4)  
The ICMID parameter specifications render the following mid-level data set qualifiers:  
ICMID(1)  
dbdname.ddname.  
ICMID(2)  
dbdname.  
ICMID(3)  
dname.  
ICMID(4)  
None.  
**Default value**  
3 |
| ICNUM | Optional | Specifies single or dual image copies.  
**Format**  
(1 | 2)  
**Default value**  
1 |
### Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICOFF</td>
<td>Optional</td>
<td>Specifies that no image copies are to be taken, and turns off the ICNEEDED parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>ICTRLR</td>
<td>Optional</td>
<td>Specifies whether to use another final suffix qualifier for image copy data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1 - 6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ICTRLR parameter specifications render the following final suffix qualifiers:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(1)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GDG</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(2)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyymmdd.Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(3)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dmmddyy.Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(4)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ddmmmyy.Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(5)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ICTRLR(6)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyyddd.Thhmmss</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>Specifies the IMS ID to use when updating the IMS Library Integrity Utilities partition description.</td>
</tr>
<tr>
<td>IMSID</td>
<td></td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nnnn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
### Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITPART</td>
<td>Optional</td>
<td>DDNAME in JCL that allows parameters that are not currently specified by the product to be added to the DBRC INIT.PART command. IMS HALDB Toolkit uses the defaults for GENMAX, DFLJTJCL, ICJCL, OICJCL, RECOVJCL, RECOVPD, RECVJCL, and NOREUSE. Any DBRC statements that you specify on the initpart_dd DD statement are included in the statements that are generated by the product. DBRC statements coded on the initpart_dd DD statement must conform to the syntax of the INIT.PART command. For the syntax rules, see the topic &quot;INIT.PART command&quot; in IMS Commands.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(initpart_dd)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>KEYLABEL</td>
<td>Optional</td>
<td>Specifies the encryption key label for encrypting dynamically allocated database data sets and image copy data sets. The key label can be up to 64 bytes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(keylabel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For database data sets: If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For image copy data sets: None.</td>
</tr>
<tr>
<td>KEYLEN</td>
<td>Optional</td>
<td>Specifies the length of the subkey when IHCPSEL0 is used. For example, to partition by country, using a country code that is 3 characters in position 7-9 of your key, specify the following parameters and values: KEYLEN(3) KEYYOFF(6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nnn) where nnn is 1 to root keylen -1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
</tbody>
</table>
### Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEYOFF</td>
<td>Optional</td>
<td>Specifies the offset within the root segment key to use when IHCSEL0 is specified as PARTSEL. The offset must be at least 1. Offset 0 does not need a partition selection exit. For example, to partition by country, using a country code that is 3 characters in position 7-9 of your key, specify the following parameters and values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>KEYLEN(3) KEYOFF(6)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (nnn) where nnn is 1 to root keylen -1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>KEYS</td>
<td>Optional</td>
<td>Specifies a DD statement that contains records for the high keys. KEYS cannot be used with PARTNUM or PARTSIZE. The KEYS parameter can be specified as a character or hexadecimal. Specifying KEYS results in as many partitions as there are keys specified in the file. The specifications are analyzed to determine whether the requested partitioning is feasible. If the number of partitions has been specified, IMS HALDB Toolkit verifies that no partition is larger than 4 GB. If the high keys are created during analysis, there must be at least as many database records as there are requested partitions. If KEYSORDR(Y) is specified with KEYS, then the keys are sorted in EBCDIC order, then assigned to the partitions in name order (also EBCDIC order).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (ddname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>KEYSORDR</td>
<td>Optional</td>
<td>When KEYS(ddname) is specified, IMS HALDB Toolkit reads the high-key values from the KEYS(ddname) and then assigns them to partitions in ascending partition number order by issuing CHANGE.PART commands to DBRC. When KEYSORDR is also specified, IMS HALDB Toolkit subsequently reassigns the high-keys to the partitions, in both their individual ascending EBCDIC order, by issuing CHANGE.PART commands again. The CHANGE.PART commands that are issued when reassigning the high-keys are in ascending EBCDIC order of partition name, which is the same order as is presented by a DBRC LIST.DB command. KEYSORDR processing is done whether adding or deleting partitions, or changing partitions’ attributes. This option can also be used for the single purpose of reorganizing partitions’ high-keys, which is accomplished by placing unchanged high-keys in the KEYS(ddname). When the KEYSORDR option is specified, PARTITION(*) is also required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>MGMTCLAS</td>
<td>Optional</td>
<td>Specifies a new SMS management class.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>NOOSAM8G</td>
<td>Optional</td>
<td>Specifies to change the maximum capacity of OSAM data sets from 8 GB of data to 4 GB of data. NOOSAM8G(Y) is applicable only for OSAM data sets of PHDAM or PHIDAM database. The database must be registered as OSAM8G in the RECON data sets. If you specify NOOSAM8G(Y), you must also specify PARTITION(*).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>ONLINE</td>
<td>Optional</td>
<td>Specifies whether the batch maintenance is to be performed while the databases remain online. ONLINE(Y) is not supported by IMS Database Utility Solution.</td>
</tr>
<tr>
<td>OVFLINCR</td>
<td>Optional</td>
<td>Increases HDAM overflow area by a number of blocks.</td>
</tr>
<tr>
<td>PARTITION</td>
<td>Optional</td>
<td>Specifies which partition is to be maintained. Either specify a partition name, or specify an asterisk (*) to process all the partitions. PARTLIST and PARTITION are mutually exclusive.</td>
</tr>
<tr>
<td>PARTLIST</td>
<td>Optional</td>
<td>Specifies which partitions are to be maintained. You can specify multiple partition names. PARTLIST and PARTITION are mutually exclusive.</td>
</tr>
</tbody>
</table>

**Format**

- **ONLINE**
  
  -(Y | N)
  
  **Default value**
  
  N

- **OVFLINCR**
  
  -(0 - 9999999)
  
  **Default value**
  
  None.

- **PARTITION**
  
  -(partition_name | *)
  
  **Default value**
  
  None.

- **PARTLIST**
  
  -(part1,part2,....,partn)
  
  **Default value**
  
  None.
### Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| PARTNUM   | Optional    | Specifies the number of partitions to create. PARTNUM cannot be used with PARTSIZE or KEYS. Specifying the PARTNUM parameter causes IMS HALDB Toolkit to find the high keys. The specifications are analyzed to determine whether the requested partitioning is feasible. PARTNUM might not result in the exact number of partitions specified because a root segment and all of its dependent segments must be written to the same partition. Therefore, fewer than PARTNUM partitions might be created so that hierarchical integrity is preserved. If the number of partitions has been specified, IMS HALDB Toolkit verifies the size of partitions as follows:  
- For a VSAM or OSAM HALDB whose maximum data capacity is 4 GB, no partition is larger than 4 GB.  
- For an OSAM HALDB whose maximum data capacity is 8 GB, no partition is larger than 8 GB.  
If the high keys are created during analysis, there must be at least as many database records as there are requested partitions.  
**Format**  
(1 - 999)  
**Default value**  
If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used. |
| PARTSEL   | Optional    | Specifies a partition selection routine to use. The PARTSEL parameter must be specified with the KEYS parameter. IMS HALDB Toolkit provides an exit routine for partition selection (IHCPSEL0). When you use the IHCPSEL0 exit routine, the database is partitioned using a subset of the key. If you use the IHCPSEL0 exit routine, you must also select the KEYOFF and KEYLEN parameters.  
**Format**  
(partition_selection_routine)  
**Default value**  
None. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| PARTSIZE        | Optional    | Specifies the size of partitions to create. PARTSIZE cannot be used with PARTNUM or KEYS. Specifying this parameter causes IMS HALDB Toolkit to find the high keys. The specifications are analyzed to determine whether the requested partitioning is feasible. Format (1 - 8191)  
• For a VSAM or OSAM HALDB whose maximum data capacity is 4 GB, 1 - 4095.  
• For an OSAM HALDB whose maximum data capacity is 8 GB, 1 - 8191. Default value  
If none of the parameters PARTNUM, PARTSIZE, or KEYS are specified, the default setting PARTSIZE(2048) is used. |
| PTRCHECK        | Optional    | Performs pointer checking during image copy. This parameter is ignored when the standard IMS image copy is used. Format (Y | N) Default value N |
| RAAINCR         | Optional    | Increases HDAM root addressable area (RAA) by a specified number of blocks. Format (0 - 26777215) Default value None. |
| RAPS            | Optional    | Specifies new PHDAM root anchor points (RAPs). Format (1 - 255) Default value  
If omitted, the default is to copy from the existing RAPs. |
| RELOAD.DBIOBUF  | Optional    | Used for IMS High Performance Load processing. Specifies the number of tracks for the access method (VSAM or BSAM) buffers that are used for one database data set group when the database is read or written to.  
If the load is a standard HD Load, this parameter is ignored.  
For details, see the *IMS High Performance Load User's Guide*. Format (1 - 999) Default value 30 |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELOAD.DBRLBUF</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies the number of database buffers (the number of tracks) to be used for one database data set group when the database is read or written to.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the load is a standard HD Load, this parameter is ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
</tbody>
</table>
|               |             | **Format**  
|               |             | (1 - 999)                                                                                                                                                                                                                                                                                                                              |
|               |             | **Default value**  
|               |             | 45                                                                                                                                                                                                                                                                                                                                   |
| RELOAD.FRSPC  | Optional    | Used for IMS High Performance Load processing. Specifies whether IMS HP Load secures free space according to the specification of the FRSPC parameter in DBD.                                                                                                                                                                           |
|               |             | If the load is a standard HD Load, this parameter is ignored.                                                                                                                                                                                                                                                                       |
|               |             | For details, see the *IMS High Performance Load User's Guide*.                                                                                                                                                                                                                                                                       |
|               |             | **Format**  
|               |             | (YES | NO)                                                                                                                                                                                                                                                                                                                               |
|               |             | **Default value**  
|               |             | YES                                                                                                                                                                                                                                                                                                                                 |
| RELOAD.HPIO   | Optional    | Used for IMS High Performance Load processing. Specifies whether IMS HP Load uses the High Performance I/O Driver for output database data sets.                                                                                                                                                                                             |
|               |             | If the load is a standard HD Load, this parameter is ignored.                                                                                                                                                                                                                                                                       |
|               |             | For details, see the *IMS High Performance Load User's Guide*.                                                                                                                                                                                                                                                                       |
|               |             | **Format**  
|               |             | (YES | NO)                                                                                                                                                                                                                                                                                                                               |
|               |             | **Default value**  
|               |             | YES                                                                                                                                                                                                                                                                                                                                 |
| RELOAD.OADSPR | Optional    | Used for IMS High Performance Load processing. Specifies whether IMS HP Load reduces the usage of data space when processing the overflow area by using the High Performance I/O driver or by using an OVERFLOW DD. This specification is valid only for HDAM or PHDAM databases.                                                                                                         |
|               |             | If the load is a standard HD Load, this parameter is ignored.                                                                                                                                                                                                                                                                       |
|               |             | For details, see the *IMS High Performance Load User's Guide*.                                                                                                                                                                                                                                                                       |
|               |             | **Format**  
|               |             | (YES | NO)                                                                                                                                                                                                                                                                                                                               |
|               |             | **Default value**  
|               |             | NO                                                                                                                                                                                                                                                                                                                                   |
Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELOAD.RAAFORMAT</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether IMS HP Load is to format HDAM or PHDAM RAA blocks regardless of the number of blocks used. Once the overflow area is used, this parameter is ignored and the entire RAA is formatted. This specification is valid only for HDAM or PHDAM databases. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>RELOAD.SEARCH</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies the limit value for a space search algorithm that finds a segment that does not fit in its home block. This specification is valid for HDAM or PHDAM databases. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0 - 999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>RELOAD.SORT</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether to run the physical sequential sort processing before loading. This specification is valid only for HDAM and PHDAM databases. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>RELOAD.USEREXIT</td>
<td>Optional</td>
<td>Used for IMS High Performance Load processing. Specifies whether IMS HP Load invokes a user exit routine. If the load is a standard HD Load, this parameter is ignored. For details, see the <em>IMS High Performance Load User's Guide</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(user_exit)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>STORCLAS</td>
<td>Optional</td>
<td>Specifies the name of the storage class for the new SMS-managed databases and image copy data sets that IMS HALDB Toolkit dynamically allocates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> <em>(storclas)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For database data sets: If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For image copy data sets: None.</td>
</tr>
<tr>
<td>TAKEOVER.FILE</td>
<td>Optional</td>
<td>Saves the takeover statements (DBRC and IDCAMS) to a specified data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> <em>(ddname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>UNLSPAC</td>
<td>Optional</td>
<td>Specifies a 4-digit numeric space allocation value for temporary data set allocations, for example, the unload file. Specify a numeric value for the number of cylinders to allocate to each temporary data set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the number of cylinders to allocate to each temporary data set is omitted, IMS HALDB Toolkit determines the optimal value.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of data sets that are allocated is determined by IMS HALDB Toolkit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> <em>(0 - 3000)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>UNLUNIT</td>
<td>Optional</td>
<td>Specifies any valid direct-access 8-character unit name for temporary data set allocations, for example, the unload file. These files are temporary files that default to SYSALLDA, unless otherwise specified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> <em>(unitname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> SYSALLDA</td>
</tr>
</tbody>
</table>
Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLALLO</td>
<td>Optional</td>
<td>Used to override the space allocation when creating the database data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[(nn,pppp,ssss)]</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>nn</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of volumes to be used. This parameter is for SMS controlled allocations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If (nn) is greater than 1, candidate volumes are defined. If (nn) is zero, VOLALLO is ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>pppp</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of cylinders for the primary allocation. The maximum is 2000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ssss</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of cylinders for the secondary allocation. The maximum is 2000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (nn): 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (pppp): 300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (ssss): 300</td>
</tr>
<tr>
<td>VOLALLOL</td>
<td>Optional</td>
<td>Used to override the space allocation when creating the ILDS data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[(nn,pppp,ssss)]</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>nn</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of volumes to be used. This parameter is for SMS controlled allocations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If (nn) is greater than 1, candidate volumes are defined. If (nn) is zero, VOLALLOL is ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>pppp</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of cylinders for the primary allocation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ssss</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of cylinders for the secondary allocation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (nn): 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (pppp): None.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (ssss): None.</td>
</tr>
</tbody>
</table>
Table 11. MAINTAIN command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLALLOX</td>
<td>Optional</td>
<td>Used to override the space allocation when creating the primary index data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nn,pppp,ssss)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nn</td>
<td></td>
<td>The number of volumes to be used. This parameter is for SMS controlled allocations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If nn is greater than 1, candidate volumes are defined. If nn is zero, VOLALLOX is ignored.</td>
</tr>
<tr>
<td>pppp</td>
<td></td>
<td>The number of cylinders for the primary allocation.</td>
</tr>
<tr>
<td>ssss</td>
<td></td>
<td>The number of cylinders for the secondary allocation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nn: 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pppp: None.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sss: None.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How the MAINTAIN function works when adding, deleting, and naming partitions

Learn how the MAINTAIN function adds, deletes, and names partitions.

Adding or deleting partitions

When adding partitions (splitting partitions) or deleting partitions (merging partitions), the MAINTAIN function processes the partitions according to the following rules:

- If the high key of an existing partition matches one of the new high keys, IMS HALDB Toolkit keeps that existing partition unchanged.
- IMS HALDB Toolkit assigns new high keys to partitions in ascending order, firstly to the new partitions (if created) and then to the existing partitions that have no high keys assigned. When there are multiple existing partitions with no high keys assigned, IMS HALDB Toolkit assigns high keys to the partitions in ascending order of the original high keys.
- IMS HALDB Toolkit deletes unnecessary partitions in ascending order of the original high keys.

The following examples demonstrate specific cases to help you understand the changes that the MAINTAIN function makes to partitions.

**Example 1: Splitting one partition**

HALDB PHDOA has three partitions; Part_A (high key is 200), Part_B (high key is 400), and Part_C (high key is 600). You want to split partition Part_B into two partitions so you specify the MAINTAIN command as follows:

```
MAINTAIN DBD(PHDOA) PARTITION(Part_B) PARTNUM(2)
```

In this case, IMS HALDB Toolkit processes the partitions as follows:

1. Creates a new partition, Part_D.
2. Calculates the new high keys for splitting partition Part_B and resulted with high keys of 300 and 400.
3. Checks whether the existing partition (in this case Part_B) has one of the new high keys. IMS HALDB Toolkit detected that Part_B has the high key of 400 so it keeps Part_B unchanged.
4. Assigns the new high key of 300 to the new partition Part_D.

**Original partitions**

<table>
<thead>
<tr>
<th>Partition</th>
<th>High key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part_A</td>
<td>200</td>
</tr>
<tr>
<td>Part_B</td>
<td>400</td>
</tr>
<tr>
<td>Part_C</td>
<td>600</td>
</tr>
</tbody>
</table>

**New partitions**

<table>
<thead>
<tr>
<th>Partition</th>
<th>High key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part_A</td>
<td>200</td>
</tr>
<tr>
<td>Part_B</td>
<td>400</td>
</tr>
<tr>
<td>Part_C</td>
<td>600</td>
</tr>
<tr>
<td>Part_D</td>
<td>300</td>
</tr>
</tbody>
</table>

**Example 2: Splitting multiple partitions**

HALDB PHDOB has four partitions; Part_A (high key is 150), Part_B (high key is 300), Part_C (high key is 450), and Part_D (high key is 600). You want the HALDB PHDOB to have six partitions instead of four partitions so you specify the MAINTAIN command as follows:

```
MAINTAIN DBD(PHDOB) PARTITION(*) PARTNUM(6)
```

In this case, IMS HALDB Toolkit processes the partitions as follows:

1. Creates two new partitions, Part_E and Part_F.
2. Calculates the new high keys for repartitioning and resulted with high keys of 100, 200, 300, 400, 500, and 600.
3. Checks whether any of the existing partitions has one of the new high keys. It detected that Part_B has the high key of 300 and Part_D has the high key of 600 so it keeps these two partitions unchanged.
4. Assigns a high key to each of the remaining partitions in ascending order of the high keys, starting with the new partition; high key 100 to Part_E and high key 200 to Part_F. Then it assigns the remaining high keys to the existing partitions that have no high keys assigned; high key 400 to Part_A and high key 500 to Part_C.
Example 3: Merging multiple partitions into one partition

HALDB PHDOC has three partitions; Part_A (high key is 200), Part_B (high key is 400), and Part_C (high key is 600). You want the HALDB PHDOC to have only one partition instead of three partitions so you specify the MAINTAIN command as follows:

```
MAINTAIN DBD(PHDOC) PARTITION(*) PARTNUM(1)
```

In this case, IMS HALDB Toolkit processes the partitions as follows:

1. Checks whether any of the existing partitions has the new high key, which is 600. It detected that Part_C has the high key of 600 so it keeps Part_C unchanged.
2. Deletes the other two partitions.

Example 4: Merging multiple partitions into fewer partitions

HALDB PHDOD has six partitions; Part_A (high key is 100), Part_B (high key is 200), Part_C (high key is 300), Part_D (high key is 400), Part_E (high key is 500), and Part_F (high key is 600). You want the HALDB PHDOD to have four partitions instead of six partitions so you specify the MAINTAIN command as follows:

```
MAINTAIN DBD(PHDOD) PARTITION(*) PARTNUM(4)
```
In this case, IMS HALDB Toolkit processes the partitions as follows:

1. Calculates the new high keys for the partitions and resulted with high keys of 150, 300, 450, and 600.
2. Checks whether any of the existing partitions has one of the new high keys. It detected that Part_C has the high key of 300 and Part_F has the high key of 600 so it keeps these two partitions unchanged.
3. Deletes two partitions in ascending order of original high keys. In this case, Part_A, which had a high key of 100, and Part_B, which had a high key of 200.
4. Assigns the remaining high keys to each of the remaining partitions in ascending order of the high keys; high key 150 to Part_D and high key 450 to Part_E.

### Original partitions

<table>
<thead>
<tr>
<th>Part_A</th>
<th>Part_B</th>
<th>Part_C</th>
<th>Part_D</th>
<th>Part_E</th>
<th>Part_F</th>
</tr>
</thead>
<tbody>
<tr>
<td>High key = 100</td>
<td>High key = 200</td>
<td>High key = 300</td>
<td>High key = 400</td>
<td>High key = 500</td>
<td>High key = 600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part_C</th>
</tr>
</thead>
<tbody>
<tr>
<td>High key = 300</td>
</tr>
<tr>
<td>(No change)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part_D</th>
</tr>
</thead>
<tbody>
<tr>
<td>High key = 150</td>
</tr>
<tr>
<td>(New high key)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part_E</th>
</tr>
</thead>
<tbody>
<tr>
<td>High key = 450</td>
</tr>
<tr>
<td>(New high key)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part_F</th>
</tr>
</thead>
<tbody>
<tr>
<td>High key = 600</td>
</tr>
<tr>
<td>(No change)</td>
</tr>
</tbody>
</table>

### New partitions

<table>
<thead>
<tr>
<th>Part_C</th>
<th>Part_D</th>
<th>Part_E</th>
<th>Part_F</th>
</tr>
</thead>
<tbody>
<tr>
<td>High key = 300</td>
<td>High key = 150</td>
<td>High key = 450</td>
<td>High key = 600</td>
</tr>
<tr>
<td>(No change)</td>
<td>(New high key)</td>
<td>(New high key)</td>
<td>(No change)</td>
</tr>
</tbody>
</table>

### Assigning partition names

The MAINTAIN function does not change the names of existing partitions. It only assigns names to new partitions.

New partition names are determined based on the CONST, DBDPATT, and FIRSTPART parameters and the current partition ID in the RECON data sets. For more information about these parameters, see “MAINTAIN command parameters” on page 79.

The following examples demonstrate how IMS HALDB Toolkit assigns partition names when the FIRSTPART parameter is specified.

**Example 1: Assigning partition names when FIRSTPART(01)**

HALDB PHDOE has five partitions; PHDOE01, PHDOE02, PHDOE03, PHDOE04, and PHDOE05. The value of CURRENT PARTITION ID in RECON is 5 (index=5). You want to split partition PHDOE01 into three partitions so you specify the MAINTAIN command as follows:

```
MAINTAIN DBD(PHDOE) DBDPATT(*****...) PARTITION(PHDOE01) PARTNUM(3) FIRSTPART(01)
```

In this case, IMS HALDB Toolkit processes the partitions as follows:

1. Creates two new partitions.
2. Reads the DBDPAT(*****...) parameter and uses the first five letters (PHDOE) of the DBD name for the first five characters of the new partition names.
3. Reads the FIRSTPART(01) parameter and obtains the value of CURRENT PARTITION ID from RECON, which is 5. Adds two character numeric extension of 06 and 07 to the end of the new partition names.
4. The two new partitions have the names of PHDOE06 and PHDOE07 respectively.
Example 2: Assigning partition names when FIRSTPART(AA)

HALDB PHDOF has five partitions; PHDOFAA, PHDOFAB, PHDOFAC, PHDOFAD, and PHDOFAE. The value of CURRENT PARTITION ID in RECON is 5 (index=5). You want to split partition PHDOFAA into three partitions so you specify the MAINTAIN command as follows:

```
MAINTAIN DBD(PHDOF) DBDPATT(*****...) PARTITION(PHDOFAA) PARTNUM(3) FIRSTPART(AA)
```

In this case, IMS HALDB Toolkit processes the partitions as follows:

1. Creates two new partitions.
2. Reads the DBDPAT(*****...) parameter and uses the five letters (PHDOF) of the DBD name for the first five characters of the new partition names.
3. Reads the FIRSTPART(AA) parameter and obtains the value of CURRENT PARTITION ID from RECON, which is 5. Adds two character extension of AF and AG to the end of the new partition names.
4. The two new partitions have the names of PHDOFAF and PHDOFAG respectively.

**MAINTAIN examples**

Use the following examples to learn what you can do with the MAINTAIN function.

- “MAINTAIN example: Specifying the number of partitions” on page 102
- “MAINTAIN example: Specifying the partition size” on page 103
- “MAINTAIN example: Specifying the key ranges for partitions” on page 104
- “MAINTAIN example: Maintaining a database when the IMS management of ACBs is enabled” on page 106

**MAINTAIN example: Specifying the number of partitions**

If you know how many partitions you intend to maintain, you can use the PARTNUM parameter to specify this number.

To specify the number of partitions, use the sample member IHCEMTN1. The following example splits a database into four partitions:
**MAINTAIN example: Specifying the partition size**

If you know how large you want each partition to be, you can use the PARTSIZE parameter to specify this number.

To specify the size of partitions, use the member IHCEMTN2. The following example splits a database into partitions each with a size of 2048 MB.
**MAINTAIN example: Specifying the key ranges for partitions**

If you want to assign specific key ranges to partitions, you can use the KEYS parameter to specify an input data set containing the keys. The KEYS parameter specifies the high key boundaries for each partition.

To specify the ranges for partitions, use the member IHCEMTN3. The following example splits the partition that is specified on the PARTITION parameter into 13 partitions with specific key ranges.
//JOBNAME   JOB NAME,000,CLASS=A,MSGCLASS=X
//********************************************************************
//*         SAMPLE JCL FOR MAINTAIN - using KEYS method
//*         SPLITS the first partition into specific key-boundaries
//*      (note:  the first partition had a high key of M999999999
//*              and has records for all key ranges)
//*  Your old HALDB databases/partitions must be registered to DBRC
//*  You must /dbcr the affected partitions prior to executing this job
//* unless you use ONLINE(Y) and have Online Reorg installed
//********************************************************************
//S2     EXEC PGM=IHCHALDB,DYNAMNBR=999,REGION=80M
//STEPLIB  DD DISP=SHR,DSN=your.SIHCLOAD   <=== your hcma loadlib
//         DD DISP=SHR,DSN=your.SDFSRESL     <=== ims reslib
//         DD DISP=SHR,DSN=your.SHPSLMD0     <=== ims tools loadlib
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL     <=== ims reslib
//IMS      DD DISP=SHR,DSN=your.dbdlib      <=== ims dbdlib
//IMSDALIB DD DISP=SHR,DSN=your.mdalib      <=== ims mdalib
//SYSPRINT DD SYSOUT=*                       
//MSGPRINT DD SYSOUT=*                       
//AMSPRINT DD SYSOUT=*                       
//SYSUDUMP DD SYSOUT=*                       
//IHCLIST  DD SYSOUT=*                       
//KEYSIN   DD * (documentation only)
//* your first high-order key for partition1
//* your second high-order key for partition2 and so on...
//* your highest key for last partition
//********************************************************************
//KEYSIN   DD *
A999999999
B999999999
C999999999
D999999999
E999999999
F999999999
G999999999
H999999999
I999999999
J999999999
K999999999
L999999999
M999999999
//IHCSYSIN DD *
MAINTAIN ONLINE(N) -
KEYS(KEYSIN) -
DBD(masterdbd) -
PARTITION(part) -
DBDPATT(*****...) DSNPREF(DBSMS.DB) -
ICMID(3) -
ICHLQ(DBSMS.DB.IC) -
ICTRLR(2) -
IC.COMP(Y) -
IC.COMPRTN(FABJCMP2) -
PTRCHECK(Y)

Figure 13. Sample JCL (IHCEMTN3) for batch using KEYS
MAINTAIN example: Maintaining a database when the IMS management of ACBs is enabled

This example shows JCL statements to maintain a database in an IMS managed ACBs environment.

```plaintext
//S2 EXEC PGM=IHCHALDB,DYNAMNBR=999,REGION=80M
//STPLIB DD DISP=SHR,DSN=IMSTOOLS.SIHLOAD <== hcma loadlib
//         DD DISP=SHR,DSN=IMSTOOLS.SHPSLMD0 <== ims tools loadlib
//         DD DISP=SHR,DSN=IMSTOOLS.SGLXLOAD <== ims tools base loadlib
//         DD DISP=SHR,DSN=IMS.DFSFRESL <== ims reslib
//DFSRESLB DD DISP=SHR,DSN=IMS.DFSRESL <== ims reslib
//PROCLIB DD DISP=SHR,DSN=IMS.PROCLIB <== ims proclib
//SYSPRINT DD SYSOUT=* 
//MSGPRINT DD SYSOUT=* 
//AMSPRINT DD SYSOUT=* 
//SYSUDUMP DD SYSOUT=* 
//IHCLIST DD SYSOUT=* 
//IHCSYSIN DD * 
//MAINTAIN ONLINE(N) - 
//      PARTNUM(4) - 
//      DBD(masterdbd) - 
//      PARTLIST(partb,partc) - 
//      DBDPATT(*****...) DSNPREF(DBSMS.DB) - 
//      ICMID(3) - 
//      ICHLQ(DBSMS.DB.IC) - 
//      ICTRLR(2) - 
//      IC.COMP(Y) - 
//      IC.COMPRTN(FABJCMP2) - 
//      PTRCHECK(Y) - 
//      DFSDF(CAT)
```

Figure 14. Sample JCL stream to maintain a database in an IMS managed ACBs environment

- The DFSDF(CAT) parameter in IHCSYSIN and the PROCLIB DD statement specify the DFSDFCAT PROCLIB member that contains the IMS catalog definition.
- If you include the IMS Catalog Definition exit routine (DFS3CDX0) in the STEPLIB concatenation, you do not need to specify the DFSDF parameter and the PROCLIB DD statement.
- The SGLXLOAD library of IMS Tools Base must be in the STEPLIB concatenation.
- The library containing the DFSMDA member with TYPE=CATDSHLQ statement must be in the STEPLIB concatenation if the DFSMDA member is used to specify the high-level qualifier of the IMS catalog system data sets.
- The IMS DD statement is not needed.
Part 5. HALDB utilities

JCL for HALDB utilities can be created from the examples in the sample library file, or through the ISPF user interface.

The topics in this section describe how to use the sample JCL provided in the SIHCSAMP file. The sample member is named for each specific utility.

A comment is made if an equivalent ISPF-generated JCL option is available for the utility. See the ISPF section of this reference for ISPF-related information.

Topics:

- Chapter 5, “Using DBRC enhancement utilities,” on page 109
- Chapter 6, “Using the HALDB Analyzer,” on page 127
- Chapter 7, “Reorganizing a PSINDEX,” on page 145
- Chapter 8, “Splitting an unload file into single partition files,” on page 151
- Chapter 9, “Recovering by using the ILK reset utility,” on page 157
- Chapter 10, “Healing index pointers,” on page 161
- Chapter 11, “System utilities,” on page 167
Chapter 5. Using DBRC enhancement utilities

DBRC maintains information that is required for database recoveries, generates recovery control (RECON) statements, verifies recovery input, maintains a separate change log for database data sets, and supports sharing of IMS databases and areas by multiple IMS subsystems.

IMS HALDB Toolkit provides several DBRC enhancement utilities to support HALDB movement between multiple RECONs.

Topics:

- “Backing up DBRC definitions for HALDB DBD” on page 109
- “Cloning DBRC definitions for test environments” on page 114
- “Copying HALDBs to a different IMS system” on page 122

Backing up DBRC definitions for HALDB DBD

The DBRC definitions backup utility allows you to save the current DBRC definition of a HALDB to a sequential file.

About this task

You would perform a backup each time before you make changes. In this case, you want to change the partition layout.

The utility creates DBRC statements that can be used as input for the batch DBRC utility (DSPURX00).

Procedure

1. Locate the sample JCL in the SIHCSAMP file, member IHCEDBBK.
2. Specify the JCL DD statements.
   For a list of DD statements, see “BACKUPDBRC DD statements” on page 110.
3. Specify the BACKUPDBRC command parameters.
   For the DBD parameter, you must specify the DBD for the HALDB (primary or index).
   For other parameters, see “BACKUPDBRC command parameters” on page 112.

Example

The following example shows the sample JCL for backing up DBRC definition for HALDB DBD:
//JOBNAME   JOB 00,000,CLASS=A,MSGCLASS=X
//*-----------------------------------------------------------
//*          BACKUP DBRC DEFINITION FOR DB
//*-----------------------------------------------------------
//S2     EXEC PGM=IHCHALDB,
//        REGION=80M
//STEPLIB  DD DISP=SHR,DSN=your.SIHCLOAD
//         DD DISP=SHR,DSN=your.SDFSRESL
//IMSDALIB DD DISP=SHR,DSN=your.recon.mdalib
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//IMS      DD DISP=SHR,DSN=your.DBDLIB
//TRACE    DD SYSOUT=*  
//MSGPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
//IHCSYSIN DD *
//BACKUPDBRC DD(dddd) - /* specify HALDB BD
//INCLIND(Y) - /* include secind
//INCLIC(Y) - /* include batch IC
//TODD(OUTDBRC) /* specify output DDname
//OUTDBRC  DD SYSOUT=*

Figure 15. JCL for backing up DBRC definition for HALDB BD

BACKUPDBRC DD statements
DD statements are used to identify the source of input and the placement of output information.
The following table shows DD statements and record format for the BACKUPDBRC command.

Table 12. DD statements and record format for the BACKUPDBRC command

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>DBRCOUT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

STEPLIB
This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
• IMS utilities that are available for IMS HALDB Toolkit
• IMS RESLIB library
• Any other libraries

The libraries can appear in any order.

```
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:
• `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
• `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
• `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**
This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**
This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:
1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(*ddd*) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDF*ddd* member exists in the IMS.PROCLIB data set.

**RECONx**
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**IHCSYSIN**
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.
For more information about the format of IHCSYSIN DD statements, see “BACKUPDBRC command parameters” on page 112.

**SYSPRINT**
This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

**MSGPRINT**
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**DBRCOUT**
This statement is required if TODD(ddname) parameter is not specified. The statement defines the output data set for generating DBRC statements.

**TRACE**
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

### BACKUPDBRC command parameters

The following table summarizes the BACKUPDBRC command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the name of the HALDB DBD.</td>
</tr>
<tr>
<td>Format</td>
<td></td>
<td>(dbdname)</td>
</tr>
<tr>
<td>Default value</td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>DFSDF</td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met: • IMS manages the ACBs (ACBMGMT=CATALOG). • The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddd)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(nnnn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
<tr>
<td>INCLIC</td>
<td>Optional</td>
<td>Specifies whether to include the non-fuzzy image copies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>INCLIND</td>
<td>Optional</td>
<td>Specifies whether to include the secondary index.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>TODD</td>
<td>Optional</td>
<td>Specifies the output file where the DBRC statements are written. You must specify either the TODD(ddname) parameter in the IHCSYSIN DD statement or the DBRCOUT DD statement in the JCL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
</tbody>
</table>
Cloning DBRC definitions for test environments

In a test environment, the clone DBRC definitions utility allows you to ease DBRC problems by cloning DBRC definitions to an alternate RECON.

About this task

The utility replicates HALDB DBRC definitions to other RECONs and allows you to exchange the high-level data set name qualifier.

You must have your own data sets for testing the batch program, or testing online programs with IMS Batch Terminal Simulator. This requires you to have your own RECONs.

When batch jobs are run with DBRC active, you must accommodate recovery and authorization issues as well. For example, if an application program fails, the database is flagged by DBRC to indicate the need for some recovery action. This utility helps eliminate those problems.

To use this utility, include the sample JCL in your test JCL.

Alternatively, you can create the JCL by using the ISPF user interface.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCECLON.
2. Specify the JCL DD statements.
   For a list of DD statements, see “COPYDBRC DD statements” on page 116.
3. Specify the COPYDBRC command parameters.
   For a list of COPYDBRC command parameters, see “COPYDBRC command parameters” on page 118.
4. Include the sample JCL in your test JCL.

Example

In the following sample JCL:

- the.other.RECON is the RECON for the programmer.
- your.RECON is the RECON to be copied from.
- your.DBDLIB is the DBD library for the DBD.
Clone DBRC definitions to alternate RECON

Allocate RECON datasets

ALLOC EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
DELETE the.other.RECON1  
DELETE the.other.RECON2  
DELETE the.other.RECON3  
SET MAXCC=0  
DEFINE CLUSTER(NAME(the.other.RECON1) VOL(volser) KEYS(32 0) -  
CISZ(8192) RECSZ(8100 8192) CYLINDERS(2 2) -  
FREESPACE(30,10) INDEXED SHR(3 3) SPEED)  
DEFINE CLUSTER(NAME(the.other.RECON2) VOL(volser) KEYS(32 0) -  
CISZ(8192) RECSZ(8100 8192) CYLINDERS(2 2) -  
FREESPACE(30,10) INDEXED SHR(3 3) SPEED)  
DEFINE CLUSTER(NAME(the.other.RECON3) VOL(volser) KEYS(32 0) -  
CISZ(8192) RECSZ(8100 8192) CYLINDERS(2 2) -  
FREESPACE(30,10) INDEXED SHR(3 3) SPEED)  
/* Create HALDB statements  
CRE EXEC PGM=ICHALDB,  
REGION=60M  
//STEPLIB DD DISP=SHR,DSN=your.SIHLOAD  
//DD DISP=SHR,DSN=your.SDFSRESL  
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL  
//IMS DD DISP=SHR,DSN=your.DBDLIB  
//RECON1 DD DISP=SHR,DSN=your.RECON1  
//RECON2 DD DISP=SHR,DSN=your.RECON2  
//RECON3 DD DISP=SHR,DSN=your.RECON3  
//MSGPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
COPYDBRC DBD(nn.nn) -  
DSNBPREF(new.hlq) -  
DSNBDB(DBD) -  
INCLUD(YES) -  
TODD(DBRCOUT)  
/*  
//DBRCOUT DD DISP=(,PASS),SPACE=(TRK,(1,1)),UNIT=SYSALLDA  
/* */  
INIT.RECON  
/* */  
INITRCN EXEC PGM=DSPURX00,REGION=50M,COND=(4,LE)  
//STEPLIB DD DISP=SHR,DSN=your.SDFSRESL  
//RECON1 DD DISP=SHR,DSN=the.other.RECON1  
//RECON2 DD DISP=SHR,DSN=the.other.RECON2  
//RECON3 DD DISP=SHR,DSN=the.other.RECON3  
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL  
//IMS DD DISP=SHR,DSN=your.DBDLIB  
//SYSIN DD *
INIT.RECON NOFORCER CATDS TAPEUNIT(3480)  
/* */

Figure 16. Sample JCL from member IHCECLON (Part 1 of 2)
COPYDBRC DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the COPYDBRC command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

STEPLIB

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```plaintext
//STEPLIB DD DISP=SHR,DSN=ihcload
//    DD DISP=SHR,DSN=imstools
//    DD DISP=SHR,DSN=reslib
```
where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**
This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**
This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

**RECONx**
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**IHCSYSIN**
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “COPYDBRC command parameters” on page 118.

**MSGPRINT**
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.
TRACE
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

COPYDBRC command parameters
The following table summarizes the COPYDBRC command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPYIC</td>
<td>Optional</td>
<td>Specifies whether to create NOTIFY.IC statements. COPYIC and DFDSS parameters are mutually exclusive.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>DATACLAS</td>
<td>Optional</td>
<td>Represent the SMS constructs to be used for the IDCAMS statements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dataclas)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the name of the HALDB DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dbname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>DELDBD</td>
<td>Optional</td>
<td>Specifies whether to create DELETE.DB statements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>
### Table 15. COPYDBRC command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFDSS</td>
<td>Optional</td>
<td>Specifies whether to create DFDSS statements for the new data sets. DFDSS parameter is mutually exclusive with COPYIC and IDCAMS parameters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>DFDSSOUT</td>
<td>Conditionally required</td>
<td>Specifies the file name that will contain the DFDSS statements. You must specify this parameter if DFDSS(Y).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ddname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
</tbody>
</table>
| DFSDF     | Optional        | Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met:

- IMS manages the ACBs (ACBMGMT=CATALOG).
- The IMS Catalog Definition exit routine (DFS3CDX0) is not used.

Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog. |
<p>|           |                  | <strong>Format</strong>  |
|           |                  | (ddd)       |
|           |                  | <strong>Default value</strong>  |
|           |                  | None.       |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNDBD</td>
<td>Optional</td>
<td>Specifies the suffix portion of the new dsname you are using. A total of 37 characters are allowed for the entire dsname, which includes the characters used for the DSNPREF prefix and the characters used for the DSNDBD suffix.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NONE</strong> Do not add a suffix to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DBD</strong> Add the DBD name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PART</strong> Add the partition name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DBDPART</strong> Add the DBD name and the partition name to DSNPREF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> DBDPART</td>
</tr>
<tr>
<td>DSNPREF</td>
<td>Required</td>
<td>Specifies the prefix portion of the new dsname you are using. A total of 37 characters are allowed for the entire dsname, which includes the characters used for the DSNPREF prefix and the characters used for the DSNDBD suffix.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (dsnprefix)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>IDCAMS</td>
<td>Optional</td>
<td>Specifies whether to create IDCAMS statements for the new data sets. IDCAMS and DFDSS parameters are mutually exclusive.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> N</td>
</tr>
<tr>
<td>IDCOUT</td>
<td>Conditionally required</td>
<td>Specifies the file name that will contain the IDCAMS statements. You must specify this parameter if IDCAMS(Y) or DFDSS(Y).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (ddname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
</tbody>
</table>
### Table 15. COPYDBRC command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(nnnn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSV000).</td>
</tr>
<tr>
<td>INCLIND</td>
<td>Optional</td>
<td>Specifies whether to include the secondary index.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>KEYLABEL</td>
<td>Optional</td>
<td>Specifies the encryption key label to be used in IDCAMS processing. The key label can be up to 64 bytes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(keylabel)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td>STORCLAS</td>
<td>Optional</td>
<td>Represent the SMS constructs to be used for the IDCAMS statements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(storclas)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the default action is to copy from existing data sets.</td>
</tr>
<tr>
<td>TODD</td>
<td>Required</td>
<td>Specifies the output file where the DBRC statements are written. This file will be the input to the DBRC utility.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>VOLSER</td>
<td>Conditionally</td>
<td>Specifies the volume serial to be used for IDCAMS. This parameter is required for non-SMS allocation.</td>
</tr>
<tr>
<td></td>
<td>required</td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(volume)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
</tbody>
</table>
Copying HALDBs to a different IMS system

You can copy HALDBs to different IMS systems by using either image copies or DFSMSdss.

In this topic:

- “Copying HALDBs by using an image copy” on page 122
- “Copying HALDBs by using DFSMSdss” on page 123

Copying HALDBs by using an image copy

The HALDB copy utility allows you to copy a HALDB, using the latest non-fuzzy image copy, to a different IMS.

About this task

The utility transfers a production HALDB to a different IMS and allocates the target data set in that system, if the data set is not already available.

This task is typically performed when a problem is discovered in the production database, where the database cannot be kept offline until the error in the application has been identified and resolved.

This utility performs the following operations:

- Copies the most recent HALDB definitions across to a different RECON by changing the hlq portion of the data set name.
- Creates the necessary allocation statements.
- Registers all non-fuzzy image copies to the new RECON.

After these operations have been performed, you can run a recovery using the new RECON.

Alternatively, you can create the JCL by using the ISPF user interface.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCECOPY.
2. Specify the JCL DD statements.
   - For a list of DD statements, see “COPYDBRC DD statements” on page 116.
3. Specify the COPYDBRC command parameters.
   - For a list of COPYDBRC command parameters, see “COPYDBRC command parameters” on page 118.
Copying HALDBs by using DFSMSdss

You can use DFSMSdss to copy a HALDB to a different IMS.

About this task

Using DFSMSdss works like image copy recovery. The target RECON must reflect any deleted partitions and you must /DBR the database.

You can create the partition definition for the target RECON and create the DFSMSdss commands that are necessary to make the copy.
Procedure
1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEDFDS.
2. Specify the JCL DD statements.
   For a list of DD statements, see “COPYDBRC DD statements” on page 116.
3. Specify the COPYDBRC command parameters.
   For a list of COPYDBRC command parameters, see “COPYDBRC command parameters” on page 118.
4. Make sure that the target RECON reflects any deleted partitions.
5. Run /DBR on the database.

Example

```*/
//** Copy a database to different RECON
//** The copy function is done via DFDSS
//**
//**----------------------------------------------------------
//CRE    EXEC PGM=IHCWHALD,
//       REGION=60M
//STEPLIB DD DISP=SHR, DSN=your.SIHCLOAD
//         DD DISP=SHR, DSN=your.SDFSRESL
//DFSRESLB DD DISP=SHR, DSN=your.SDFSRESL
//IMS DD DISP=SHR, DSN=your.DBDLIB
//RECON1 DD DISP=SHR, DSN=your.RECON1
//RECON2 DD DISP=SHR, DSN=your.RECON2
//RECON3 DD DISP=SHR, DSN=your.RECON3
//MSGPRINT DD SYSOUT=*     
//SYSUDUMP DD SYSOUT=* 
//IHCSYSIN DD *
COPYDBRC DBD(nnnn) -
   DSNPREF(new.hlq) -
   DSNDBD(DBD) -
   INCLIND(YES) -
   DFDSS(YES) -
   DFDSSOUT(DSSOUT) -
   IDCOUT(IDCOUT) -
   TODD(DBRCOUT)
/*
//DBRCOUT DD DISP=(PASS),SPACE=(TRK,(1,1)),UNIT=SYSALLDA
//DSSOUT DD DISP=(PASS),SPACE=(TRK,(1,1)),UNIT=SYSALLDA
//IDCOUT DD DISP=(PASS),SPACE=(TRK,(1,1)),UNIT=SYSALLDA
/*
//** APPLY TO OTHER DBRC
//**
//**----------------------------------------------------------
//DBRC EXEC PGM=IHCWHALD,
//       REGION=60M
//STEPLIB DD DISP=SHR, DSN=your.SIHCLOAD
//         DD DISP=SHR, DSN=your.SDFSRESL
//DFSRESLB DD DISP=SHR, DSN=your.SDFSRESL
//RECON1 DD DISP=SHR, DSN=the.other.RECON1
//RECON2 DD DISP=SHR, DSN=the.other.RECON2
//RECON3 DD DISP=SHR, DSN=the.other.RECON3
//IMS DD DISP=SHR, DSN=your.DBDLIB
//TRACE DD DUMMY
//SYSPRINT DD SYSOUT=*     
//MSGPRINT DD SYSOUT=* 
//SYSIN DD DISP=(OLD,DELETE), DSN=*.CRE.DBRCOUT
//IHCSYSIN DD *
RUN PGM(IHCYDBR0)
*/
```

Figure 19. Sample JCL from member IHCEDFDS (Part 1 of 2)
//***************************************************************
// Delete target datasets
//***************************************************************
//DEL    EXEC PGM=IDCAMS,DYNAMNBR=99,
//       REGION=50M,COND=(4,LE)
//SYSPRINT DD SYSOUT=* 
//SYSIN   DD DISP=(OLD,DELETE),DSN=*.CRE.IDCOUT
//***************************************************************
// Use DFDSS to copy
//***************************************************************
//IDC    EXEC PGM=ADRDSSU,DYNAMNBR=99,
//       REGION=50M,COND=(4,LE)
//SYSPRINT DD SYSDR=* 
//SYSIN   DD DISP=(OLD,DELETE),DSN=*.CRE.DSSOUT
//       DD *
//       TGTALLOC(SOURCE) -
//       TOL(ENQF) -
//       ADMINISTRATOR -
//       VOL(ANY) -
//       WAIT(2,2) SHR
//***************************************************************

Figure 20. Sample JCL from member IHCEDFDS (Part 2 of 2)
Chapter 6. Using the HALDB Analyzer

The HALDB Analyzer utility checks the health of a HALDB by verifying HALDB constructs within a database and its indexes.

About this task
The utility analyzes the HALDB structure and verifies that all root keys are in the correct partition, that all ILKs are valid, and that all EPS pointers will find the correct ILE. Additional performance-related data is also collected.

The HALDB Analyzer monitors specific HALDB components. You can provide thresholds that trigger the utility to issue critical warnings when these components are not performing properly. These components include:

- **Partition selection**
  A root segment in a partition is not found in the same partition when searched by partition selection.

- **Randomizer error**
  A call to the randomizer using an existing root segment does not return a zero return code. This warning is performed for the standard IMS randomizer (DFSHDCnn) only.

- **ILKs in error**
  The ILK of a segment is invalid.

- **Duplicate ILKs**
  There should not be any duplicate ILKs.

- **Missing ILEs**
  EPS pointer requires pointer healing, but there is no corresponding ILE.

A return code of 8 is set when any of these situations is detected.

Performance and administration parameters allow you to set threshold levels for the components being monitored by the HALDB Analyzer.

The threshold values for performance and administration parameters are set as percentage numbers from 0 to 100, unless otherwise stated.

The parameters produce two levels of warning operands:

- **Normal warning level**
  The warning level operand notifies you of a problem situation, but allows you some time to resolve the problem.

- **Critical warning level**
  The critical level operand informs you that an immediate action needs to be taken to correct the problem.

A value of 0 in any operand suppresses the notification. However, the report still shows the data. There are no default settings for the parameters. When the keyword is omitted, no threshold warning is issued.

Procedure
1. Locate the sample JCL for the HALDB Analyzer utility in the SIHCSAMP file, member IHCEANA.
2. Specify the JCL DD statements.
   For a list of DD statements, see “CHECK DD statements” on page 128.
3. Specify the CHECK command parameters.
   For a list of CHECK command parameters, see “CHECK command parameters” on page 131.
CHECK DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the CHECK command.

Table 16. DD statements and record format for the CHECK command

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCLIST</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>
STEPLIB
This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

• IMS HALDB Toolkit load library
• IMS utilities that are available for IMS HALDB Toolkit
• IMS RESLIB library
• Any other libraries

The libraries can appear in any order.

```
//STEPLIB DD DISP=SHR,DSN=ihcload
  DD DISP=SHR,DSN=imstools
  DD DISP=SHR,DSN=reslib
```

where:

• `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
• `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
• `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

DFSRESLB
This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

IMS
This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

IMSDALIB
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

PROCLIB
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(`ddd`) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDF`ddd` member exists in the IMS.PROCLIB data set.

RECON
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.
Attention: If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

IHCSYSIN
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “CHECK command parameters” on page 131.

MSGPRINT
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

IHCLIST
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for reports. For more information about the reports generated in this data set, see “IHCLIST data set” on page 280.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

TRACE
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.
CHECK command parameters

The following table summarizes the CHECK command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4GBWARN</td>
<td>Optional</td>
<td>Sets the warning level for used space. None of the data sets can use more than 4 GB (gigabytes). When the data set tries to go beyond this limit, an abend 844 will occur. This is not the high allocation point, but rather the high use point. This point can be indicated by the threshold setting. 4GBWARN and 8GBWARN are mutually exclusive.</td>
</tr>
</tbody>
</table>

**Format**

\[(llll, hhhh)\]

**llll**

Sets the low threshold. Specify a number (in MB) in the range of 0 - 4095. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**hhhh**

Sets the high threshold. Specify a number (in MB) in the range of 0 - 4095. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Usage**

A recommended setting is: 4GBWARN(2500, 3500)

**Resolution**

When the partition grows too large, you should split it into two partitions.
### Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| 8GBWARN   | Optional    | Sets the warning level for used space. None of the data sets can use more than 8 GB (gigabytes). When the data set tries to go beyond this limit, an abend 844 will occur. This is not the high allocation point, but rather the high use point. This point can be indicated by the threshold setting.

4GBWARN and 8GBWARN are mutually exclusive.

**Format**

\[(lilll, hhhh)\]

- **lilll**: Sets the low threshold. Specify a number (in MB) in the range of 0 - 8191. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

- **hhhh**: Sets the high threshold. Specify a number (in MB) in the range of 0 - 8191. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Usage**

A recommended setting is: 8GBWARN (6500, 7500)

**Resolution**

When the partition grows too large, you should split it into two partitions.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| **AVGFSE** | Optional | Describes the number of free space elements (FSE) per block. This parameter can indicate that a reorganization is needed.  
An FSE describes a portion of free space in a block. There should only be one FSE that describes one large chunk of free space. However, after any update activity, that free space can become multiple smaller pieces. This is especially true with compressed segments.  
**Format**  
\((lll,hhh)\)  
\(lll\)  
Sets the low threshold for the number of FSEs per block. Specify a number in the range of 0 - 999. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.  
\(hhh\)  
Sets the high threshold for the number of FSEs per block. Specify a number in the range of 0 - 999. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.  
**Default value**  
None.  
**Usage**  
The low and high values are dependent on the segment size. You want to set this value smaller with large segments. A recommended setting is: AVGFSE \((5,10)\)  
**Resolution**  
A reorganization will return the free space back to one block. |
| **DBD** | Required | Specifies the name of the HALDB DBD.  
**Format**  
\((dbdname)\)  
**Default value**  
None. |
### Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| DFSDF     | Optional    | Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met:  
  - IMS manages the ACBs (ACBMGMT=CATALOG).  
  - The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog. |

**Format**  
(ddd)

**Default value**  
None.
### Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTENT</td>
<td>Optional</td>
<td>Indicates the extent number that triggers a warning. The maximum number of extents allowed depends on the data management type. <strong>VSAM</strong> The maximum number of extents per data set is 251. The maximum number of extents per volume is 123. <strong>OSAM</strong> The maximum number of extents per data set depends on the version of IMS; approximately 120 for IMS V14 and later. The maximum number of extents per volume is 16. When no more extents are possible, an attempt to obtain a new one creates an out-of-space condition, which leads to an 844 IMS abend. The purpose of the EXTENT parameter settings is to prevent this occurrence. <strong>Format</strong> ((lll,hhh)) <strong>lll</strong> Sets the low threshold. Specify a number in the range of 0 - 251. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed. <strong>hhh</strong> Sets the high threshold. Specify a number in the range of 0 - 251. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed. <strong>Default value</strong> None. <strong>Usage</strong> A recommended setting is: EXTENT ((25,35)) <strong>Resolution</strong> Consider dividing this partition into two partitions using the functions provided with this utility. If the space usage is not very high, adjust the primary and the secondary space parameter to allow fewer extents. It is also possible that your SMS pool volumes are heavily split, so that each space request must be satisfied using multiple extents. In this situation, your volumes should be maintained.</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine. <strong>Format</strong> ((nnnn)) <strong>Default value</strong> If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
### Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| KEYS      | Optional    | The designated ddname will receive a file containing the root keys.  
  **Format**  
  (ddname)  
  **Default value**  
  None.  
  **Usage**  
  Use this parameter if you want to perform a root key analysis; otherwise, do not specify this parameter.  
  The KEYS file is created upon request only. The file only exists when the KEYS parameter has been specified.  
  The following example shows the layout of the file:  
  | PID | DS | XL2 | Current partition id  
  | REORGNO | DS | XL2 | Current reorg number  
  | SEGRBA | DS | XL4 | Current RBA (data portion if split)  
  | TARGPID | DS | XL2 | Target partition id  
  | RMRESULT | DS | XL4 | Randomizer result  
  | KEY | DS | 0C  | Start of root key |
| MINROOT   | Optional    | Defines the minimum amount of root segments in the database for the segment-oriented thresholds. If there are less than the specified root segments, some warnings are suppressed. This is because the percentage values do not perform well with small databases. The thresholds are suppressed for ROOTHOME, ROOTOVFL, SPLIT, and PTRHEAL.  
  **Format**  
  (nnnnnn)  
  **Default value**  
  0 |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTRHEAL</td>
<td>Optional</td>
<td>Indicates the amount of EPS pointer (PSINDEX ONLY) that needs pointer healing. The secondary index EPS pointer is not maintained when reorganizing the primary database (or a partition). In this situation, pointer healing (updating the direct pointer from the index to its target) must be done when the pointer is used. The ILDS data set is used. This process creates many I/Os. Therefore, it is recommended that you have all pointers healed. This parameter can help you decide when to perform this task.</td>
</tr>
</tbody>
</table>

**Format**

\[(ll, hh)\]

- **ll**
  
  Sets the low threshold. Specify a percentage number in the range of 0 - 99. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

- **hh**
  
  Sets the high threshold. Specify a percentage number in the range of 0 - 99. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Usage**

A recommended setting is: PTRHEAL(20, 60)

**Resolution**

You can use the pointer healer function provided by IMS HALDB Toolkit or rebuild the indexes using an index builder utility.
Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPUSE</td>
<td>Optional</td>
<td>Indicates the usage of root anchor points (RAPs) in a PHDAM database. This parameter is used only for PHDAM. RAP usage is very dependent on the randomizing module. This parameter is designed for DFSHDC40, but can be used for others as well. A performance criteria for DFSHDC40 is that it should have more RAPs than root segments. This condition leads to RAPs not being used. The RAPUSE parameter monitors this usage.</td>
</tr>
</tbody>
</table>

**Format**

     (ll, hh)

     **ll**
     Sets the low threshold. Specify a percentage number in the range of 0 - 99. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

     **hh**
     Sets the high threshold. Specify a percentage number in the range of 0 - 99. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Usage**

A recommended setting is: RAPUSE (60, 80)

**Resolution**

The randomizing parameter must be changed. See ROOTHOME for details.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOTHOME</td>
<td>Optional</td>
<td>Indicates the number of root segments that are not in home block. This parameter is effective for PHDAM only. It is ignored for PHIDAM. PHDAM has a randomizing module that addresses a root anchor point (RAP). The root segment is chained off. For performance reasons, the root segment should be residing in the same block. However, this is not always the case. This parameter allows you to set thresholds on how many root segments are not in that block.</td>
</tr>
</tbody>
</table>

**Format**

\[(ll, hh)\]

- **ll**
  - Sets the low threshold. Specify a percentage number in the range of 0 - 99. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

- **hh**
  - Sets the high threshold. Specify a percentage number in the range of 0 - 99. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Usage**

Do not allow too many roots in the home block. A recommended setting is: `ROOTHOME(10, 30)`

**Resolution**

The randomizing parameter must be changed. In most cases, you must increase the RAASIZE.

You might also have too many RAPs per block. In this case, decrease the RAPs per block and increase the RAASIZE accordingly. Remember that the randomizing parameter is defined with the partition, so you must perform this task using the DBRC utility and CHANGE.PART. You can use the MAINTAIN function to resolve this.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOTOVFL</td>
<td>Optional</td>
<td>Indicates how many root segments are in overflow. This parameter applies to PHDAM only. It is like the ROOTHOME parameter. However, this situation occurs when many new root segments are inserted. All roots in the overflow area are also reflected by ROOTHOME, but these roots could be brought back by a simple reorganization.</td>
</tr>
</tbody>
</table>

**Format**

\((ll, hh)\)

*ll*

Sets the low threshold. Specify a percentage number in the range of 0 - 99. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

*hh*

Sets the high threshold. Specify a percentage number in the range of 0 - 99. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Resolution**

The resolution is to change the randomizing parameter for the indicated partition.

<table>
<thead>
<tr>
<th>SPACE</th>
<th>Optional</th>
<th>Sets thresholds for partition size. This parameter can be used to make decisions about partitions.</th>
</tr>
</thead>
</table>

**Format**

\((llll, hhhh)\)

*llll*

Sets the lowest preferred partition size. Specify a number (in MB) in the range of 0 - 8191. You will get a warning when the partition size is smaller than this value. If you specify a value of 0, this warning is suppressed.

*hhhh*

Sets the high partition size. Specify a number (in MB) in the range of 0 - 8191. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

**Default value**

None.

**Usage**

A recommended setting is: \(\text{SPACE}(512, 3500)\)

**Resolution**

When a partition is too small, you might want to combine it with the left or right (or both) neighboring partition. The IMS HALDB Toolkit provides the functionality to do this. When a partition becomes too large, it should be split into two partitions.
Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPLIT</td>
<td>Optional</td>
<td>Indicates how many of the split segments are split to a different block. A variable length segment could be split into the prefix and the data portion. This can happen during an update when the size of the data increases, but there is not enough room to update this in place. The prefix portion cannot be moved and needs to stay in place. The data portion is now stored at a different location and is pointed to by an additional pointer in the prefix. This becomes a problem when the different location is in a different block. That situation will cause an additional I/O when retrieving the segment. The parameter threshold settings address this specific situation. The parameter is active for each segment type that has variable length or is compressed.</td>
</tr>
</tbody>
</table>

Format

\((ll, hh)\)

- **ll**: Sets the low threshold for all segments of a segment type that is split to a different block. Specify a percentage number in the range of 0 - 99. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

- **hh**: Sets the high threshold. Specify a percentage number in the range of 0 - 99. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.

Default value

None.

Usage

A recommended setting is: SPLIT(5,20)

Resolution

A reorganization will resolve this problem.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYNONYM</td>
<td>Optional</td>
<td>Indicates the number of root segment occurrences in the synonym chain. This parameter is effective for PHDAM only. It is ignored for PHIDAM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ll, hh)</td>
</tr>
<tr>
<td>ll</td>
<td></td>
<td>Sets the low threshold. Specify a percentage number in the range of 0 - 99. You will get a warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.</td>
</tr>
<tr>
<td>hh</td>
<td></td>
<td>Sets the high threshold. Specify a percentage number in the range of 0 - 99. You will get a critical warning when this value is exceeded. If you specify a value of 0, this warning is suppressed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Resolution</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The randomizing parameter must be changed. In most cases, you must increase the RAASIZE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You might also have too few RAPs per block. In this case, increase the RAPs per block and increase the RAASIZE accordingly. Remember that the randomizing parameter is defined with the partition, so you must perform this task using the DBRC utility and CHANGE.PART. You can use the MAINTAIN function to resolve this.</td>
</tr>
<tr>
<td>VERIFYILE</td>
<td>Optional</td>
<td>When EPS pointers are present, they might require pointer healing. Pointer healing requires that the targeted partition has an ILE (a record in the ILDS) to be used for healing. If this record is not there, the situation is the equivalent of a pointer error.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Usage</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This condition should be checked regularly.</td>
</tr>
</tbody>
</table>
Table 17. CHECK command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERIFYILK</td>
<td>Optional</td>
<td>In HALDB, each segment has a unique indirect list key (ILK) that can never be the same for the same segment type in the entire database. The pointer healing process relies on this uniqueness. This condition should be treated like a pointer, so its verification is important. The function provided will check for duplicate and invalid ILK.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Usage</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This condition should be checked regularly.</td>
</tr>
</tbody>
</table>
Chapter 7. Reorganizing a PSINDEX

The reorganize PSINDEX utility helps you reorganize a partitioned secondary index (PSINDEX) to improve space management due to heavy update activity, where the number of CI splits and CA splits would be high.

About this task

The following tasks can be performed by this utility:

- Reclaim space
- Reclaim split indexes
- Remove deleted index records

Although this reorganization task could be performed with IDCAMS REPRO, the task would not be registered with DBRC.

The following example shows another way to use the REORGIND command to reorganize a PSINDEX:

```
REORGIND  DBD(dbdbname)  PARTITN(psindex_partition_name)
```

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEREOI.
2. Specify the JCL DD statements.
   For a list of DD statements, see “REORGIND DD statements” on page 146.
3. Specify the REORGIND command parameters.
   For a list of REORGIND command parameters, see “REORGIND command parameters” on page 148.

Example

```
//JOBNAME   JOB    00,000,CLASS=A,MSGCLASS=X
//**------------------------------------------------------------
//**           Reorg partition
//**------------------------------------------------------------
//REO   EXEC PGM=IHCHALDB,
//       REGION=60M
//STEPLIB  DD DISP=SHR,DSN=your.SIHCLOAD
//RECON1   DD DISP=SHR,DSN=your.RECON1
//RECON2   DD DISP=SHR,DSN=your.RECON2
//RECON3   DD DISP=SHR,DSN=your.RECON3
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//IMS      DD DISP=SHR,DSN=your.DBDLIB
//MSGPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
//IHCSYSIN DD  *
//REORGIND  DBD(SH022)
/*
```

Figure 22. Sample JCL for reorganizing a PSINDEX
**REORGIND DD statements**

DD statements are used to identify the source of input and the placement of output information. The following table shows DD statements and record format for the **REORGIND** command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```bash
//STEPLIB DD DISP=SHR,DSN=ihcload
// DD DISP=SHR,DSN=imstools
// DD DISP=SHR,DSN=reslib
```

where:

- **ihcload** is the name of the library that contains the IMS HALDB Toolkit load modules.
- **imstools** is the optional name of the library that contains the IMS reorganization utilities load modules.
- **reslib** is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.
This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**

This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

**RECONx**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “REORGIND command parameters” on page 148.

**SYSPRINT**

This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

**MSGPRINT**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.
SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.
This data set can reside on DASD, or it can be routed through the output job.

**REORGIND command parameters**

The following table summarizes the `REORGIND` command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| **DBD**   | Required    | Specifies the name of a primary DBD or a PSINDEX.  
If you specify a primary DBD, PARTITN must not be specified. All PSINDEX partitions for the specified primary DBD are reorganized.  
If you specify a PSINDEX DBD, you can specify a partition. If a partition is not specified or specified with an asterisk (*), then all partitions of that PSINDEX are reorganized.  
**Format**  
(dbdbname)  
**Default value** None. |
| **DFSDF** | Optional    | Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog.  
The specified member is used when the following two conditions are met:  
• IMS manages the ACBs (ACBMGMT=CATALOG).  
• The IMS Catalog Definition exit routine (DFS3CDX0) is not used.  
Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.  
**Format**  
(ddd)  
**Default value** None. |
| **IMSID** | Optional    | IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.  
**Format**  
(nnnn)  
**Default value** If omitted, the value is obtained from the current SDFSRESL(DFSVC000). |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTITN</td>
<td>Optional</td>
<td>Specifies the name of the PSINDEX partition. If the DBD is PSINDEX, the default name value is an asterisk (*). This parameter is invalid when a primary DBD is specified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(psindex_partition_name</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
Chapter 8. Splitting an unload file into single partition files

The split unload file utility allows you to split or consolidate an unload file into single partition unload files. The reloads then can run in parallel.

About this task

A HALDB unload file can contain data from multiple partitions. As the data grows or shifts, partitions grow or shrink. When reloading partitions, it would be faster to reload each partition in parallel.

The single partition unload files are standard Hierarchical Direct (HD) unload files with header and trailer statistics. Each file contains only records for the selected partition.

This utility separates the HALDB unload file on the partition boundary and maintains the unload header and trailer records for each file.

The sample JCL for this utility is in the SIHCSAMP file, member IHCESPLT.

You must specify the DBD and the unload file you want to split.

The DD name for the single partition HD unload files are constructed using the partition name appended with a Z. These files are required.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCESPLT.
2. Specify the JCL DD statements.
   For a list of DD statements, see “IHCUSPLT DD statements” on page 152.
3. Specify the IHCUSPLT command parameters.
   For a list of IHCUSPLT command parameters, see “IHCUSPLT command parameters” on page 154.

Example

In the following example, each partition unload file is named PARTxxZ.
**IHCUSPLT DD statements**

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the **IHCUSPLT** command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>DFSUINPT</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IHCYSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>partition_nameZ</td>
<td>Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:
• IMS HALDB Toolkit load library
• IMS utilities that are available for IMS HALDB Toolkit
• IMS RESLIB library
• Any other libraries

The libraries can appear in any order.

```
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

• `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
• `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
• `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDLIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDLIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDLIB DD statement is coded, IMSDLIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDLIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDLIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**

This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(`ddd`) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDF`ddd` member exists in the IMS.PROCLIB data set.

**RECONx**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDLIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**DFSUINPT**

This statement is required. The statement defines the unload file you want to split.
**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “IHCUSPLT command parameters” on page 154.

**partition_nameZ**

These statements are required. Each of these statements defines the HD unload file for each partition. The DD names for the single partition HD unload files are constructed using the partition name appended with a Z.

**MSGPRINT**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**

This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

### IHCUSPLT command parameters

The following table summarizes the **IHCUSPLT** command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the name of a primary DBD.</td>
</tr>
<tr>
<td>Format</td>
<td><em>(dbdname)</em></td>
<td></td>
</tr>
<tr>
<td>Default value</td>
<td>None.</td>
<td></td>
</tr>
</tbody>
</table>

---

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### Table 21. IHCUSPLT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DFSDF</strong></td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met: • IMS manages the ACBs (ACBMGMT=CATALOG). • The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog. <strong>Format</strong> (ddd) <strong>Default value</strong> None.</td>
</tr>
<tr>
<td><strong>IMSID</strong></td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine. <strong>Format</strong> (nnnn) <strong>Default value</strong> If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
Chapter 9. Recovering by using the ILK reset utility

Recovery is the process of rebuilding databases after a system failure. IMS HALDB Toolkit provides the ILK utility to help you recover from the database rebuild process.

About this task

In a HALDB, an indirect list entry key (ILK) is a unique token that is assigned to a segment in PHDAM and PHIDAM databases when the segment is created. Eight bytes in length and stored in the prefix of the segment, the ILK uniquely identifies every segment in PHDAM and PHIDAM databases.

The ILK reset utility enables you to rebuild all ILKs and their references, and allows you to resolve conflicting ILKs.

The ILK reset utility resets the ILK of each segment. The utility offers a solution when duplicate or invalid ILKs are encountered. Run this utility when the HALDB Analyzer detects invalid ILKs.

This utility does not support logical relations. It creates an HD unload file, which contains the new ILKs. This file can be used as input to reload.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEILK.
2. Specify the JCL DD statements.
   For a list of DD statements, see “RESETILK DD statements” on page 158.
3. Specify the RESETILK command parameters.
   For a list of RESETILK command parameters, see “RESETILK command parameters” on page 160.
4. Make sure that an index builder utility is available because secondary indexes must be rebuilt.
5. Take the databases offline.

Example

```
//JOBNAME JOB 00,000,CLASS=A,MSGCLASS=X
//*------------------------------------------------------------
//*           Reset ILK
//*           A new HD unload file is created containing
//*           new ILKs. Reload database using this unload file.
//*           Secondary indexes must be rebuild
//*------------------------------------------------------------
//S2     EXEC PGM=IHCHALDB,
//       REGION=50M
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
//       DD DISP=SHR,DSN=your.SDFSRESL
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//RECON1 DD DISP=SHR,DSN=your.RECON1
//RECON2 DD DISP=SHR,DSN=your.RECON2
//RECON3 DD DISP=SHR,DSN=your.RECON3
//IMS DD DISP=SHR,DSN=your.DBDLIB
//TRACE DD SYSOUT=*   
//MSGPRINT DD SYSOUT=*   
//SYSUDUMP DD SYSOUT=*   
//IHCSYSIN DD *
//RESETILK DBD(ddddd)
//DFSURGU1 DD UNIT=SYSDA,DISP=(*,PASS),
//          DSN=&&UNL,SPACE=(CYL,1,1))
```

Figure 24. Sample ILK reset JCL
**RESETILK DD statements**

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the **RESETILK** command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>DFSURGU1</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```plaintext
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.
IMS

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

IMSDALIB

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

PROCLIB

This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

RECONx

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

Attention: If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

IHCSYSIN

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “RESETILK command parameters” on page 160.

DFSURGU1

This statement is required. The statement defines a new HD unload file for storing new ILKs.

MSGPRINT

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

TRACE

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP

This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.
## RESETILK command parameters

The following table summarizes the **RESETILK** command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the name of a primary DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(dbdname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>DFSDF</td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IMS manages the ACBs (ACBMGMT=CATALOG).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddd)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(nnnn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
Chapter 10. Healing index pointers

After reorganizing the primary database, all secondary index pointers require healing. HALDB can handle this situation with its self-healing feature. Indexes can provide direct access to data, which otherwise can be found only by scanning the entire database.

About this task
HALDB identifies the new direct pointer by using the indirect list data set (ILDS) and replaces the invalid pointer with the current pointer. This process is called pointer healing.

However, this task might demand extra resources that can affect performance during peak time.

The index pointer healer utility allows you to heal index pointers offline and at a less expensive time. The utility allows you to replace, or heal, all index pointers that have become invalid after a database reorganization. The utility updates the index using the ILDS, which is an efficient process because it works sequentially.

When the primary database (or its partitions) is reorganized, the secondary indexes are not rebuilt. However, the target segment in the primary database has moved to a different place (the relative byte address or RBA). This condition makes the direct pointer in the index invalid.

Pointer healing takes place only when required (for example, when the secondary index is used to locate the target). This process requires many I/Os. It is recommended that you avoid pointer healing during peak transaction time.

The following conditions apply to using the index pointer healer utility:
• The primary database must not be open for update.
• The secondary indexes must be offline.

Alternatively, you can create the JCL by using the ISPF user interface.

Procedure
1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEIXHL.
2. Specify the JCL DD statements.
   For a list of DD statements, see “PTRHEAL DD statements” on page 162.
3. Specify the PTRHEAL command parameters.
   For a list of PTRHEAL command parameters, see “PTRHEAL command parameters” on page 164.
4. Make sure that the primary database is closed for update.
5. Make sure that the secondary indexes are offline.
Example

```plaintext
//JOBNAME JOB 00,000,CLASS=A,MSGCLASS=X
/*------------------------------------------------------------
/* Pointer healing for secondary indexes
/* for index DBD specified.
/*------------------------------------------------------------
//S2 EXEC PGM=IHCHALDB,
// REGION=50M
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//RECON1 DD DISP=SHR,DSN=your.RECON1
//RECON2 DD DISP=SHR,DSN=your.RECON2
//RECON3 DD DISP=SHR,DSN=your.RECON3
//IMS DD DISP=SHR,DSN=your.DBDLIB
//TRACE DD SYSOUT=*
//MSGPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//IHCSYSIN DD *
PTRHEAL DBD(nnnnn)
```

Figure 25. Sample Index Pointer Healer JCL

PTRHEAL DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the `PTRHEAL` command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries
The libraries can appear in any order.

```java
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**

This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

**RECONx**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “PTRHEAL command parameters” on page 164.
**MSGPRINT**
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

---

**PTRHEAL command parameters**
The following table summarizes the PTRHEAL command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the PSINDEX DBD name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>DFSDF</td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IMS manages the ACBs (ACBMGMT=CATALOG).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(nnnn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
Chapter 11. System utilities

IMS HALDB Toolkit provides several utilities to help you with database handling tasks.

Topics:
- “Rebuilding DBD source from DBDLIB” on page 167
- “Creating a PSB list for selected DBDs” on page 170
- “Creating OSAM multi-volume data sets” on page 172
- “Listing VIO and unit names” on page 173

Rebuilding DBD source from DBDLIB

The rebuild DBD source utility rebuilds DBD source statements from DBDLIB. If you are not sure that your DBD source reflects the DBDLIB, you can use this utility to rebuild the DBD source. The DBDLIB contains the most recent DBD description.

About this task

DBD source statements are compiled to create the DBD description in DBDLIB. The rebuild DBD source utility reverses that process.

A database description (DBD) is the collection of macro parameter statements that define the characteristics of a database, such as the database's organization and access method, the segments and fields in a database record, and the relationship between types of segments.

The output from this job is written to the OUTPUT file.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEDBD.
2. Specify the JCL DD statements.
   For a list of DD statements, see “IHCUDBD DD statements” on page 168.
3. Specify the IHCUDBD command parameters.
   For a list of IHCUDBD command parameters, see “IHCUDBD command parameters” on page 170.
Example

```c
//JOBNAME JOB 00,000,CLASS=A,MSGCLASS=X
//*------------------------------------------------------------
//* Rebuild DBD source
//*------------------------------------------------------------
//S2      EXEC PGM=IHCHALDB,
//        REGION=50M
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
//RECON1  DD DISP=SHR,DSN=your.SDFSRESL
//RECON2  DD DISP=SHR,DSN=your.RECON1
//RECON3  DD DISP=SHR,DSN=your.RECON2
//IMS     DD DISP=SHR,DSN=your.DBDLIB
//TRACE   DD DUMMY
//MSGPRINT DD DUMMY
//OUTPUT   DD SYSOUT=* 
//IHCSYSIN DD *
//RUN     PGM(IHCUDBD) -
//        DBD(ddddd)            <=== specify DBD name

Figure 26. Sample JCL member IHCEDBD
```

IHCUDBD DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the IHCUDBD command.

### Table 26. DD statements and record format for the IHCUDBD command

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

#### STEPLIB

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries
The libraries can appear in any order.

```plaintext
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDLALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**IMS**

This statement is required. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

**IMSDLALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDLALIB DD statement is coded, IMSDLALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDLALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDLALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**RECONx**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDLALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “IHCUDBD command parameters” on page 170.

**OUTPUT**

This statement is required. The statement defines the output data set for storing the rebuilt DBD source.

The output file can be allocated as SYSOUT=* or PDS.

**MSGPRINT**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.
TRACE
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

IHCUDBD command parameters
The following table summarizes the IHCUDBD command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the DBD name.</td>
</tr>
<tr>
<td>Format</td>
<td></td>
<td>(dbdname)</td>
</tr>
<tr>
<td>Default value</td>
<td>None.</td>
<td></td>
</tr>
</tbody>
</table>

Creating a PSB list for selected DBDs
A program specification block (PSB) is a control block that describes databases and logical message destinations used by an application program. A PSB consists of one or more program communication blocks (PCB).

About this task
A program communication block (PCB) is an IMS control block that describes an application program’s interface to and view of an IMS database or, additionally for message processing and batch message processing programs, to the source and destinations of messages. PCBs are defined by the user during PSB generation.

The show PSB utility can be used to create a list of program specification blocks (PSB) that reference a given database, and assists in online changes by identifying which PSBs require change.

The references to both the DBDs and the PSBs reside in the application control block (ACB) library. The ACB library is used during online and database batch (DBB) region type execution of IMS.

Procedure
1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEACBL.
2. Specify the JCL DD statements.
   For a list of DD statements, see “IHCWPSBL DD statements” on page 171.
3. Edit the list of the DBD names on the DBDLIST DD.

Results
The list of PSB names can be found in the MSGPRINT file.
Example

//JOBNAME JOB 0,000,CLASS=A,MSGCLASS=X
//*******************************************************
//*        SHOW PSBS FROM ACBLIB FOR SPECIFIED DBD(S)
//*******************************************************
//PSBS EXEC PGM=IHCYUTIL,
//      REGION=50M
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
//IMS DD DISP=SHR,DSN=your.DBDLIBRARY
//IMSA CB DD DISP=SHR,DSN=your.ACBLIB
//TRACE DD SYSOUT=* 
//TRACE DD SYSOUT=* 
//IHCSYSIN DD *
//DBDLIST DD *
/*

Figure 27. Sample JCL member IHCEACBL

IHCWPSBL DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the IHCWPSBL command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IM SAS CB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>DBDLIST</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.
where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**IMS**

This statement is required. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

**IMSACB**

This statement is required. The statement defines the ACB library that contains the DBD that the DBDLIST DD statement specifies.

This data set must reside on DASD.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

**DBDLIST**

This statement is required. This statement defines the DBDs. To specify multiple DBDs, write one DBD name on each line.

**MSGPRINT**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279. The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis. This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**

This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis. This data set can reside on DASD, or it can be routed through the output job.

---

**Creating OSAM multi-volume data sets**

This utility creates the additional VTOC records on the subsequent volumes using the secondary allocation. Overflow Sequential Access Method (OSAM) is an IMS data management access method that combines selected characteristics of BSAM and BDAM. OSAM is used by the following IMS database access methods: HIDAM and HDAM if VSAM is not used. OSAM is also used by some of the online pool management routines.
About this task

The OSAM multi-volume utility allows you to create OSAM multi-volume data sets using the **ALLOCATE** command in TSO/IDCAMS.

You do not need to create OSAM multi-volume data sets for z/OS Storage Management Subsystem (SMS) managed data sets. This utility is appropriate only for non-SMS data sets.

The **ALLOCATE** command creates the catalog entries for all specified volumes, but only builds a VTOC record on the first volume. IMS OSAM does not allow this and will abend.

Procedure
1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEOSAM.
2. Edit the JCL as necessary.

Example

```
//JOBNAME JOB 00,000,CLASS=A,MSGCLASS=X
//*-----------------------------------------------------------
//*   OSAM MULTI VOLUME UTILITY
//*   MAKE SURE THAT ALL VOLUMES HAVE A VTOC
//*   NOT REQUIRED WHEN SMS
//*-----------------------------------------------------------
//MVOL EXEC PGM=IHCYOSAM
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
//MSGPRINT DD SYSOUT=*  
//SYSIN    DD *  
dsnname1       <=== specify your DSN

dsnname2
```

Figure 28. Sample JCL member IHCEOSAM

Listing VIO and unit names

It is possible for an installation parameter to ask you for non-VIO (virtual I/O) unit names. This list DASD unit names utility shows all unit names that do not reflect device types (such as 3390) and marks those that are defined as VIO.

Procedure
1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEUNIT.
2. Edit the JCL as necessary.

Results
The list of unit names can be found in the MSGPRINT file.
Example

```plaintext
//JOBNAME JOB 0,000,CLASS=A,MSGCLASS=X
.showMessage_*** LIST DASD UNIT NAMES
.showMessage_*** EXEC PGM=IHCYUTIL,
.showMessage_***       REGION=50M
.showMessage_*** /STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
.showMessage_***       DD DISP=SHR,DSN=your.SDFSRESL
.showMessage_*** /TRACE DD SYSOUT=* 
.showMessage_*** /MSGPRINT DD SYSOUT=* 
.showMessage_*** /SYSUDUMP DD SYSOUT=* 
.showMessage_*** /IHCSYSIN DD * 
.showMessage_*** RUN PGM(IHCWEDTI)
```

Figure 29. Sample JCL member IHCEUNIT
Part 6. HALDB without DBRC

The HALDB without DBRC feature provides the ability to perform data set name substitutions outside of DBRC. This feature is intended for use in test installations.

You can also convert non-HALDB DBDs and data sets to HALDB DBDs and data sets.

Topic:

• Chapter 12, “HALDB without DBRC,” on page 177
Chapter 12. HALDB without DBRC

You can use this feature to perform HALDB data set name substitutions outside of DBRC. It is intended for use in test installations. The feature can process multiple database data sets with one definition.

You can substitute HALDB data set names by using either of the following methods:

- Substituting data set names by specifying the DD statements in the JCL.
- Modifying the global table definitions by using the ISPF user interface or batch definitions.

You can also convert non-HALDB DBDs and data sets to HALDB DBDs and data sets by using the ISPF user interface.

When you use the HALDB without DBRC utility, the database is treated as if it is not registered to DBRC.

The underlying HALDB structure comes from the RECON. This RECON could be the same RECON that is used in the associated online system or the RECON for that online system in a test environment. The RECON holds the HALDB definitions, such as partition names and numbers, key ranges, and file attributes. The HALDB without DBRC utility does not update the RECON, it only refers to it to obtain the HALDB definitions.

All the functions of IMS HALDB Toolkit, except for the HALDB without DBRC function, use DBRC (DBRC=Y). In a HALDB environment without DBRC, all IMS utilities that rely on the RECON content are not usable. However, the backup and recovery utilities continue to work.

Topics:

- “Configuring HALDB for use without DBRC” on page 177
- “Substituting data set names by using JCL” on page 178
- “Substituting data set names by using ISPF or batch definitions” on page 179
- “Converting non-HALDB DBDs to HALDB DBDs” on page 193

Configuring HALDB for use without DBRC

You can configure HALDB without DBRC to perform data set name substitutions by modeling them after the DD statements that are provided in the JCL or by using the ISPF interface or batch definitions.

Before you begin

In the IMS batch JCL, the DBRC parameter in the parameter string must be set to Y to obtain the partition information from the RECON.

CAUTION:

- DSPCTR0, DFSISV10, and IHCUITDD, which are customized modules of IMS HALDB Toolkit, must reside on a different library from the library where other IMS Tools product modules reside.
- You must not concatenate the library that contains DSPCTR0, DFSISV10, and IHCUITDD modules to the STEPLIB statement of IMS online (DBRC region) JCL.
- Remember to back up the database as necessary. The HALDB without DBRC utility processes the database as if it is not registered to RECON and therefore no recovery point is created.

About this task

During the configuration, set the JCLALLO parameter in the IHCEDBRI member to indicate whether you want to substitute data set names by modeling them after the DD statements in the JCL or by using the ISPF user interface or batch definitions to modify the global tables.
Procedure

To substitute data set names by using the ISPF user interface or batch definitions, complete the following steps:

1. Add the DBRCNODD=YES | NO parameter to the IHCEDBRI member by choosing one of the following options:
   - To deactivate DBRC for this particular run only, add DBRCNODD=YES and specify the following DD statement: //$$DBRCNO DD DUMMY.
   - To deactivate DBRC entirely, add DBRCNODD=NO. If necessary, you can temporarily disable this bypass by specifying the following statement: //$$DBRCYY DD DUMMY.

2. Add the JCLALLO=YES | NO parameter to the IHCEDBRI member by choosing one of the following options:
   - To create rules for substituting HALDB data set names by using the ISPF or batch definitions, add JCLALLO=NO.
   - To substitute data set names by specifying JCL, add JCLALLO=YES.

3. Run SIHCSAMP member IHCEDBRI.
   The information KSDS is created, and its data set name is saved in a program.

   **CAUTION:** Make sure you create the IHCU*TD* module in a library that is different from where other IMS Tools product libraries exist.

4. Run SIHCSAMP member IHCEDBRC. IHCEDBRC generates modules DSPCRTR0 and DFSISVIO.

   **CAUTION:** Make sure you create DSPCRTR0 and DFSISVIO modules in a library that is different from where other IMS Tools product libraries exist.

   This step re-links the DBRC module DSPCRTR0 to add the intercept module. The module can reside in the IMS RESLIB, but for testing purposes, add it to the output data set (your_output_dataset in IHCEDBRC) and not to the IMS HALDB Toolkit library.

5. Concatenate the output data sets generated by IHCEDBRI and IHCEDBRC to the STEPLIB DD. These data sets must be concatenated before IMS RESLIB.

6. For ISPF users: Copy the CLIST IHCCN*TY into your CLIST library.
   The CLIST contains the ISPF invocation. You must adjust the data set names to your names. You can change the CLIST name after you copy it into your CLIST library.

Substituting data set names by using JCL

You can substitute data set names by adding DD statements to the JCL.

Procedure

To substitute data set names by using JCL:

Add a DD statement for each HALDB that is used.

The following example shows the valid form for the DD statements that you add.

```
//haldbdn DD DISP=SHR, DSN=your.first.partition.A00001
```

All other partition data sets must use the same dsname prefix, `your.first.partition`. The HALDB master DBD name must be haldbdn. If you have a PSINDEX, each index must be specified.

Results

Data set names are modeled after the DD statements that you specified in the JCL.
Substituting data set names by using ISPF or batch definitions

You can create data set naming rules by using the ISPF user interface or batch update.

If you are unfamiliar with JCL or batch scripts, you can use the ISPF interface to gain an understanding of the types of rules you can create.

In this topic:

• “Substituting data set names by using the ISPF user interface” on page 180
• “Substituting data set names by using batch functions” on page 188

Global tables

The HALDB without DBRC feature includes three preinstalled global tables. You can use the ISPF interface or batch update to modify these tables to create rules for substituting HALDB data set names.

These global tables are used when special tables do not exist. Each global table has one row defined by the key "**Global." These rows cannot be deleted because they function as a fallback for row selection errors. However, these rows might be the only rows you need, and they can be modified.

The following global tables are preinstalled:

**SYSTEM table**
Each row in the SYSTEM table defines a certain system. If you need different user definitions per system, the SYSTEM table can have a user table assigned. If the global DBD table cannot be used for certain DBDs, it can have a DBD table assigned to it.

**USER table**
Each row in the USER table defines a certain user. Use it only if the global user row is not sufficient. If special definitions for that user and that DBD are required, the user row can have a DBD table attached to it.

**DBD table**
Each row in the DBD table defines a certain DBD. This row is required only if the data set name creation rule is kept at the DBD level. A DBD table can be assigned to a user, a system, or a system and a user.

Data set names

Data set names are created by modeling them after DD statements in the JCL or by using the ISPF user interface or batch update to modify table definitions that are identified by the IMS system (IMSID), the user (USERID), and the DBD.

Data set names in HALDB are specified by using the DSNPREFX parameter in DBRC, which is limited to 37 characters.

You can use any combination of the following five elements to create the DSNPREFX parameter:

**HLQ**
The high-level qualifier. It can contain up to 37 characters.

**SYS**
The name of the system. It can contain up to eight characters.

**USR**
The name of the user. It can contain up to eight characters. You can specify whether to use the content of the USR field, the TSO user ID, or a TSO user ID that is created by using a pattern.

**DBD**
The name of the DBD. It can contain up to eight characters.

**PART**
The name of the partition. It can contain up to seven characters.

Here is an example of the DSNPREFX parameter:
You conduct data set substitution at the DBD level. The rule for creating data set names is the same for all partitions of the same DBD.

**Substituting data set names by using the ISPF user interface**

You can use the ISPF user interface to create rules for substituting HALDB data set names.

To use the ISPF user interface, begin by opening the **IMS HALDB Toolkit** panel, as shown in the following figure.

---

**Figure 30. IMS HALDB Toolkit panel**

You can use the ISPF user interface to do the following tasks:

- “Modifying the system definition” on page 180
- “Modifying the system selection method” on page 182
- “Maintaining the RECON table” on page 183
- “Maintaining the IMSID table” on page 184
- “Specifying the level where rules are active” on page 184
- “Maintaining SYSTEMs” on page 186
- “Specifying the USER for creating data set names” on page 186
- “Maintaining USERS” on page 187

**Modifying the system definition**

You can modify the system definition to change the IMS libraries and DBD libraries.

**Procedure**

To modify the system definition, complete the following steps:

1. On the **IMS HALDB Toolkit** panel, specify option 1, System Setup.
   
   The **System Setup** panel is displayed, as shown in the following figure.
2. Specify option **1**, System definition.

   The **System definition** panel is displayed, as shown in the following figure.


   The **Update IMS Libraries** panel is displayed, as shown in the following figure. The specified IMS libraries are used as default settings and are required for specific functions.

4. Verify or update the IMS libraries and press Enter.

   You can specify the following DD names:

   **MACLIB**
   - Specifies the MACLIB data set. Use MACLIB2 to specify an additional macro library.

   **RESLIB**
   - Specifies the RESLIB data set. Use RESLIB2 and RESLIB3 if you need a concatenation to the RESLIB.

   **MDALIB**
   - Specifies the MDALIB data set. Use MDALIB2 if you have more than one MDALIB. MDALIB might hold the RECON data set that contains the HALDB layout that you will use.

   The **System definition** panel is displayed again.

5. On the **System definition** panel, specify option **2**, Specify DBD libraries.

   The **Update DBD libraries** panel is displayed, as shown in the following figure.

---

**Figure 31. System Setup panel**

**Figure 32. System definition panel**

**Figure 33. Update IMS libraries panel**

**Figure 34. Update DBD libraries panel**

---
6. Verify or update the DBD libraries and press Enter.

The DBD libraries contain the non-HALDB and the HALDB DBDs. To convert multiple data sets, both libraries must be available.

**Results**
The system definition is updated with the IMS libraries and DBD libraries that you specified.

**Modifying the system selection method**
You can use a system selection method other than the default setting by modifying the system selection method.

**About this task**
The default setting for the system selection method is IMSID. In this setting, an IMSID selects the system row. Selecting a system row assigns a key for the system table. If the system table does not have a key, the default setting is the global key. After the system row has been selected, all other table selections are made based on that table.

To use a system selection method other than IMSID, complete the following steps:

**Procedure**
1. On the **IMS HALDB Toolkit** panel, specify option **1**, System Setup.
   The **System Setup** panel is displayed, as shown in the following figure.

   The **System Selection Method** panel is displayed, as shown in the following figure.
3. Specify one of the four following options to locate the system row in the system table. These options are used to define the rules for naming data sets.

**RECON**
If you select RECON, you must create a table that assigns RECON data set names to a system row by its name.

**IMSID**
If you select IMSID, you must create a matching table that assigns an IMSID to the name of a system row. If the table does not contain an assignment for the specified IMSID, the IMSID is used to locate the system row.

**FILE**
If you select FILE, you must provide a DD statement that has a record that contains the name of the system table row.

**User exit**
If you cannot use one of the other three methods, select User exit. The user exit provides the system name.

**Results**
The system selection method is updated so that the method that you selected will locate the system row and assign a key for the system table.

**What to do next**
You can maintain the RECON table and the IMSID table or specify the level where the rules are active.

**Maintaining the RECON table**
You can display, add, update, or delete a RECON.

**Procedure**
To display, add, update, or delete a RECON, complete the following steps:
1. On the **IMS HALDB Toolkit** panel, specify option 1, System Setup.

   The **System Setup** panel is displayed, as shown in the following figure.

   ![System Setup panel](image)

   **Figure 37. System Setup panel**

2. Specify option 3, Maintain RECON table.

   The **System Selection by RECON data set name** panel is displayed, as shown in the following figure.
Maintaining the IMSID table
You can display, add, update, or delete an IMSID.

Procedure
To display, add, update, or delete an IMSID, complete the following steps:
1. On the **IMS HALDB Toolkit** panel, specify option **1**, System Setup.
   The **System Setup** panel is displayed, as shown in the following figure.

   ![System Setup panel](image)

   **Figure 39. System Setup panel**
   The **System Selection by IMSID** panel is displayed, as shown in the following figure.

   ![System Selection by IMSID panel](image)

   **Figure 40. System Selection by IMSID panel**
3. Specify whether you want to display, add, update, or delete an IMSID.

Specifying the level where rules are active
You can specify whether the rules for creating the DSNPREFX parameter are active on the SYSTEM level, the USER level, or the DBD level.

Procedure
1. On the **IMS HALDB Toolkit** panel, select option **2**, Maintain SYSTEMs.
The **SYSTEM Definition** panel is displayed, as shown in the following figure.

![SYSTEM Definition panel](image)

**Figure 41. SYSTEM Definition panel**

2. Select option 2, Display SYSTEM.

The panel for the **SYSTEM Definition** of the SYSTEM you selected is displayed, as shown in the following figure.

![SYSTEM Definition panel](image)

**Figure 42. SYSTEM Definition of the selected SYSTEM panel**

On this panel, the SYSTEM status indicates whether the SYSTEM you selected and the dsname substitution are active.

3. Specify a Y next to the level where you want the rules for creating a data set name to be active.

You can specify the SYSTEM level, the USER level, or the DBD level. In the previous figure, the rules are active on the SYSTEM level.

In the previous figure, the rules use the HLQ and the name of the DBD to create the DSNPREFX parameter.

**Results**

The DSNPREFX parameter is created based on the rules that are specified and the level where those rules are active.
**Maintaining SYSTEMs**
You can select, add, update, and delete SYSTEMs.

**About this task**
The systems are kept in the SYSTEM table. Each row in the table represents a system. Systems are selected by searching the SYSTEM table for the name of the system. If the name of the system is not found, the global system row, which is represented by "*Global," is selected. All other table selections are based on the selected system.

**Procedure**
1. On the IMS HALDB Toolkit panel, select option 2, Maintain SYSTEMs.
   
The SYSTEM Definition panel is displayed, as shown in the following figure. You are automatically connected to the SYSTEM that you previously selected.

```
----------------------------- IMS HALDB Toolkit -----------------------------
Command ==> SYSTEM Definition
 Select Function  Current SYSTEM: IVP1
 1  Select SYSTEM
 2  Display SYSTEM
 3  Add new SYSTEM
 4  Update SYSTEM
 5  Delete SYSTEM
 6  Set IMS libraries
 7  Set DBD libraries
 8  Maintain DBD list
```

*Figure 43. SYSTEM Definition panel*
2. Specify the appropriate option to select, add, update, or delete a SYSTEM.

**Specifying the USER for creating data set names**
You can specify whether you want to use the content of the USR field, a TSO user ID, or a TSO user ID that is generated by a pattern as the USER.

**Procedure**
1. On the IMS HALDB Toolkit panel, select option 3, Maintain USERs.
   
The USER Definition panel is displayed, as shown in the following figure.

```
----------------------------- IMS HALDB Toolkit -----------------------------
Command ==> USER Definition
 Select Function  Current SYSTEM: IVP1
 1  Select USER
 2  Display USER
 3  Add new USER
 4  Update USER
 5  Delete USER
 6  Maintain DBD list
```

*Figure 44. USER Definition panel*
2. Select option 2, Display USER.
   
The panel for the USER Definition of the USER that you selected is displayed, as shown in the following figure.
Command ===>

USER Definition for CKOE1

User name .............: Test User

USER (for DSNPREFX) creation rules:
Use USR field
Use TSO Userid ( CKOE1    )
Y Create from TSO Userid using pattern
    ****

Dataset name (DSNPREFX) creation rules:
USR.......: CKOE
HLQ.......: DBSMS.CKIHC
Rule......: HLQ  SYS  USER DBD  PART    (HLQ,SYS,USER,DBD,PART)
Result....: DBSMS.CKIHC.IMSP.CKOE.dbd.part.A00001

Figure 45. USER Definition of the selected USER panel

3. Specify a Y next to the method that you want to use to create the USER field when you build the data set name.

You can create the USER field by choosing one of the following methods:

**Use USR field**
The definition of the USR field.

**Use TSO User ID**
The current USER.

**Create from TSO User ID using pattern**
A user ID that is generated by a pattern.

In the previous figure, the USER field is created by using a TSO user ID that is generated by a pattern.

In the previous figure, the rule uses all five elements to create the DSNPREFX parameter.

**Maintaining USERS**
You can select, add, update, and delete USERS.

**Procedure**

To select, add, update, and delete USERS, complete the following steps:

1. On the IMS HALDB Toolkit panel, select option 3, Maintain USERS.

   The USER Definition panel is displayed, as shown in the following figure. You are automatically connected to the current user.

Command ===>

USER Definition

Select Function

1 Select USER
2 Display USER
3 Add new USER
4 Update USER
5 Delete USER
6 Maintain DBD list

Current SYSTEM: IVP1
Current USER..: CKOE1

Figure 46. USER Definition panel

2. Specify the appropriate option to select, add, update, or delete a USER.
Substituting data set names by using batch functions

You can use batch update to create rules for substituting HALDB data set names.

In batch update, each table is identified by the NAME parameter, and the data comes from an input file that is specified by the FILE parameter. You can do the following tasks, which use the same input file:

- ADD
- DELETE
- UPDATE

The SYSTEM parameter and the USER parameter specify the association of the table rows. An asterisk in parentheses (*) defines a row as global.

The samples contain comment rows to help you align parameters. These rows begin with an asterisk and are followed by a field name. You enter data directly underneath these rows, starting at the asterisk.

The rule for constructing data set names is defined as 12345, where:

1. Identifies the high-level qualifier (HLQ).
2. Identifies the name of the system.
3. Identifies the name of the user.
4. Identifies the name of the DBD.
5. Identifies the name of the partition.

The SIHCSAMP file provides members IHCESAM1 to IHCESAM6. These sample members provide example JCL for specifying rules for creating the DSNPREFX parameter and adding a row to each table.

<table>
<thead>
<tr>
<th>SIHCSAMP member</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHCESAM1</td>
<td>Adds a system to the SYSTEM table. For more information, see “Adding a system to the SYSTEM table” on page 188.</td>
</tr>
<tr>
<td>IHCESAM2</td>
<td>Adds a user to the USER table of SYSTEM IVP1. For more information, see “Adding an IMS ID to the IMSID table of SYSTEM IVP1” on page 190.</td>
</tr>
<tr>
<td>IHCESAM3</td>
<td>Adds an IMS ID to the IMSID table of SYSTEM IVP1. For more information, see “Adding a row to the DBD table” on page 191.</td>
</tr>
<tr>
<td>IHCESAM4</td>
<td>Adds a row to the DBD table. For more information, see “Adding a user to the USER table of SYSTEM IVP1” on page 189.</td>
</tr>
<tr>
<td>IHCESAM5</td>
<td>Adds DD names to the DBDLIB table of SYSTEM IVP1. For more information, see “Adding DD names to the DBDLIB table of SYSTEM IVP1” on page 192.</td>
</tr>
<tr>
<td>IHCESAM6</td>
<td>Adds DD names to the IMSLIB table of SYSTEM IVP1. For more information, see “Adding DD names to the IMSLIB table of SYSTEM IVP1” on page 192.</td>
</tr>
</tbody>
</table>

Adding a system to the SYSTEM table

You can add a system to the SYSTEM table by modifying the member IHCESAM1 in the SIHCSAMP file.

Procedure

1. Locate the sample JCL in the SIHCSAMP file, member IHCESAM1.
2. Modify the following parameters:
**SYSID**
The ID of the system. In the example, IVP1 is the specified SYSID.

**SYSNAM**
The name of the system, which is used to create the data set name. In the example, IMSP is the specified SYSNAM. You can also specify IVP1.

**RULE**
The rules that are used to create the DSNPREFX parameter. In the example, 14 is specified. According to these rules, the DSNPREFX parameter is created from the HLQ and the name of the DBD.

**A**
Indicates whether the system is activated. In the example, Y is specified, indicating that the SYSTEM is activated. You can specify Y or N.

**HLQ**
The high-level qualifier that is used to create the DSNPREFX parameter. In the example, DBSMS.CKIHC is specified as the HLQ.

**DESCR**
The description of the system. In the example, test is specified as the DESCR.

### Example

```
//S2     EXEC PGM=IHCHALDB,
//            REGION=80M,DYNAMNBR=99
//STEPLIB  DD DISP=SHR,DSN=your.SIHCSAMP
//         DD DISP=SHR,DSN=your.SDFSRESL
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//IMSDALIB DD DISP=SHR,DSN=your.mdalib
//IMS      DD DISP=SHR,DSN=your.dbdlib
//TRACE    DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//IHCSYSIN DD *

//DD1 DD *

TABLE   NAME(SYSTEM) FILE(DD1) FUNCTION(ADD)

*SYSID  *SYSNAM *RULE   *A   *HLQ       *DESCR
IVP1    IMSP    14      Y   DBSMS.CKIHC   test
```

**Figure 47. Sample JCL for the SYSTEM table**

### Adding a user to the USER table of SYSTEM IVP1
You can add a user to the USER table of SYSTEM IVP1 by modifying the member IHCESAM2 in the SIHCSAMP file.

**About this task**
The rule for creating the user name is also used for creating the data set name, even when the data set name creation level is not on the USER level.

**Procedure**
1. Locate the sample JCL in the SIHCSAMP file, member IHCESAM2.
2. Modify the following parameters:
   - **UID**
     The name of the user ID. TEST1 is specified as the UID.
   - **RULE**
     The rules that are used to create the DSNPREFX parameter. According to these rules, the DSNPREFX parameter is created from the HLQ, the system, the user, the DBD, and the partition name.
The indicator that determines the content of the USER field when the data set name is created. You can specify one of the following values:

- **R**
  Uses the USR field.

- **D**
  Uses the UID field.

- **P**
  Uses a pattern to create the portion of the user ID. P is specified as the content of the USER field.

**HLQ**
The high-level qualifier that is used to create the DSNPREFX parameter. DBSMS.CKIHC is specified as the HLQ.

**Important:** Do not change this field if it is used at this level for creating the data set name.

**USR**
The definition of the user TEST is specified as the USR.

**Important:** Do not change this field if it is used at this level for creating the data set name.

**USER NAME**
The name of the user. Test User is specified as the USER NAME.

Example

```plaintext
//S2     EXEC PGM=IHCALDB,
//            REGION=80M,DYNAMNBR=99
//STEPLIB DD DISP=SHR,DSN=your.SIHLOAD
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//IMSDALIB DD DISP=SHR,DSN=your.MDALIB
//IMS DD DISP=SHR,DSN=your.DBDLIB
//TRACE DD SYSOUT=* 
//SYSPRINT DD SYSOUT=* 
//SYSUDUMP DD SYSOUT=* 
//IHCSYSIN DD * 
//TABLE NAME(USER) FILE(DD2) FUNCTION(ADD) SYSTEM(IPV1)
//DD2 DD *
* UID *PATTERN=RULE * HLQ * USR * USER NAME
TEST1 **** 12345 P DBSMS.CKIHC TEST Test User
```

Figure 48. Sample JCL for the USER table

Adding an IMS ID to the IMSID table of SYSTEM IVP1
You can add an IMS ID to the IMSID table of SYSTEM IVP1 by modifying the member IHCESAM3 in the SIHCSAMP file.

**Procedure**

1. Locate the sample JCL in the SIHCSAMP file, member IHCESAM3.
2. Modify the following parameters:

   - **IMSID**
     The name of the IMS ID. In the example, CKCK is specified as the IMSID.

   - **SYSID**
     The name of the system ID. In the example, IVP1 is specified as the SYSID.
DESCR
The description of the IMS ID. In the example, Same IMS data sets as IVP1 is specified as the DESCR.

Example

```plaintext
//S2 EXEC PGM=IHCHALDB,
// REGION=80M,DYNAMNBR=99
// STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
// DFSRESLIB DD DISP=SHR,DSN=your.SDFSRESL
// IMSDALIB DD DISP=SHR,DSN=your.MDALIB
// IMS DD DISP=SHR,DSN=your.DBDLIB
// TRACE DD SYSOUT=* 
// SYSPRINT DD SYSOUT=* 
// SYSDUMP DD SYSOUT=* 
// IHCSYSIN DD * 
//TABLE NAME(IMSID) FILE(DD3) FUNCTION(ADD) 
//DD3 DD * 
*CIMSID *SYSID *DESCR 
CKCK IVP1 Same IMS datasets as IVP1 
```

Figure 49. Sample JCL for the IMSID table

Adding a row to the DBD table
You can add a row to the DBD table by modifying the member IHCESAM4 in the SIHCSAMP file.

Procedure

1. Locate the sample JCL in the SIHCSAMP file, member IHCESAM4.
2. Modify the following parameters:

   **DBD**
   The name of the DBD. In the example, PHD02 is specified as the DBD.

   **RULE**
   The rules for creating the data set name. In the example, 1234 is specified as the RULE. According to the rule for constructing data set names, the DSNPREFX parameter is created from the HLQ, the system, the user, and the name of the DBD.

   **HLQ**
   The name of the high-level qualifier. In the example, DBSMS.CKIHC is specified as the HLQ.

Example

```plaintext
//S2 EXEC PGM=IHCHALDB,
// REGION=80M,DYNAMNBR=99
// STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
// DFSRESLIB DD DISP=SHR,DSN=your.SDFSRESL
// IMSDALIB DD DISP=SHR,DSN=your.MDALIB
// IMS DD DISP=SHR,DSN=your.DBDLIB
// TRACE DD SYSOUT=* 
// SYSPRINT DD SYSOUT=* 
// SYSDUMP DD SYSOUT=* 
// IHCSYSIN DD * 
//TABLE NAME(DBD) FILE(DD3) FUNCTION(ADD) SYSTEM(*) USER(*) 
//DD3 DD * 
*DBD *RULE *HLQ 
PHD02 1234 DBSMS.CKIHC 
```

Figure 50. Sample JCL for the DBD table
Adding DD names to the DBDLIB table of SYSTEM IVP1
You can add DD names to the DBDLIB table of SYSTEM IVP1 by modifying the member IHCESAM5 in the SIHCSAMP file.

About this task
If you want to assign the DBDs to more than one system, repeat the TABLE command with the name of a different system. If all systems have the same DBDLIBs, assign the different SYSTEM name to the global table.

Procedure
1. Locate the sample JCL in the SIHCSAMP file, member IHCESAM5.
2. Modify the following parameter:

   **DDNAME**
   - This name is fixed. You can specify DDs of the non-HALDB as DBDLIB1 to DBDLIB5. However, you must specify the DD of the HALDB DBDLIB as DBDLIBH. In the example, DBDLIB1 is specified as the DD of the non-HALDB DBDLIB, and DBDLIBH is specified as the DD of the HALDB DBDLIB.

Example

```plaintext
//S2 EXEC PGM=IHCHALDB,
//    REGION=80M,DYNAMNBR=99
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
//      DD DISP=SHR,DSN=your.SDFSRESL
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//IMSDALIB DD DISP=SHR,DSN=your.MDALIB
//IMS DD DISP=SHR,DSN=your.DBDLIB
//TRACE DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//IHCSYSIN DD *
//TABLE NAME(DBDLIB) FILE(DDDD) FUNCTION(ADD) SYSTEM(IVP1)
//DDDD DD *
*DDNAME *DSN
   DBDLIB1 your.DBDLIB
   DBDLIBH your.haldb.DBDLIB
```

*Figure 51. Sample JCL for the DBDLIB table*

Adding DD names to the IMSLIB table of SYSTEM IVP1
You can add DD names to the IMSLIB table of SYSTEM IVP1 by modifying the member IHCESAM6 in the SIHCSAMP file.

Procedure
1. Locate the sample JCL in the SIHCSAMP file, member IHCESAM6.
2. Modify the following parameters:

   **DDNAME**
   - Only the following DD names are allowed:

     **MACLIB**
     - Specifies the MACLIB data set. Use MACLIB2 to specify an additional macro library for DBDGEN.

     **RESLIB**
     - Specifies the RESLIB data set. Use RESLIB2 and RESLIB3 if you need a concatenation to the RESLIB.

     **MDALIB**
     - Specifies the MDALIB data set. Use MDALIB2 to specify more than one MDALIB.
Example

```
//S2 EXEC PGM=IHCHALDB,
//     REGION=80M,DYNAMNBR=99
//STEPLIB DD DISP=SHR,DSN=your.SIHLOAD
// DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
// IMSALIB DD DISP=SHR,DSN=your.MDALIB
// /TRACE DD SYSOUT=* 
//SYSPRINT DD SYSOUT=* 
//SYSUDUMP DD SYSOUT=* 
//IHCSYSIN DD * 
//TABLE NAME(IMSLIB) FILE(DDIM) FUNCTION(ADD) SYSTEM(IVP1)
//DDIM DD * 
//MACLIB your.SDFSMAC
//MDALIB your.MDALIB
```

Figure 52. Sample JCL for the IMSLIB table

---

**Converting non-HALDB DBDs to HALDB DBDs**

You can use the ISPF user interface to convert non-HALDB DBDs to HALDB DBDs, and later convert non-HALDB data sets to HALDB data sets.

**Step 1. Converting non-HALDB DBDs to HALDB DBDs**

You must convert non-HALDB DBDs to HALDB DBDs before you can convert non-HALDB data sets to HALDB data sets.

**About this task**

To convert non-HALDB DBDs to HALDB DBDs, complete the following steps:

**Procedure**

1. On the **IMS HALDB Toolkit** panel, select option 4, Convert DBD.

   The **Update DBD libraries** panel is displayed, as shown in the following figure.

   ![Update DBD libraries panel](image)

   **Figure 53. Update DBD libraries panel**

2. Verify the DBD libraries or modify them, and press Enter.

   The **Update IMS libraries** panel is displayed, as shown in the following figure.

---
Figure 54. **Update IMS libraries panel**

3. Verify the IMS libraries or modify them, and press Enter.

The **DBD Conversion** panel is displayed, as shown in the following figure.

Figure 55. **DBD Conversion panel**

4. Specify the name of the HALDB DBD that you want to convert.
5. Specify whether you want to convert from VSAM to OSAM or to a single data set.
   You can select both types of conversions, neither type of conversion, or just one type of conversion.
6. Press Enter to begin the conversion.

**Results**

The source of the specified DBD in the non-HALDB library is rebuilt in HALDB format. Then, the source is recompiled and the HALDB DBD is saved in the specified HALDB DBD library.

**What to do next**

Keep the non-HALDB DBDs and the HALDB DBDs because you will need them to convert non-HALDB data sets to HALDB data sets.

**Step 2. Converting non-HALDB data sets to HALDB data sets**

To convert non-HALDB data sets to HALDB data sets, you need data set names for the non-HALDB.

**Before you begin**

Before you convert non-HALDB data sets to HALDB data sets, you must convert non-HALDB DBDs to HALDB DBDs. Also, you must register the definitions of the converted HALDB DBDs to the RECON data sets.

**About this task**

You can load the database with an application program. However, you also must create the HALDB data sets.

**Attention:** After you convert non-HALDB data sets to HALDB data sets, do not delete the non-HALDB DBD because you might want to convert the data sets from other users later. However, conduct new testing with the new HALDB DBDLIB.

You do not need JCL for the new data sets because they are dynamically allocated.
Procedure

To convert non-HALDB data sets to HALDB data sets:

1. On the **IMS HALDB Toolkit** panel, select option **5** and press Enter.
   
   The **Update IMS libraries** panel is displayed, as shown in the following figure.

   ![Update IMS libraries panel](image_url)

   **Figure 56. Update IMS libraries panel**

2. Verify the IMS libraries or modify them, and press Enter.
   
   The **Update DBD libraries** panel is displayed, as shown in the following figure.

   ![Update DBD libraries panel](image_url)

   **Figure 57. Update DBD libraries panel**

3. Verify the DBD libraries or modify them, and press Enter.
   
   The **Dataset Conversion** panel is displayed, as shown in the following figure.

   ![Dataset Conversion panel](image_url)

   **Figure 58. Dataset Conversion panel**

4. Specify the name of the HALDB DBD.
   
   The JCL that is required to transform the non-HALDB data sets to HALDB data sets is generated.

   **Important**: For the non-HALDB data sets, you must include the DD statements, including those DD statements for secondary indexes. If data sets are missing, you are prompted to specify the DD statements.
Part 7. Application support

IMS HALDB Toolkit provides functions that enable IMS batch applications to make better use of the HALDB environment.

**Topics:**

- Chapter 13, “Partition selection API,” on page 199
- Chapter 14, “Testing partition selection exits,” on page 201
- Chapter 15, “Loading logical children (PROCOT=L),” on page 207
- Chapter 16, “Creating a DFSHALDB statement,” on page 209
- Chapter 17, “Loading a single partition,” on page 213
- Chapter 18, “Deleting a single partition,” on page 217
- Chapter 19, “Merging two databases into one HALDB,” on page 221
Chapter 13. Partition selection API

The partition selection API provides a callable interface to assign a key to a partition.
This API allows applications to split their input on a partition boundary for parallel processing. The API returns the partition name and the partition number. The API does not need to run in a DL/I environment.

You can use the partition selection API with an application that processes partitions in parallel. When an application wants to process partitions in parallel, there might be a need to split the application's input on partition boundaries.

However, the application does not know those boundaries, especially when those boundaries can be changed. The partition selection API resolves this problem by receiving the database root segment key and returning the partition name and number.

Invoking the partition selection API
The following definition specifications are required to invoke the partition selection API:

- Define HANDLE as a 4-byte binary field
- Define PARTNAME as an 8-byte character field
- Define PARTNUM as a 2-byte binary field
- Define RETCODE as a 4-byte binary field
- Define RSNCODE as a 4-byte binary field

The application must be linked as AMODE 31.

API calls
The following calls are appropriate for the partition selection API:

Initial (one time) call
CALL IHCUAPI using ("INIT",HANDLE,RETCODE,RSNCODE,dbdname)
The API sets HANDLE to be used in subsequent calls.

Selection call
CALL IHCUAPI using ("SEL",HANDLE,RETCODE,RSNCODE,yourkey,PARTNAME,PARTNUM)
The caller provides yourkey.
The API returns PARTNAME and PARTNUM.

Termination (last) call
CALL IHCUAPI using ("TERM",HANDLE,RETCODE,RSNCODE)
RETCODE and RSNCODE are returned for each call.

Return and reason codes

<table>
<thead>
<tr>
<th>Return code</th>
<th>Reason code</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>N/A</td>
<td>Function complete</td>
</tr>
<tr>
<td>Return code</td>
<td>Reason code</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| 16          | 256         | Invalid function  
            |              | Must be INIT,SEL,TERM |
| 257         |             | Invalid DBD  
            |              | The specified DBD is not a valid DBD |
| 258         |             | Not a HALDB  
            |              | The specified DBD is not HALDB |
| 259         |             | No handle  
            |              | The HANDLE is not valid |
| 260         |             | Partition not found  
            |              | The key does not belong to any partition |
| 261         |             | Invalid TCB  
            |              | TERM call has a different TCB than INIT |
| 512-599     |             | Internal error  
            |              | Contact IBM Software Support |
Chapter 14. Testing partition selection exits

The test partition selection exit utility allows testing of partition selection exits without requiring the DBD to be previously converted to HALDB.

About this task

Additionally, the distribution results of a partition selection exit can be tested. The DBD can currently be HALDB.

The input for this utility is an HD unload file. This file must have DFSURGU1 as the ddname.

The output of this utility is a distribution list.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEPSEL.
2. Specify the JCL DD statements.
   For a list of DD statements, see “PSEXIT DD statements” on page 201.
3. Specify the PSEXIT command parameters.
   For a list of PSEXIT command parameters, see “PSEXIT command parameters” on page 204.

Example

```bash
//------------------------------------------------------------
// *                                      Test partition selection exit
// *------------------------------------------------------------
//PSEXIT EXEC PGM=IHCHALDB,                  //
//REGION=50M                                //
//STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD     //
// DD DISP=SHR,DSN=your.SDFSRESL
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL    //
//IMS DD DISP=SHR,DSN=your.BDLIB           //
//RECON1 DD DISP=SHR,DSN=your.RECON1        //
//RECON2 DD DISP=SHR,DSN=your.RECON2        //
//RECON3 DD DISP=SHR,DSN=your.RECON3        //
//DFSURGU1 DD DISP=SHR,DSN=your.unload.file //
//MSGPRINT DD SYSOUT=*                     //
//SYSUDUMP DD SYSOUT=*                     //
//IHCSYSIN DD *                            //
//PSEXIT DBD(nnnn) -                       /*     <=== specify DBD
//PARTNUM(n) -                             /*     <=== no. of partitions
//KEYLEN(xx) -                             /*     <=== for IHCPSEL0
//KEYOFF(xx) -                             /*     <=== for IHCPSEL0
//PSNAME(IHCPSEL0) -                       /*     <=== partition select
//KEYS AAA                                 /*     <=== partition high keys
//KKKK DD *                                /*     <=== for IHCPSEL0
//JJJJ DD *                                /*     <=== for IHCPSEL0
```

Figure 59. Sample JCL member IHCEPSEL

PSEXIT DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the PSEXIT command.
Table 30. DD statements and record format for the PSEXIT command

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>DFSURGU1</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>KEYS</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCLIST</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```
//STEPLIB DD DISP=SHR,DSN=ihcload
//       DD DISP=SHR,DSN=imstools
//       DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.
This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**

This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

**RECON**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**DFSURGU1**

This statement is required. The statement defines the DBD unload file that the DBD parameter specifies.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “PSEXIT command parameters” on page 204.

**KEYS**

This statement is required for selection exits that require a string for partition selection. If the selection routine does not need keys or strings, use the PARTNUM parameter instead.

The statement defines the KEYS file that contains a list of keys. Use this statement with the KEYLEN and the KEYOFF parameters.

**MSGPRINT**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**IHCLIST**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for reports. For more information about the reports generated in this data set, see “IHCLIST data set” on page 280.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.
**TRACE**

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**

This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

---

**PSEXIT command parameters**

The following table summarizes the **PSEXIT** command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DBD</strong></td>
<td>Required</td>
<td>Specifies the name of the DBD to be tested. The unload file (DFSURG01) must be for the specified DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dbdname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td><strong>DFSDF</strong></td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The specified member is used when the following two conditions are met:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IMS manages the ACBs (ACBMGMT=CATALOG).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The IMS Catalog Definition exit routine (DFS3CDX0) is not used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ddd)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td><strong>IMSID</strong></td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(nnnn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
Table 31. PSEXIT command parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| KEYLEN    | Optional    | Specifies the length of the subkey when the IHCPSELO selection exit is used. IHCPSELO allows you to select a subset of the key. You can use the exit to specify the offset within the key (KEYOFF) and the length of the key portion (KEYLEN). **Example** In the following example, the root key is 8 bytes. Position 5 and 6 have the state code. You want to separate the DB by state. You would specify KEYLEN(2) KEYOFF(5) and provide the state codes in the KEYS file. For example:  
//KEYS DD *  
AL  
AZ  
WY  
**Format**  
(nnn) where nnn is 1 to root keylen -1  
**Default value**  
None. |
| KEYOFF    | Optional    | Specifies the offset within the root segment key to use when the IHCPSELO selection exit is used. IHCPSELO allows you to select a subset of the key. You can use the exit to specify the offset within the key (KEYOFF) and the length of the key portion (KEYLEN). **Example** In the following example, the root key is 8 bytes. Position 5 and 6 have the state code. You want to separate the DB by state. You would specify KEYLEN(2) KEYOFF(5) and provide the state codes in the KEYS file. For example:  
//KEYS DD *  
AL  
AZ  
WY  
**Format**  
(nnn) where nnn is 1 to root keylen -1  
**Default value**  
None. |
| PARTNUM   | Optional    | Specifies the number of partitions required. **This parameter must be specified only for selection routines that do not need keys or strings. Specify the strings for all other selection routines in the KEYS file. The number of keys in the KEYS file defines the number of partitions. For more information about the KEYS file, see “KEYS” on page 203.**  
**Format**  
(1 - 999)  
**Default value**  
None. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSNAME</td>
<td>Required</td>
<td>Specifies the name of the partition selection exit you have written.</td>
</tr>
</tbody>
</table>

**Format**

(exit_name)

**Default value**

None.
Chapter 15. Loading logical children (PROCOPT=L)

A logical child is a segment that has a physical parent and a logical parent.

A logical relationship allows for a different view of segments in a database by providing a new set of pointers (LP, LT, LCH). HALDB only uses the LP equivalent as an EPS pointer. The LP-EPS pointer requires the ILK of the logical parent, which is not known at that time.

HALDB does not allow loading of logical child segments because there is no WF1 work file, and the extended pointer set (EPS) of the logical parent and the paired segment are unavailable at load time.

WF1 is the work file created during reorganization reload or by a database load application.

In addition, load segments in the hierarchy below the logical child segment (variable intersection data) are not allowed.

IMS HALDB Toolkit improves this situation by allowing these load segments with the following restrictions:

• The logical child segment must contain the LPCK in the IO area.
• The application will receive a BB status code.
  The segments (1 child and dependents) are inserted later.
• JCL is structured as follows:
  – Step 1 is the load program. File DFSURWF1 is used to store the delayed segments.
  – Step 2 is prefix update. This step inserts all delayed segments. All WF1 data sets created by step 1 must be included in the DFSURWF3 file.
• You must change your JCL as follows:
  – Use IHCWRC00 instead of DFSRRC00 to accommodate steps 1 and 2
  – Include the SIHCLOAD target load library in the STEPLIB

At the end of the load (prefix update), all databases are labeled IC needed unless they are defined as NONRECOV.
Chapter 16. Creating a DFSHALDB statement

The DFSHALDB create utility provides dynamic management of the DFSHALDB statement by providing a key for the starting partition and a key for the ending partition.

About this task

Batch applications can process a subset of a HALDB. To accomplish this task, the applications must specify a DFSHALDB DD statement and a parameter statement that specifies the program communication block (PCB), the starting partition, and the number of consecutive partitions.

When the partition structure changes, this statement must be modified. The DFSHALDB create utility makes this change obsolete.

When you specify a key range, the utility transforms the key range into a starting and ending partition. Therefore the application does not require a change when partitions are split or consolidated.

This utility runs as an additional step in front of the specified application.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEDFSH.
2. Specify the JCL DD statements.
   For a list of DD statements, see “IHCUDFSH DD statements” on page 210.
3. Specify the IHCUDFSH command parameters.
   For a list of IHCUDFSH command parameters, see “IHCUDFSH command parameters” on page 212.

You must specify the DBD and the PCB to be used in the RUN command.

Example

```/*------------------------------------------------------------
/*           Create a DFSHALDB statement from keys.
/*           The file (DFSHALDB) must be used in
/*           the subsequent IMS step.
/*------------------------------------------------------------*/
/*S2     EXEC PGM=IHCHALDB,
 //REGION=80M
 //STEPLIB DD DISP=SHR,DSN=your.SIHCLOAD
 // DD DISP=SHR,DSN=your.SDFSRESL
 //RECON1 DD DISP=SHR,DSN=your.RECON1
 //RECON2 DD DISP=SHR,DSN=your.RECON2
 //RECON3 DD DISP=SHR,DSN=your.RECON3
 //IMS DD DISP=SHR,DSN=your.DBDLIB
 //TRACE DD SYSOUT=*  
 //SYŞABEND DD SYSOUT=*
 //MSGPRINT DD SYSOUT=*
 //IHCSYSIN DD * 
 //RUN PGM(IHCUDFSH) DD *(PASS),UNIT=SYSDA,SPACE=(TRK,1), 
 //                 DSN=&&DFSHAL
 //KEYS 08001000 /*     <= low key 
 //      98008000 /*     <= high key 
 //DFSHALDB DD DISP=(,PASS),UNIT=SYSDA,SPACE=(TRK,1), 
 // DSN=&&DFSHAL
```

Figure 60. JCL for creating a DFSHALDB statement
**IHCUDFSH DD statements**

DD statements are used to identify the source of input and the placement of output information. The following table shows DD statements and record format for the IHCUDFSH command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>KEYS</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>DFSHALDB</td>
<td>Output</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```plaintext
//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**IMS**

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.
IMSDALIB
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

PROCLIB
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

RECONx
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

Attention: If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

IHCSYSIN
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “IHCUDFSH command parameters” on page 212.

KEYS
This statement is required. The statement specifies the low and the high key. The utility refers to the key range and transforms the key range into a starting and ending partition.

DFSHALDB
This statement is required. The statement defines a file to be used in a subsequent step.

Specify the following line:

```
//DFSHALDB DD DSN=&&HAL,DISP=(OLD,DELETE)
```

MSGPRINT
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

TRACE
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.
This data set can reside on DASD, or it can be routed through the output job.

### IHCUDFSH command parameters

The following table summarizes the **IHCUDFSH** command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Defines the DBD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(dbdname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>DFSDF</td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The specified member is used when the following two conditions are met:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IMS manages the ACBs (ACBMGMT=CATALOG).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The IMS Catalog Definition exit routine (DFS3CDX0) is not used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddd)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td>IMSID</td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(nnnn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
<tr>
<td>PCB</td>
<td>Required</td>
<td>Defines the PCB number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(pcb_number)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
</tbody>
</table>
Chapter 17. Loading a single partition

Databases with secondary indexes must insert the secondary indexes in random sequence when loading.

About this task
You can improve performance (elapsed time) when loading partitions that contain secondary indexes by using the load a single partition utility. The utility delays the insertion of secondary indexes until the end of the load process, at which point it sorts the indexes and loads the indexes sequentially.

Procedure
1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCELOAD.
2. Specify the JCL DD statements.
   For a list of DD statements, see “HALDBLOAD DD statements” on page 213.
3. Specify the HALDBLOAD command parameters.
   For a list of HALDBLOAD command parameters, see “HALDBLOAD command parameters” on page 215.

Example

```
//JOBNAME  JOB   00,000,CLASS=A,MSGCLASS=X
//**------------------------------------------------------------
//*             LOAD a single partition
//**------------------------------------------------------------
//DROP   EXEC PGM=IHCHALDB,
// Region=60M
//STEPLIB  DD DISP=SHR,DSN=your.SIHCLOAD
//DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
//RECON1   DD DISP=SHR,DSN=your.RECON1
//RECON2   DD DISP=SHR,DSN=your.RECON2
//RECON3   DD DISP=SHR,DSN=your.RECON3
//IMS      DD DISP=SHR,DSN=your.DBDLIB
//MSGRPTIN DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*
//IHCSYSIN DD *
   HALDBLOAD  DBD(dbdname) PARTITION(partname) -
              PSB(psbname) -
              PCB(1)  -
              PGM(pgmname)
/*
```

Figure 61. JCL for delaying the load of a single partition containing secondary indexes

HALDBLOAD DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the HALDBLOAD command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
</tbody>
</table>
Table 34. DD statements and record format for the HALDBLOAD command (continued)

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PGMLIB</td>
<td>Input</td>
<td>RECFM=U</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```plaintext
//STEPLIB DD DISP=SHR,DSN=ihcload
//       DD DISP=SHR,DSN=imstools
//       DD DISP=SHR,DSN=reslib
```

where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**

This statement is required. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

**IMSDALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.
For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**RECONx**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**PGMLIB**

This statement is optional. The statement defines the APF-authorized application program. You can use either STEPLIB or PGMLIB to specify the application program.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “HALDBLOAD command parameters” on page 215.

**MSGPRINT**

This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**

This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**

This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

---

**HALDBLOAD command parameters**

The following table summarizes the HALDBLOAD command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD</td>
<td>Required</td>
<td>Specifies the master DBD name.</td>
</tr>
<tr>
<td><strong>Format</strong></td>
<td></td>
<td><strong>(dbdname)</strong></td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>PARTITION</td>
<td>Required</td>
<td>Specifies the partition name to be loaded.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (partname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>PCB</td>
<td>Optional</td>
<td>Specifies the PCB. You can specify a PCB name, or a PCB number as specified in the PSB.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (pcbname</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> If omitted, the default is to use the first PCB for the DBD with PROCOPT=L</td>
</tr>
<tr>
<td>PGM</td>
<td>Required</td>
<td>Specifies the program name to load the partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (pgmname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
<tr>
<td>PSB</td>
<td>Required</td>
<td>Specifies the name of the PSB to be used to load the partition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong> (psbname)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong> None.</td>
</tr>
</tbody>
</table>
Chapter 18. Deleting a single partition

The drop partition utility provides an alternative approach for correcting a pointer error after a single database partition is deleted.

About this task

When a single partition is deleted, all secondary indexes for the primary database are invalid. The indexes now contain records for non-existent segments. This condition is known as a pointer error. The secondary indexes must be corrected. You can correct the indexes by rebuilding the indexes using an index builder tool (such as IMS Index Builder).

You could alternatively remove those index records that point to the deleted partition. The drop partition utility provides this solution. This process is recoverable and fast and might be more efficient than rebuilding the indexes.

Alternatively, you can create the JCL by using the ISPF user interface.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEDROP.
2. Specify the JCL DD statements.
   For a list of DD statements, see “REORGIND DD statements” on page 217.
3. Specify the REORGIND command parameters.
   For a list of REORGIND command parameters, see “REORGIND command parameters” on page 220.

Example

```java
//JOBNAME JOB 00,000,CLASS=A,MSGCLASS=X
//*------------------------------------------------------------
//*           Drop partition                                   *
//*------------------------------------------------------------
//DROP      EXEC PGM=IHCHALDB,                                  
//          REGION=60M                                         
//STEPLIB    DD DISP=SHR,DSN=your.SIHCLOAD                     
//          DD DISP=SHR,DSN=your.SDFSRESL                      
//RECON1     DD DISP=SHR,DSN=your.RECON1                       
//RECON2     DD DISP=SHR,DSN=your.RECON2                       
//RECON3     DD DISP=SHR,DSN=your.RECON3                       
//DFSRESLB   DD DISP=SHR,DSN=your.SDFSRESL                     
//IMS        DD DISP=SHR,DSN=your.DBDLIB                        
//MSGPRINT   DD SYSOUT=*                                       
//SYSDUMP    DD SYSOUT=*                                       
//IHCSYSIN   DD *                                              
//REORGIND   DBD(PHDO2) DROP(PHDO22)                           
/*
```

Figure 62. JCL for deleting a single partition

REORGIND DD statements

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the REORGIND command.
Table 36. DD statements and record format for the REORGIND command

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**
This statement is required. The library data sets pointed to from the STEPLIB DD statement must always be APF-authorized, even if a DFSRESLB DD statement is provided. Authorized library data sets include:
- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.

```//STEPLIB DD DISP=SHR,DSN=ihcload
//        DD DISP=SHR,DSN=imstools
//        DD DISP=SHR,DSN=reslib```

where:
- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**
This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**
This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.
IMSDALIB
This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:
1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

PROCLIB
This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFsddd member exists in the IMS.PROCLIB data set.

RECONx
These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

Attention: If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

IHCSYSIN
This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “REORGIND command parameters” on page 220.

SYSPRINT
This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

MSGPRINT
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

TRACE
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

SYSUDUMP
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.
## REORGIND command parameters

The following table summarizes the REORGIND command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DBD</strong></td>
<td>Required</td>
<td>Specifies the master DBD name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(dbdname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td><strong>DFSDF</strong></td>
<td>Optional</td>
<td>Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The specified member is used when the following two conditions are met:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IMS manages the ACBs (ACBMGMT=Catalog).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The IMS Catalog Definition exit routine (DFS3CDX0) is not used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(ddd)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td><strong>DROP</strong></td>
<td>Required</td>
<td>Specifies the name of the partition to be removed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(partname)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td><strong>IMSID</strong></td>
<td>Optional</td>
<td>IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(nnnn)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Default value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If omitted, the value is obtained from the current SDFSRESL(DFSVC000).</td>
</tr>
</tbody>
</table>
Chapter 19. Merging two databases into one HALDB

The merge DBD utility allows you to merge identical HALDBs, or combine user-partitioned databases into one multi-partitioned HALDB.

About this task

The following requirements for this utility and task apply:

- Both DBDs must currently be HALDB
- No secondary index is allowed
- No logical relationships are allowed
- Both DBDs must be identical
  If compression is used, the compression exit must support both DBDs.
- If you use your own partition selection exit, ensure that it is supported by IMS HALDB Toolkit, or use the supplied exit, IHCPSEL0
  The partition string is copied to the target ("to") DBD.
- DBDs must use high keys that reflect their data
  IMS HALDB Toolkit must be able to merge the partition definition into one DBD without changing defined high keys.

IMS HALDB Toolkit verifies that key ranges do not conflict. If they conflict, the merge process stops. However, because the merge is performed using temporary RECONS, the database will not have been changed. During post-processing, the DBRC is updated. The source ("from") DBD is deleted, and its partitions become part of the target DBD.

You must perform an image copy of the new partitions while the source DBD is offline, unless the source partitions are to be added to the end of the target DBD. In that case, the source DBD might be kept online.

When user partitioning (multiple identical databases on different key ranges) has been used, the conversion first transforms the databases to HALDB, and then merges them together using this process.

This task is necessary when you require secondary indexing that was not possible when using multiple databases.

Procedure

1. Locate the sample JCL for this utility in the SIHCSAMP file, member IHCEMERG.
2. Specify the JCL DD statements.
   For a list of DD statements, see “HALDBCOPY DD statements” on page 222.
3. Specify the HALDBCOPY command parameters.
   For a list of HALDBCOPY command parameters, see “HALDBCOPY command parameters” on page 224.

Example

The following example shows the JCL for merging user-partitioned HALDBs into one HALDB.
Figure 63. Sample JCL for merging two DBDs into one DBD

**HALDBCOPY DD statements**

DD statements are used to identify the source of input and the placement of output information.

The following table shows DD statements and record format for the **HALDBCOPY** command.

<table>
<thead>
<tr>
<th>DD name</th>
<th>Use</th>
<th>Format</th>
<th>Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Required</td>
</tr>
<tr>
<td>DFSRESLB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMS</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IMSDALIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>PROCLIB</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>RECONx</td>
<td>Input</td>
<td>Same as IMS</td>
<td>Optional</td>
</tr>
<tr>
<td>IHCSYSIN</td>
<td>Input</td>
<td>LRECL=80</td>
<td>Required</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>MSGPRINT</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>TRACE</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
<tr>
<td>SYSUDUMP</td>
<td>Output</td>
<td>LRECL=133</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**STEPLIB**

This statement is required. The library data sets pointed to from the **STEPLIB** DD statement must always be APF-authorized, even if a **DFSRESLB** DD statement is provided. Authorized library data sets include:

- IMS HALDB Toolkit load library
- IMS utilities that are available for IMS HALDB Toolkit
- IMS RESLIB library
- Any other libraries

The libraries can appear in any order.
where:

- `ihcload` is the name of the library that contains the IMS HALDB Toolkit load modules.
- `imstools` is the optional name of the library that contains the IMS reorganization utilities load modules.
- `reslib` is the name of the library that contains the IMS load modules.

If you do not specify an IMSDALIB DD statement in the JCL, you must specify the MDALIB in the STEPLIB for dynamic allocation purposes.

**DFSRESLB**

This statement is optional. The statement points to an authorized library that contains IMS SVC modules.

IMS HALDB Toolkit dynamically allocates this DD if you do not provide it.

**IMS**

This statement is required only if the IMS management of ACBs is not enabled. The statement describes the library that contains the DBDs of the database that you are processing.

This data set must reside on DASD.

When the IMS management of ACBs is enabled, IMS HALDB Toolkit ignores the IMS DD statement.

**IMSDALIB**

This statement is optional. The statement specifies a partitioned data set or data sets that contain the dynamic allocation members for the database data sets of non-HALDB and the RECON data sets.

If DBRC is active and the IMSDALIB DD statement is coded, IMSDALIB is always referred to by DBRC, and DBRC determines the data sets to be allocated for each RECON DD.

For the database data sets of non-HALDB, IMSDALIB is referred to only when the dynamic allocation for the original data sets is requested. Dynamic allocation of the database data sets is attempted in the following order:

1. Dynamic allocation members in the IMSDALIB concatenation
2. Dynamic allocation members in JOBLIB or STEPLIB concatenation

**PROCLIB**

This statement is optional. The statement points to the IMS.PROCLIB data set. If DFSDF(ddd) is specified in the IHCSYSIN data set, you must specify this DD statement and ensure that the DFSDFddd member exists in the IMS.PROCLIB data set.

**RECONx**

These statements are optional. The statements define the database recovery control (DBRC) RECON data sets. RECON data sets dictate which databases and IMS online systems to use during the processing.

**Attention:** If you specify IMSDALIB DD dynamic allocation, do not use these RECON DD statements. If you used JCL to allocate RECON1 as a spare data set, you must restart the database.

**IHCSYSIN**

This statement is required. The statement defines a control statement or data set that contains control statements that specify the functions of IMS HALDB Toolkit.

For more information about the format of IHCSYSIN DD statements, see “HALDBCOPY command parameters” on page 224.

**SYSPRINT**

This statement is optional. The statement defines the statistics output data set and output from other utilities that are executed under the control of IMS HALDB Toolkit.
The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide it.

**MSGPRINT**
This statement is optional. The statement defines the IMS HALDB Toolkit output data set for progress messages issued during the job. For more information, see “MSGPRINT data set” on page 279.

The data set can reside on DASD, or it can be routed through the output job. IMS HALDB Toolkit dynamically allocates this data set if you do not provide this DD statement.

**TRACE**
This statement is optional. The statement defines the output data set that IMS HALDB Toolkit uses to write diagnostic trace records. This data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job. If you do not provide this DD statement, it is dynamically allocated to SYSOUT by IMS HALDB Toolkit.

**SYSUDUMP**
This statement is required only if a dump is requested by IBM Software Support. The statement defines a dump data set. If the IMS HALDB Toolkit detects an error and ends with a U0999 abend, this dump is not necessary. However, if any other system or user abend occurs, this data set might be required for problem diagnosis.

This data set can reside on DASD, or it can be routed through the output job.

---

**HALBCOPY command parameters**

The following table summarizes the HALBCOPY command parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| DFSDF     | Optional    | Specifies the 3-character suffix of the DFSDFxxx member of the IMS PROCLIB data set that contains the settings and attributes of the IMS catalog. The specified member is used when the following two conditions are met:
  • IMS manages the ACBs (ACBMGMT=CATALOG).
  • The IMS Catalog Definition exit routine (DFS3CDX0) is not used. Ensure that the CATALOG section of the DFSDFxxx member specifies CATALOG=Y, ACBMGMT=CATALOG, and the alias name for the IMS catalog.
  **Format**
    *(ddd)*
  **Default value**
    None. |
| FROMDBD   | Required    | Specifies the DBD, including all partitions, to be merged into the TODBD. **Format**
    *(dbdname)*
  **Default value**
    None. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
</table>
| IMSID     | Optional    | IMSID must be specified when the IMS catalog is enabled by the IMS Catalog Definition exit routine and IMSID is referred to in the exit routine.  
**Format**  
\((nnnn)\)  
**Default value**  
If omitted, the value is obtained from the current SDFSRESL(DFSVC000). |
| TODBD     | Required    | Specifies the DBD to receive all partitions specified in the FROMDBD.  
**Format**  
\((abddname)\)  
**Default value**  
None. |
Part 8. Using the ISPF user interface

You can create the JCL for many of the IMS HALDB Toolkit batch utilities by using the ISPF user interface.

Topics:

• Chapter 20, “Setting up the environment for the ISPF user interface,” on page 229
• Chapter 21, “Processing a project,” on page 243
• Chapter 22, “Converting to HALDB,” on page 259
• Chapter 23, “Maintaining HALDB,” on page 263
• Chapter 24, “Creating JCL statements for database utilities,” on page 267
• Chapter 25, “Other ISPF utilities,” on page 269
• Chapter 26, “Using ISPF DBRC support functions,” on page 271
Chapter 20. Setting up the environment for the ISPF user interface

The JCL for many of the IMS HALDB Toolkit utilities can be created using the ISPF user interface.

Topics:
• “Starting the ISPF user interface” on page 229
• “Creating an IMS environment” on page 230
• “Creating projects” on page 238
• “Deleting an environment” on page 240

Starting the ISPF user interface

You can use the CLIST to start the ISPF user interface.

Before you begin

Before you run IMS HALDB Toolkit as an ISPF application, you must perform a one-time setup task. Ensure that the steps in the topic "Setting up the ISPF interface for IMS HALDB Toolkit" in the IMS Database Utility Solution: Overview and Customization have been completed.

Procedure

• Issue the following command to start the ISPF user interface:

  ```
  ex 'your.CLIST(IHCCHAL)'
  ```

  The IMS HALDB Toolkit main menu panel is displayed:

  ![](image)

  Figure 64. Main menu panel
Creating an IMS environment

You create an IMS environment to keep conversion projects and definitions for different IMS systems in one place. Help is available for each panel.

About this task

An IMS environment consists of library definitions such as RESLIB, DBDLIB, MDALIB and, perhaps, RECON. Projects are connected to an environment.

Environments typically have names such as TEST or PROD. There is no limit to the number of environments you can create. An environment must be completely defined before it can be used by a project.

Databases can belong to multiple IMS systems. However, only one RECON should represent a database.

Parameters and data sets are uniquely defined for each IMS environment, and most parameters can have an ask-me-later setting. This setting allows you to delay a decision until it is needed and applicable.

Procedure

1. Start the ISPF user interface.

   The IMS HALDB Toolkit main menu is displayed.

   Figure 65. Main menu panel

2. Select option 1 from the Main Menu and press Enter.

   The Environment Maintenance panel is displayed.

   Figure 66. Environment Maintenance panel
3. To add a new environment, select option 2 from the Environment Maintenance panel and press Enter.

   The Define a New Environment panel is displayed:

   ![Define a New Environment panel](image)

   Figure 67. Define a New Environment panel

4. Enter an environment name and a description that provides useful information. Press Enter.

   The Project Definition Settings panel is displayed.

   ![Project Definition Settings panel](image)

   Figure 68. Project Definition Settings panel

5. On this panel make the following specifications:

   - Whether to perform partitioning evaluation separately or during the unload process
   - How you would prefer JCL to be generated (as a single JOB for each phase or as one multi-step JOB)
   - Whether you would like the data sets of the database that is being converted, to be deleted. If the data sets are to be deleted, specify at which stage the deletion occurs.

   When you have finished specifying all of the panel information, press Enter.

   The Data sets panel is displayed.
6. From the Data Sets panel, specify the data sets to use when generating the JCL.

If the RECONs are not located in either the RESLIB or MDALIB data sets, you can specify them explicitly with option 4. Otherwise, the Specify RECON Data set names panel is skipped.

7. If you selected option 4 to specify RECON data sets, the Specify RECON Data Set Names panel is displayed.

8. Specify the RECON data set names to use and press Enter.

The DBD Libraries panel is displayed.

9. Specify the DBD load libraries to use and press Enter.

The DBD Conversion Rules panel is displayed.
### DBD Conversion Rules

<table>
<thead>
<tr>
<th>Rule Description</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi DSG: To single DSG</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Multi DSG: Leave as-is</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Multi DSG: Ask during Conversion</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Convert VSAM to OSAM: Yes</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Convert VSAM to OSAM: No</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Convert VSAM to OSAM: Ask during Conversion</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Change DBD name: Yes</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Change DBD name: No</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Change DBD name: Ask during Conversion</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Selection Exit: Yes</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Selection Exit: No</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Selection Exit: Ask during Conversion</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Heal Index Pointer Yes</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Heal Index Pointer No</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Heal Index Pointer Ask during Conversion</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

**Figure 72. DBD Conversion Rules panel**

10. Specify the conversion rules to use, and press **Enter**.

The **Save Source Statements** panel is displayed.

Press the HELP key for explanation of items on the panel.

### Save Source Statements

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBD Source: No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>DBD Source: Yes</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Source File:</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>IDCAMS Source: No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>IDCAMS Source: Yes</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>IDCAMS Source: Yes, but no DELETE file</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Member Name: DBD Name</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Member Name: Partition Name</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Member Name: DD Name</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Figure 73. Save Source Statements panel**

11. Specify where you would like to save the generated DBD source and the IDCAMS source statements, and press **Enter**.

The **Primary DBD Partitioning Rules** panel is displayed.
12. Specify conversion rules for the primary DBD, and press Enter.

The PSINDEX Definition Rules panel is displayed.

13. Specify the conversion rules for secondary index DBDs, and press Enter.

The Partition Naming Rules panel is displayed.

The **Space Allocation Rules for PHDAM and PHIDAM** panel is displayed.

15. Specify space allocation rules for both PHDAM and PHIDAM, and press Enter.

The **Space Allocation Rules for PSINDEX Data Sets** panel is displayed.
Figure 78. Space Allocation Rules for PSINDEX Data Sets panel


The Space Allocation Rules for ILDS Data Sets panel is displayed.

Figure 79. Space Allocation Rules for ILDS Data Sets panel

17. Specify space allocation rules for HALDB ILDS data sets, and press Enter.

The JCL Defaults panel is displayed.
JCL Defaults

JOB statement:
//JOBNAME  JOB  0,USR,MSGCLASS=X

Allocation Rules for UNLOAD file

Set the maximum database size to use disk allocation
Database Size Limit(MB): 200
Unit name for tape allocation: TAPE
RETPD........: 030
Volume count: 99
Unit name for disk allocation: SYSDA
Use REGION=0M? (Y|N) N

Figure 80. JCL Defaults panel

18. Specify the JOBCARD JCL defaults and the allocations rules to use during the unload process and press Enter.

The Utility Setup for UNLOAD panel is displayed.

Utility Setup for UNLOAD

1 Select Unload type
   1 Standard IMS (DFSURGU0)
   2 High Performance Unload

1 Select Data set Name Rule for Unload File
   1 High Level Qualifier.dbd.timestamp
   2 High Level Qualifier.dbd.GDG
      Specify High Level Qualifier: your.hlq
   3 Prompt for Data set Name
      Specify HP Unload program library:
      your.SHPSLMD0

Figure 81. Utility Setup for UNLOAD panel

19. Specify the specific rules to use for the UNLOAD utility and press Enter.

The Utility Setup for RELOAD panel is displayed.

Utility Setup for RELOAD

1 Select Reload type
   1 Standard IMS (DFSURGU0)
   2 High Performance Reload

Specify STEPLIB for High Performance Reload:
your.SHPSLMD0

Figure 82. Utility Setup for RELOAD panel

20. Specify the specific rules to use for the RELOAD utility and press Enter.
The **Utility Setup for BACKUP** panel is displayed.

```
------------------------------ IMS HALDB Toolkit -----------------------------
Command ==>

Utility Setup for BACKUP
1  Select Backup type
   1 Standard IMS (DFSUDMP0)
   2 HP Image Copy (FABJMAIN)
1  Select No. of copies (1 or 2)
1  Select Data set Name Rule
   1 High Level Qualifier.dbd.ddname.IC.timestamp
   2 High Level Qualifier.ddname.IC.timestamp
   3 High Level Qualifier.dbd.ddname.IC.GDG
   4 High Level Qualifier.ddname.IC.GDG
      Specify High Level qualifier: your.hlq
1  Specify Data set Name for Product Library:
your.SHPSLMD0
```

*Figure 83. Utility Setup for BACKUP panel*

21. Specify the specific rules to use for the image copy utility and press **Enter**.

**Results**

After you have completed all panels, a dialog box displays indicating that the environment was successfully created.

If the environment was successfully created, press **Enter** and the first panel for creating a project will be displayed.

You can create the project now or later.

**Creating projects**

After defining an environment, you can create one or more conversion projects which are associated with that environment.

**About this task**

**Note:** If you have just added an environment, you should already be on the **Convert Full function to HALDB** panel.

**Procedure**

1. Select option 4 from the IMS HALDB Toolkit Main Menu, and press **Enter**.

   The **Convert from Full Function to HALDB** panel is displayed.
Convert Full function to HALDB

1 Select Function

Environment: your new environment
Project: IMS Version: 14

1 Add-Delete-Change Project
2 Projects in Progress
3 Select a Project
4 Start or Continue with the Current Project
5 Rebuild old DBD
6 Rebuild old dataset allocation
7 Rebuild old DBRC
8 UNDO conversion

Figure 84. Convert Full function to HALDB panel
2. Select option 1 (Add-Delete-Change Project), and press Enter.

The Project Maintenance for Environment panel is displayed.

----------------------------- IMS HALDB Toolkit -----------------------------
Command ===>

Project Maintenance for Environment new environment name just created

Select Function
1 Display Project(s)
2 Add a new Project
3 Delete Project(s)
4 Change Project Settings

Figure 85. Project Maintenance for Environment panel
3. To add a new project, select option 2 and press Enter.

The Define a New Conversion Project panel is displayed.

----------------------------- IMS HALDB Toolkit -----------------------------
Command ===>

Define a New Conversion Project
Current Environment is your new environment just created

Project Name:
Description:

Figure 86. Define a New Conversion Project panel
4. Specify a useful name and description for the project, and press Enter.

The Project Tracking and Staging KSDS Allocation panel is displayed.
5. Specify the KSDS allocation rules, and press **Enter**.

An ISPF edit panel is displayed with generated JCL that you can submit to create the required KSDS data set. If necessary, edit the job, then submit it.

6. After the job runs successfully, press the **END** key (PF3).

The next panel indicates that the environment definitions have been copied, and asks you if you want to change any options.

---

### Deleting an environment

An IMS environment allows you to keep conversion projects and definitions for different IMS systems in one place. You can also delete existing environments that are no longer needed.

**Procedure**

1. Select option 1 (Add-Delete-Change Environment) from the IMS HALDB Toolkit Main Menu and press **Enter**.

   The **Environment Maintenance** panel is displayed.
2. Select option 1 to see a list of all environments and press Enter.

The Environment List panel is displayed. The panel shows an example of a list of environments.

3. You can select the one to delete by entering an s next to PROD environment. Press Enter.

The next panel that is displayed is a verification panel that confirms the deletion.

If Y is specified, a dialog box is displayed which indicates that the environment was deleted. Otherwise, you are returned to the list of environments and no environment is deleted.
Chapter 21. Processing a project

You can process a project to perform maintenance and conversion tasks.

Topics:
- “Selecting a project” on page 243
- “Processing a project using the Project Work panel” on page 246
- “Creating and submitting JCL” on page 248
- “Using SYNC points to halt or continue to the next phase of a project” on page 249
- “Processing a project using a partition selection exit” on page 250

Selecting a project

You can use the IMS HALDB Toolkit main menu to select conversion and maintenance options for projects.

You must select an environment before beginning a conversion so that IMS HALDB Toolkit knows which data sets and RECONs to use. If you do not currently have an environment or you want to switch to a different environment, select option 2 (Add-Delete-Change Environment) from the IMS HALDB Toolkit main menu.

To begin a conversion project from an existing environment, select option 4 (Convert from Full Function to HALDB) from the IMS HALDB Toolkit main menu.

To begin an entire DBD library conversion project from an existing environment, select option 5 (Convert entire DBD library to HALDB) from the IMS HALDB Toolkit main menu.

To begin a maintenance project from an existing environment, select option 6 (Split or Consolidate HALDB Partitions) from the IMS HALDB Toolkit main menu.

Alternatively, you can select option 3 (Projects in Progress) to obtain a list of all projects for this environment. From this list, you can select the appropriate project.

Choosing a new or "last active" conversion project

To begin a conversion project from an existing environment, select option 4 (Convert from Full Function to HALDB) from the IMS HALDB Toolkit main menu.

The Convert Full Function to HALDB panel is displayed.
Selecting option 4 on this panel automatically connects IMS HALDB Toolkit to the last active project.

**Note:** If no connection can be made, the message *no project selected* is displayed. In that case, select option 3 to select a project.

### Choosing a new or "last active" entire DBD library conversion project

To begin an entire DBD library conversion project from an existing environment, select option 5 (Convert entire DBD library to HALDB) from the IMS HALDB Toolkit main menu.

The **Convert DBD library to HALDB panel** is displayed.

Selecting option 4 or option 5 on this panel automatically connects IMS HALDB Toolkit to the last active project.

**Note:** If no connection can be made, the message *no project selected* is displayed. In that case, select option 3 to select a project.

### Choosing a new or "last active" maintenance project

To begin a maintenance project from an existing environment, select option 6 (Split or Consolidate HALDB Partitions) from the IMS HALDB Toolkit main menu.

The **Split or Consolidate HALDB Partitions panel** is displayed.
Selecting option 4 on this panel automatically connects IMS HALDB Toolkit to the last active project.

**Note:** If no connection can be made, the message no project selected is displayed. In that case, select option 3 to select a project.

### Selecting a project from the environment

After you choose a new or "last active" project, the Project List for Environment your environment panel is displayed, which shows all projects in the specified environment.

In the following example, two types of projects are shown: maintenance (M) and conversion (C).

You can now select a conversion or maintenance project.

If the conversion or maintenance project you select has already been selected by a different user ID, you cannot select it.

After you select a project, the **Project Work** panel is displayed.
Processing a project using the Project Work panel

After you select a project to convert, the Project Work panel is displayed.

About this task

![Command screen](image)

Figure 96. Project Work panel

You can select any of the following options in any order that is necessary to help you complete your work.

Procedure

- If you select option 0 (Setup Parameter) from the Project Work panel, the Select Function panel is displayed. Select the Setup Parameter to specify any setup changes. However, some changes can only be performed at the start of a project.

  You can use the Select Function panel to change setup parameters that were made during project definition or to include parameters that might have been omitted. Depending on which step the conversion process is performing, some changes might have no effect.

  You should ensure that you complete all changes before selecting DBDs to be converted.

![Command screen](image)

Figure 97. Select Function panel

- Select the Continue with Current Project to continue with a project that was interrupted. If the previous step was completed, conversion begins with the next step.

  If this is the first time you are selecting option 1, IMS HALDB Toolkit proceeds to the DBD selection phase.
If you select option 2 (Show Status of Project) from the Project Work panel, the DBDs in Project HDO2 panel is displayed. Select Show Status of Project to view the step which is currently being processed. Use the Help key for explanations of fields on the panel.

This panel is informational, only, and lists all DBDs that have been specified for conversion.

In the example, suppose you selected HDO2 and HPV20. The secondary indexes (indicated by X) and the primary index (indicated by P) are added, automatically.

If the selected databases had logically related databases, they would also be added automatically, and the process would continue until all related databases were added.

If you had a complex relationship consisting of, for example, five primary DBDs and twenty secondary indexes, all would be included by selecting only one.

---

**Figure 98. DBDs in Project HDO2 panel**

Select Recreate JCL of Current Phase to re-create JCL for all processes currently in SUBMITTED status. This might be necessary if, for example, a batch function did not complete and you are no longer in the panel to submit the JCL.

After re-creating the JCL, you might need to resubmit it.

If you select option 4 (Restart at Current or Prior Level) from the Project Work panel, a list of project phases is displayed in chronological order. Select Restart at Current or Prior Level to restart a conversion project from the current or prior level. This would typically be necessary if the JOB did not complete, and the JCL is no longer available.

This panel shows all steps within a current conversion phase that are finished or in progress. You can go back to a previous step if the step has not completed. After you have started the "reload" phase, it might not be possible to go back. You cannot proceed to a future step. When you restart at a prior level, the project restarts at the beginning of that step.

In the following example, the last project syncpoint is displayed at the top of the panel; the current phase is displayed at the bottom.

---

**Figure 99. Project phases panel**

If you select option 5 (Restart from Beginning) from the Project Work panel, a delete confirmation panel is displayed. Select Restart from Beginning to restart a conversion project from the beginning. All data currently held in the project file is deleted.
Any changes made during the process up to this point, are not backed out.

------------------------------ IMS HALDB Toolkit -----------------------------
Command ===> The project is restarted from the beginning. All work so far will be deleted. If this is what you want, specify "Y".

N   Clear Project Dataset
Y   Yes
N   No

Figure 100. **Clear Project Dataset** panel

**Ask me later**
If, when setting up your parameters, you specified **Ask me later**, the panels that correspond begin to display.

**About this task**
At this stage of the conversion process, other special panels might also display.

**Creating and submitting JCL**
When all questions have been answered regarding how to process a conversion project, IMS HALDB Toolkit creates JCL and presents an ISPF panel for you to submit it.

**About this task**

```
000001 //XXJOB  JOB 11,xx,CLASS=A,MSGCLASS=X
000002 //*
000003 //*
000004 //*
000005 //DEL EXEC PGM=IDCAMS
000006 //SYSPRINT DD SYSOUT=* 
000007 //SYSIN DD *
000008 DELETE IMSDB.UNLOAD.HDO2
000009 SET MAXCC=0
000010 /*
000011 //UNLOAD EXEC PGM=IHCHALDB,
000012 // COND=(4,LE),
000013 // STEPLIB DD DISP=SHR,DSN=
000014 // DISP=SHR,DSN=your.SIMLOAD
000015 // DISP=SHR,DSN=your.SDFSRESL
000016 //DFSRESLB DD DISP=SHR,DSN=your.SDFSRESL
000017 // IMS DD DISP=SHR,DSN=your.BDDLIB
000018 //RECON1 DD DISP=SHR,DSN=your.RECON1
000019 //RECON2 DD DISP=SHR,DSN=your.RECON2
000020 //RECON3 DD DISP=SHR,DSN=your.RECON3
000021 //HD0201 DD DISP=SHR,DSN=IMSDB.HD02.HD0201
000022 //SI022101 DD DISP=SHR,DSN=IMSDB.SI022101
000023 //SI023201 DD DISP=SHR,DSN=IMSDB.SI023201
000024 //SI022201 DD DISP=SHR,DSN=IMSDB.SI022201
000025 //SI024201 DD DISP=SHR,DSN=IMSDB.SI024201
```

Figure 101. **ISPF panel for submitting conversion JCL**

When the JCL processes successfully, an indicator displays to confirm that the batch job has completed.
A phase can have more than one batch job; all the jobs must be completed before the next phase begins.

Using SYNC points to halt or continue to the next phase of a project

After certain phases complete, a sync point is reached. The sync point allows you to interrupt the project at a logical point.

About this task

Sync points specify whether to continue to the next step.

A typical reason to halt a project is when batch processing has not completed and you will be unavailable for a period of time.

Procedure

To halt or continue to the next phase from a project checkpoint:

1. At a project checkpoint, the Project Checkpoint panel displays and you can choose to start the next phase or halt the project.

   ![Project Checkpoint panel](image)

   Figure 102. Project Checkpoint panel

   • Specify Y to begin the next phase of the project.
   • Specify N to halt the project.

To halt or resume project conversion:

2. If you halt the project, a Project Halted panel is displayed.

   ![Project Halted panel](image)

   Figure 103. Project Halted panel

   The status panel automatically causes the Project Work panel to display.

   • Optional: To quit the project and continue later, by pressing the End key.
   • Optional: To resume project conversion, select the appropriate option from the Project Work panel.
Optional: To resume project conversion, select the appropriate option from the Project Work panel.

Optional: To resume project conversion, select option 1 from the Project Work panel. The project continues from where it stopped.

Processing a project using a partition selection exit

You must use a partition selection exit to process the project, if the database records (root segments) are to be distributed by methods other than the root segment key. If the database records are to be distributed by a portion of the root key, which is not the leftmost portion, you must use a selection exit.

Before you begin

For example, if the regional identifier is in a lower portion of the key, and the data should be separated by region identifier.

Restriction on partition selection exits:

• Caution should be used if you want to specify a partition selection exit for the secondary index.
  
  Using the exit can result in index keys that are no longer consecutive from one index partition to the next, thus impacting applications that use PCBs with PROCSEQ.

• IMS HALDB Toolkit does not support a selection exit on PSINDEX.

• If the data is to be distributed using the leftmost portions of the root segment high key, no selection exit is required, and none should be provided.

About this task

Selection exits are called for initialization and sequencing.

Exits provide the following functions:

• IMS knows the number of partitions and provides the partition number as input to the exit.

• The exit has additional parameters including the keystrng parameter from the partition definition. This parameter can be used to identify and sequence partitions.

Other methods are possible; however, they are prone to errors when the exit identifies a certain number of partitions, but does not receive that input from the DBRC definitions.

Procedure

1. Activate the partition selection exit for use.
2. Define partition boundaries.
3. Select or change the DBD.
4. Optional: Define other conversion options.

**Results**

If you use the IHCPSEL0 exit, you can activate the exit and define the partition boundaries as part of one task. If you supply your own partition selection exit, you must perform extra steps to make sure that your conversion process runs smoothly.

**IHCPSEL0 exit**

The IHCPSEL0 exit is provided with IMS HALDB Toolkit and works the same way as the high key works for partitioning without a selection exit.

IHCPSEL0 uses the DBRC keystring parameter to identify the key portion and the high subkey for that partition. This enables flexibility for changing the partitioning method. The keystring parameter is specified as \textit{o00;lll;kkkkk} where:

- \textit{o00}
  - Is the numeric specifying the offset from the start of the root key. The smallest offset is 001.

- \textit{lll}
  - Is the numeric specifying the length of the subkey. \textit{lll+oo0} must not be larger than the root segment key.

- \textit{kkkkk}
  - Is the high-level qualifier key of the subkey for this partition.

IHCPSEL0 performs certain checks during initialization. It verifies that all \textit{oo0} and \textit{lll} are the same for each partition. Then, it checks for duplicate high keys.

Keys can be defined shorter than \textit{lll}. In that case, they are padded with x"FF".

**Using a partition selection exit for conversion**

After you create a project and before you select a DBD, you can activate a partition selection exit. You can also use this procedure to define the partition boundaries.

**About this task**

On the next panel (Specify a Partition Selection Exit), you are asked to specify the partition selection exit.

**Procedure**

1. Select option 1 under "Selection Exit" on the DBD Conversion Rules panel.

   You can also specify a partition selection exit for the secondary index; however, this might cause problems. The index keys will no longer be consecutive from one index partition to the next. This has an impact on applications that use PCBs with PROCSEQ. IMS HALDB Toolkit does not support a selection exit on PSINDEX.
2. On the next panel (Partition Selection Exit), specify the partition selection exit.

You can use either IHCPSEL0, which is supplied, or provide your own selection exit.

If you use your own exit, you must provide strings for the partition or define the number of partitions.

3. If you use IHCPSEL0, provide the subset high keys.

IMS HALDB Toolkit provides the Specify Partition Keystrings panel and the Partition Keystrings (character) panel for you to enter subset high key information.
Figure 107. **Specify Partition Keystrings** panel

Command ===>

Specify Partition Keystrings

1 Select
   1 Enter keystrings in character format
   2 Enter keystrings in hex format
   3 Provide dataset

Member (if dataset is partitioned)

---

Figure 108. **Partition Keystrings (character)** panel

4. When you are finished entering keys, press the **End** key. The Keystings for xxxx panel displays all of the keys that you entered.

5. Optional: Use the Keystings for xxxx panel to change any of the information that you entered.

---

Figure 109. **Verifying partition keystings**

IMS HALDB Toolkit performs a final check for the partition selection exit.

6. Optional: If you encounter the Partition Selection Exit xxxxxxxx is not currently in your RESLIB panel, copy the exit into your RESLIB. Partition boundary calculations are then performed.
Changing the DBDs

After DBDs and partition boundaries are selected, you can begin conversion by unloading the primary DBDs.

About this task

New DBDs and partitions must be defined, and new data sets must be allocated. Then, reloads can be performed and conversion will be complete.

Because the DBDs have changed, an online change must be performed before making the new HALDBs available. The conversion process makes all changes except online changes, although it creates required JCL and control statements.

You submit the JCL as specified in your setup options or during project definition. You can change the options according to the needs of your project.

Creating partition boundaries

After DBDs are selected, you should locate effective partition boundaries. This section describes ways to create partition boundaries.

About this task

You can accomplish this by locating the high-level key of each partition that you want. You must select partition boundaries for all participating databases, including secondary indexes.

The index record size increases significantly because of the increase in the pointer size from 4 to 28 and the addition of the root segment key.

Procedure

• Use a partition selection exit.
• Specify the high key for a partition.
• Set partition boundaries automatically.
Defining the number of partitions by specifying high keys

After DBDs are selected, you can define the number of database partitions you want to have by specifying high keys for the partitions.

About this task

The number of partitions will be the number of high keys you specify. You must select partition boundaries for all participating databases, including secondary indexes. You need not specify the keys in sequence. The highest key defined is replaced as x'FF'.

The index record size increases significantly because of the increase in the pointer size from 4 to 28 and the addition of the root segment key.

Procedure

1. On the **Primary DBD Partitioning Rules** panel, select option 4 Specify High Keys.

![Figure 111. Primary DBD Partitioning Rules panel](image)

The **Specify Partition Keystrings** panel is displayed.

2. To specify keys, select option 1 or 2 depending on whether you want character or hex format.

![Figure 112. Specify Partition Keystrings panel](image)

3. Optional: Select option 1 and the **Specify Partition Keystrings Character Keystrings only** panel is displayed.

   Enter one key at a time; or, if you have a file containing the keys, you can use it here.

   The file must have as many records as the number of keys you want, the keys must be the first position of the record, and the file must have fixed record length.
4. When you have entered all keys, press the **End** key. The Keystrings for xxxx panel displays all keys that were entered.

5. To change this list, select option D, C, or I.

6. Press the **End** key to begin processing, when the list is final.

7. Verify partitioning results. You can view results using the output list from the data collector.

---

**Figure 113. Specify Partition Keystrings (character) panel**

**Setting partition boundaries automatically**

There are two methods to set partition boundaries automatically: specifying the partition size (recommended) and specifying the number of partitions.

**Procedure**

1. To specify partition size, select option 2 in the "Partitions" section of the **Primary DBD Partitioning Rules** panel.

   This method ensures that no partition will be larger than the maximum size allowed.
Command ===>

Primary DBD Partitioning Rules

Partitions:  3  
1  Fixed Number of Partitions  1
2  Fixed Partition Size (MB) 2048
3  Ask during Conversion
4  Specify High Keys

PDB Conversion:  3  
1  Use existing Keys or Partitions
2  Create new Partition boundaries
3  Ask during Conversion

Additional Partitioning Layouts to be created?
2  1  Yes
2  No, use the one created during Collect

Combine Database records:  9000  (number of database records)

Figure 115. Primary DBD Partitioning Rules panel

2. Optional: To specify the number of partitions, select option 1 in the "Partition" section of the Primary DBD Partitioning Rules panel.

   If you use this method, a resulting partition might be larger than the 4 GB maximum. In that case, IMS HALDB Toolkit resets the size to 2 GB.

3. Optional: To specify partition boundaries for a secondary index, select option 1 or 2 in the PSINDEX Definition Rules panel.

Command ===>

PSINDEX Definition Rules

2  1  Fixed Number of Partitions
   Partition Number  1
2  Fixed Partition Size
   Size (MB)  1024
*  Ask during conversion
4  Same high keys as the primary DBD
   (Index is the ROOT key)
   (Primary DBD must specify keys)
   (Defaults to “2” if index is not the root key)

Figure 116. PSINDEX Definition Rules panel

You must consider VSAM freespace.

Typically, option 2 (the default) with a maximum size of 1 GB is the best option.

Specifying additional conversion options

You can specify additional options during the conversion process.

About this task

For example:

• Change the DBD name.

   Changing the name impacts post-processing. You must define the new DBDs to your online system, change all PSBs, and ensure that the applications will be changed if they are aware of the DBD name.

• Convert from VSAM to OSAM.
OSAM has advantages not available in VSAM, especially when you use OSAM sequential buffering (OSB).

- Convert to a single data set group.

Some databases contain multiple data set groups to minimize problems with database size.

When you use IMS HALDB Toolkit, this adjustment is unnecessary. You need only one data set group.
Chapter 22. Converting to HALDB

If the database is offline, you can use the ISPF user interface to convert the database to a HALDB. The following sections explain how to accomplish this task.

Topics:
• “Considerations for converting to HALDB” on page 259
• “Converting to HALDB using the ISPF user interface” on page 259

Considerations for converting to HALDB

The following considerations apply when you convert to a HALDB by using the ISPF user interface.

When databases are offline, conversion options are available by using ISPF panels or by using the batch conversion method.

Converting full-function databases requires that IMS HALDB Toolkit evaluate partition sizes and boundaries. Partitioned databases which use the PDB/PDF product are considered full-function databases and can be converted as such.

The conversion process for PDBs/PDFs uses partition high keys (for HIDAM/HISAM to PHIDAM) or the number of partitions (HDAM to PHDAM).

You can also choose to select the partition boundaries again. In this case, the partition definition from the PDB is ignored and the database is treated in the same way as any full-function database.

Converting to HALDB using the ISPF user interface

You can use the ISPF user interface to convert your full-function databases to HALDB.

Procedure

1. To display the DBD Conversion Selection panel, select option 1 (Continue with Current Project) from the Project Work panel.
   If you did not select DBDs, or if you cleared the project data set, this step is necessary.

2. Select one of the provided DBD libraries, or enter a specific DBD library and press Enter to see a list of DBDs.
   All DBDs and related databases must be converted together. You must select, at minimum, the primary DBD.
   All related DBDs and indexes will be automatically included. In addition, you can add DBDs that are not related (from an IMS perspective), and they will be converted at the same time.
3. Select the primary DBD to be converted; related DBDs are automatically added to the list.

4. Press the **End** key to display the status panel showing all selected DBDs.

5. View your selections, and press the **End** key to display the following DBD Selection for Project xxxxx panel, which allows you to confirm that the DBD list is complete.
6. Continue processing the project as described in Chapter 21, “Processing a project,” on page 243.

7. After the conversion process is complete and you are certain that you will not need to revert the database to its non-HALDB state, you can delete any DFSMDA members for the old database.
Chapter 23. Maintaining HALDB

The maintenance function from the ISPF user interface helps you maintain HALDBs after you convert them from full-function. The maintenance function is used to split or consolidate partitions. You can use ISPF to perform maintenance tasks after databases are converted.

The databases must be offline before beginning any maintenance task. The databases must be taken offline manually.

To maintain a database online, you must use the batch process.

You can perform the following tasks using the ISPF user interface:

- Select DBDs for maintenance
- Select and maintain partitions
- Create and run JCL

The following sections explain how to accomplish these tasks.

Topics:

- “Splitting or consolidating HALDB partitions” on page 263
- “Selecting DBDs for maintenance” on page 264
- “Selecting and maintaining partitions” on page 265

Splitting or consolidating HALDB partitions

You access the maintenance panel by selecting option 6 from the IMS HALDB Toolkit main menu.

About this task

The Split or Consolidate HALDB Partitions panel is displayed.

The panel shows the current environment in which you are working and the IMS version for which it is defined. If you are connected to a project which is eligible for maintenance, the project name is also displayed.

The panel offers the following functions:

- Select option 1 to maintain projects that are defined within the specified environment.
- Select option 2 to display all projects that are defined within the environment.
- Select option 3 to select a project. If no project is preselected, you must select a project before proceeding.
A list of projects is displayed; however, only those defined as maintenance projects (Type: M) are eligible for selection.

After you select a project, the name is displayed on the project line.

- Select option 4 to connect to the project that is displayed under Current Settings and to display the **Project Work** panel.

In ISPF mode, Help is available for using the fields on this panel.

---

**Selecting DBDs for maintenance**

If you select option 1 on the **Split or Consolidate HALDB Partitions** panel, you are asked to select the DBD.

**About this task**

DBDs are extracted from the RECON.

The **HALDB DBDs** panel is displayed.

Select the DBD to be processed. Only one DBD can be selected at-a-time.

---

**Figure 121. Project Work panel**

**Figure 122. Selecting HALDB DBDs**

The panel is displayed for selecting the DBD library which contains the selected DBD, as shown in the following example.
Select the appropriate DBD library or type the data set name. The DBD library you choose will be associated with the project.

```
Command ==> Select one of the provided DBD libraries
or specify a DBD library
for HALDB DBD PHDV1
1  your.DBDLIB
2
3
4
5
6
7
8
9

Specify a DBDLIB dataset name
```

*Figure 123. Selecting HALDB DBD library*

The next step is to select a partition.

**Selecting and maintaining partitions**

You use the Select Partitions for Maintenance panel to select and maintain partitions. All partitions are displayed in key sequence.

**About this task**

The current size of the partition and the space used are displayed to assist you in deciding which partitions to select.

You can select multiple partitions. However, if you select more than one, they must be in key sequence and be selected or cleared one-at-a-time.

IMS HALDB Toolkit considers multiple partitions as one entity and creates new partitions based on the goals that you defined in the project setup.

```
Command ==> Select Partitions for Maintenance Master DBD: PHDV1

"S" to select a partition
"D" to deselect a partition

<table>
<thead>
<tr>
<th>Sel</th>
<th>Partition</th>
<th>Curr Sel</th>
<th>Space (CYL)</th>
<th>High key</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHDV13</td>
<td>2</td>
<td>2</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>PHDV14</td>
<td>2</td>
<td>2</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>PHDV12</td>
<td>2</td>
<td>2</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>PHDV10</td>
<td>2</td>
<td>2</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>PHDV11</td>
<td>2</td>
<td>2</td>
<td>x'FF'</td>
<td></td>
</tr>
</tbody>
</table>
```

*Figure 124. Displaying all partitions in key sequence*

**Restriction on partition selection exits**

Only partition selection exit IHCPSEL0 (provided with this product) is supported.

DBDs with other partition selection exits are not supported.
Chapter 24. Creating JCL statements for database utilities

IMS HALDB Toolkit can create JCL for database utilities. You can then run reorganization or backup and recovery utilities for HALDBs or selected partitions.

Procedure

1. From the IMS HALDB Toolkit main menu, select option 7 (Database Utilities) and press Enter.

The Database Utilities panel is displayed.

```
------------------------------------- IMS HALDB Toolkit -------------------------------------
Command ==> Database Utilities
Select Function                  Current Settings
          Environment: ims14
1  Index Pointer Healer
2  Recover Partition
3  Backup Partition
4  Unload Partition
5  Reload Partition
6  Unload entire Database
7  Reload entire Database
8  Reorganize PSINDEX
9  Drop Partition
A  Load Partition
B  Merge HALDBs
```

**Figure 125. Database utilities main menu**

This panel allows you to select utility functions for performing actions on selected databases or partitions.

**Option 1**
This function reads the PSINDEX data sets and determines whether the EPS pointers are valid. If necessary, ILDS data sets from the primary database partitions are used to update the index pointer. This function requires the primary database to be offline.

**Options 2 - 7**
These functions create JCL to perform the action of the selected utility. Either IMS Tools products or standard utilities are used. On the main menu, you can select option 0 (Setup Utilities) to specify which utilities and associated parameters IMS HALDB Toolkit should use.

**Option 8**
If your CI and CA splits are a high number, this function reorganizes the PSINDEX. This function requires the PSINDEX database to be offline.

**Option 9**
This function is used to remove a partition. If the database has secondary indexes, the function also removes corresponding index records. This method is faster than rebuilding indexes for remaining partitions.

It is still possible to undo the drop at this time. Because a dropped partition has only been "disabled", it can be reactivated. However, secondary indexes must be rebuilt. If the database has been updated, you must unload and reload to reactivate the dropped partition.

**Option A**
This function allows you to load a single partition (PCB with PROCOPTL). Using this function can cause performance issues if secondary indexes are inserted. The insertion of secondary indexes is
delayed until the partition has been loaded. The index records are then inserted sequentially. The application does not see status codes related to insertion of the records. However, if index loading fails, the job ends.

**Option B**

This function enables user-partitioned databases to transform to a single HALDB. The following restrictions apply:

- DBDs must be identical.
- The key range of the partitions must not overlap.

This function imports selected partitions into the target master DBD. Data set names are changed according to the rules in the target database. This function checks the key consistency of neighboring partitions. The merge is performed only if all checks have been satisfied.

2. Select a function from the menu and press **Enter**.

A panel displays that shows all HALDBs that are currently defined.

3. Select a DBD on which to perform a function and, if necessary, its partition. Press **Enter**.

The JCL for that function is generated automatically.
You can use Other Utilities functions provided by the ISPF user interface to perform other HALDB tasks. From the IMS HALDB Toolkit main menu, select option 8 (Other Utilities) and press Enter.

The Utilities panel is displayed.

```
--------------------------------------- IMS HALDB Toolkit ---------------------------------------
Command ===> Utilities
Select Function                      Current Settings
  1  Show DBD Source
  2  Reassemble DBD
  3  Partition Selection Exit Test Utility
  4  OSAM Multi volume
```

Figure 126. Utilities panel

Option 1 allows you to rebuild the source of your DBD. You are asked to specify the DBDLIB and select a DBD. The DBD source will be displayed.

Option 2 is the same as option 1, but applies JCL to the DBD source to enable you to do a DBDGEN.

Option 3 generates the JCL for testing a partition selection exit.

Option 4 creates the JCL to handle a non-SMS OSAM Multi volume.
Chapter 26. Using ISPF DBRC support functions

You can use DBRC support functions provided by the ISPF user interface to show, clone, copy, and backup HALDB definitions and partitions.

About this task
To use DBRC utilities, select option 9 (DBRC for HALDB) from the IMS HALDB Toolkit main menu and press Enter.

The DBRC Support panel is displayed to allow you to select a function that is supported by DBRC.

Figure 127. DBRC Support panel

Topics:
• “Showing partition definitions” on page 271
• “Cloning DBRC definitions” on page 272
• “Copying DBRC partitions” on page 274
• “Backing up DBRC DBD definitions” on page 275

Showing partition definitions

You can use the DBRC Support panel to show partition definitions.

Procedure
1. From the IMS HALDB Toolkit main menu, select option 9 (DBRC for HALDB) and press Enter.

   The DBRC Support panel is displayed.

2. From the DBRC Support panel, select option 1 (Show Partition Definitions) and press Enter.

   The Partition Definition in DBRC panel is displayed. The panel shows a list of all HALDB master DBDs and their partition definitions.
**Cloning DBRC definitions**

You can use the clone function from the **DBRC Support** panel to replicate HALDB DBRC definitions to other RECONs.

**Procedure**

1. From the IMS HALDB Toolkit main menu, select option 9 (DBRC for HALDB) and press **Enter**.
   
   The **DBRC Support** panel is displayed.

2. From the **DBRC Support** panel, select option 5 (Clone Partition Definition) and press **Enter**.

   The **HALDB DBDs** panel is displayed showing the list of HALDB DBDs.

---

**Figure 128. Partition Definition in DBRC panel**

3. To see details about a DBD and its partitions, select a row and press **Enter**.

   For following example shows the result for option 1 (Show all HALDB DBDs and Partitions):

---

**Figure 129. HALDB DBDs and Partitions panel**
3. Enter **s** to make a partition selection, along with any secondary indexes you want to include, and press **Enter**.

The **Enter Target RECON Data Set Names** panel is displayed.

4. Specify the RECON data sets to which you plan to clone the HALDB DBRC definitions and press **Enter**.

The **Options for DBRC Cloning of DBD** panel is displayed:

5. Specify the following parameters:
   - Specify a new data set name prefix.
   - If you include the secondary index databases, use the DBD name as an additional data set qualifier

IMS HALDB Toolkit creates the JCL to transport partition definitions of the selected DBD and any secondary indexes.

Submit the JCL to create the partition definition in your alternate RECONs.

**Note:** You should not use this function to transport image copies to partitions that have just been defined. Use the Copy function, instead. However, you can use any Load process to transport data to replicated partitions.
Copying DBRC partitions

You can use the copy function from the DBRC Support panel to replicate HALDB DBRC definitions to other RECONs.

About this task

Use this function to copy DBRC definitions and partition data sets to a different RECON.

The data transport process can unload or reload. However, this function is designed to allow transport with image copies.

Procedure

1. From the IMS HALDB Toolkit main menu, select option 9 (DBRC for HALDB) and press Enter.

   The DBRC Support panel is displayed.

2. From the DBRC Support panel, select option 6 (Copy Partitions to a Different RECON) and press Enter.

   The Enter Target RECON Dataset Names panel is displayed.

   ![Figure 133. Selecting the target RECON data sets](image)

   3. Specify the RECON data sets to which you plan to copy the HALDB DBRC definitions and press Enter.

      The Copy Database to Different RECON panel is displayed.

   ![Figure 134. Specifying copy parameters](image)

   4. Specify the following parameters:

      - Specify a new data set name prefix.
      - If you include the secondary index databases, use the DBD name as an additional data set qualifier.

      IMS HALDB Toolkit can create the IDCAMS statements for the new files.

      IMS HALDB Toolkit creates the JCL.
The first step creates a file containing DBRC statements and (optionally) a file containing IDCAMS statements.

The DBRC statements create the HALDB DBD and its partitions. The partition number is maintained so that image copies can be used.

Additionally, all complete image copy entries are transported to the new RECONs. VOLSER information is not copied.

You must have CATDS in your DBRC definition.

An optional third step uses the IDCAMS statements to allocate new files. File sizes are copied from the original files.

You can now load your database into the new files by using the Recovery function and accessing the new RECON.

### Backing up DBRC DBD definitions

You can use the **DBRC Support** panel to back up DBRC DBD definitions.

**Procedure**

1. From the IMS HALDB Toolkit main menu, select option 9 (DBRC for HALDB) and press **Enter**.

   The **DBRC Support** panel is displayed.

2. Select option 7 from the DBRC Support menu.

   A list of HALDB master DBDs displays.

3. Select the DBD.

   A **View** panel displays the database and partition definition for the selected master DBD.

4. Select all rows.

5. Issue a **CREATE** command on the command line, and specify the file to which the definitions are to be backed up.
Part 9. Reference

The topics in this section provide you with technical references to help you interpret IMS HALDB Toolkit reports and understand the contents of the sample library file.

Topics:

- Chapter 27, “Sample reports,” on page 279
- Chapter 28, “Contents of the sample library file (SIHCSAMP),” on page 291
- Chapter 29, “Performance tips and considerations,” on page 293
Chapter 27. Sample reports

This topic contains samples of reports that you might encounter as you use IMS HALDB Toolkit. This topic contains only those reports created by IMS HALDB Toolkit. The reports created by the IMS and IMS Tools products are described in the manuals for those utilities.

Topics:
- “MSGPRINT data set” on page 279
- “IHCLIST data set” on page 280

MSGPRINT data set

The MSGPRINT data contains progress messages issued during the IMS HALDB Toolkit job.

Runtime Messages report

The following figure shows an example of the Runtime Messages report.

<table>
<thead>
<tr>
<th>Time</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>22:04:07.9</td>
<td>IHC01000I Utility driver started</td>
</tr>
<tr>
<td>22:04:08.0</td>
<td>IHC01000I IMS version is 14</td>
</tr>
<tr>
<td>22:04:08.0</td>
<td>IHC01000I Control cards used in this run</td>
</tr>
<tr>
<td>22:04:08.0</td>
<td>IHC01000I ANALYZE PART DBD(PHIDB1) - PARTLIST(PHIDB11,PHIDB12) - PARTNUM(3)</td>
</tr>
<tr>
<td>22:04:08.5</td>
<td>IHC01000I Verification started</td>
</tr>
<tr>
<td>22:04:08.5</td>
<td>IHC01000I IMS HALDB Toolkit level 1.1 01/26/19 01.18 07</td>
</tr>
<tr>
<td>22:04:08.7</td>
<td>IHC01000I List of partitions</td>
</tr>
<tr>
<td>22:04:08.7</td>
<td>IHC01000I PHIDB11</td>
</tr>
<tr>
<td>22:04:08.7</td>
<td>IHC01000I PHIDB12</td>
</tr>
<tr>
<td>22:04:09.3</td>
<td>IHC01000I Verification ended, return code is 0</td>
</tr>
<tr>
<td>22:04:09.3</td>
<td>IHC01000I Analyze started</td>
</tr>
<tr>
<td>22:04:09.4</td>
<td>IHC01000I Input: PHIDB11X DBSMS.DB.PHIDB1.X00001</td>
</tr>
<tr>
<td>22:04:09.4</td>
<td>IHC01000I Input: PHIDB12 X00002</td>
</tr>
<tr>
<td>22:04:09.4</td>
<td>IHC01000I Input: PHIDB12A DBSMS.DB.PHIDB1.A00002</td>
</tr>
<tr>
<td>22:04:11.0</td>
<td>IHC01000I MSSR region controller started</td>
</tr>
<tr>
<td>22:04:11.2</td>
<td>IHC01000I 64 database records read <strong>FINAL</strong></td>
</tr>
<tr>
<td>22:04:11.3</td>
<td>IHC01000I HSSR region controller ended</td>
</tr>
<tr>
<td>22:04:11.3</td>
<td>IHC01000I Analyze ended, return code is 0</td>
</tr>
<tr>
<td>22:04:11.3</td>
<td>IHC01000I Utility driver ended</td>
</tr>
</tbody>
</table>

End of messages

Figure 135. Runtime Messages report
The IHCLIST data set contains several reports. The reports generated differ by which function was performed.

<table>
<thead>
<tr>
<th>Function</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYZE PART</td>
<td>• Collect DBDs report</td>
</tr>
<tr>
<td></td>
<td>• Runtime Options In Effect report</td>
</tr>
<tr>
<td></td>
<td>• Unload report (not printed when the input data is unloaded data sets)</td>
</tr>
<tr>
<td>CONVERT</td>
<td>• Collect DBDs report</td>
</tr>
<tr>
<td></td>
<td>• Runtime Options In Effect report</td>
</tr>
<tr>
<td></td>
<td>• Unload report</td>
</tr>
<tr>
<td>MAINTAIN</td>
<td>• Collect DBDs report</td>
</tr>
<tr>
<td></td>
<td>• Runtime Options In Effect report</td>
</tr>
<tr>
<td></td>
<td>• Unload report</td>
</tr>
<tr>
<td>CHECK (HALDB Analyzer utility)</td>
<td>HADB Analyzer report</td>
</tr>
<tr>
<td>PSEXIT (Test Partition</td>
<td>Partition Selection Exit report</td>
</tr>
<tr>
<td>Selection Exit utility)</td>
<td></td>
</tr>
</tbody>
</table>
### Collect DBDs report

The Collect DBDs report shows the result of your partition settings. The report displays the number of partitions including their respective high keys. The total line is included at the top for reference.

#### Partitioning for DBD GRE

<table>
<thead>
<tr>
<th>Part</th>
<th>Roots</th>
<th>%</th>
<th>All Segments</th>
<th>%</th>
<th>Prefix Bytes</th>
<th>%</th>
<th>Data Bytes</th>
<th>%</th>
<th>Total Bytes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>7,648,481</td>
<td>100.00</td>
<td>135,324,722</td>
<td>100.00</td>
<td>2,596,445,972</td>
<td>100.00</td>
<td>12,563,776,313</td>
<td>100.00</td>
<td>15,160,222,285</td>
<td>100.00</td>
</tr>
<tr>
<td>1</td>
<td>1,230,845</td>
<td>16.09</td>
<td>16,886,545</td>
<td>12.47</td>
<td>301,372,370</td>
<td>11.60</td>
<td>1,933,145,962</td>
<td>15.38</td>
<td>2,234,518,332</td>
<td>14.73</td>
</tr>
</tbody>
</table>

Key: 0993049356
F0F9F9F3F0F4F9F3F5F6

2    | 1,120,757 | 14.65 | 20,321,387 | 15.01 | 398,392,968 | 15.34 | 1,813,704,646 | 14.43 | 2,212,097,614 | 14.59 |

Key: 1643153240
F1F6F4F3F1F5F3F2F4F0

3    | 1,055,010 | 13.79 | 20,430,027 | 15.09 | 397,198,092 | 15.29 | 1,824,718,562 | 14.52 | 2,221,916,654 | 14.65 |

Key: 2133450824
F2F1F3F3F4F5F0F8F2F4


Key: 2720091872
F2F7F2F0F0F9F1F8F7F2

5    | 1,029,017 | 13.45 | 20,921,079 | 15.45 | 401,675,768 | 15.47 | 1,857,788,517 | 14.78 | 2,259,464,285 | 14.90 |

Key: 3673346745
F3F6F7F3F3F4F6F7F4F5

6    | 915,871  | 11.97 | 20,180,337 | 14.91 | 393,720,982 | 15.16 | 1,794,588,257 | 14.28 | 2,188,309,239 | 14.43 |

Key: 4333266611
F4F3F3F3F2F6F6F6F1F1

7    | 1,194,572 | 15.61 | 16,746,986 | 12.37 | 323,619,742 | 12.46 | 1,498,844,418 | 11.92 | 1,822,464,160 | 12.02 |

Key: ...........
FFFFFFFFFFFFFFFFFF

#### Partitioning for DBD GRX01

<table>
<thead>
<tr>
<th>Part</th>
<th>Roots</th>
<th>%</th>
<th>All Segments</th>
<th>%</th>
<th>Prefix Bytes</th>
<th>%</th>
<th>Data Bytes</th>
<th>%</th>
<th>Total Bytes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>7,648,408</td>
<td>100.00</td>
<td>7,648,408</td>
<td>100.00</td>
<td>152,968,160</td>
<td>100.00</td>
<td>145,319,752</td>
<td>100.00</td>
<td>298,287,912</td>
<td>100.00</td>
</tr>
<tr>
<td>1</td>
<td>7,648,408</td>
<td>100.00</td>
<td>7,648,408</td>
<td>100.00</td>
<td>152,968,160</td>
<td>100.00</td>
<td>145,319,752</td>
<td>100.00</td>
<td>298,287,912</td>
<td>100.00</td>
</tr>
</tbody>
</table>

#### Partitioning for DBD GRX02

<table>
<thead>
<tr>
<th>Part</th>
<th>Roots</th>
<th>%</th>
<th>All Segments</th>
<th>%</th>
<th>Prefix Bytes</th>
<th>%</th>
<th>Data Bytes</th>
<th>%</th>
<th>Total Bytes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>6,911</td>
<td>100.00</td>
<td>6,911</td>
<td>100.00</td>
<td>138,220</td>
<td>100.00</td>
<td>3,476,233</td>
<td>100.00</td>
<td>3,614,453</td>
<td>100.00</td>
</tr>
<tr>
<td>1</td>
<td>6,911</td>
<td>100.00</td>
<td>6,911</td>
<td>100.00</td>
<td>138,220</td>
<td>100.00</td>
<td>3,476,233</td>
<td>100.00</td>
<td>3,614,453</td>
<td>100.00</td>
</tr>
</tbody>
</table>

#### Partitioning for DBD GRX03

<table>
<thead>
<tr>
<th>Part</th>
<th>Roots</th>
<th>%</th>
<th>All Segments</th>
<th>%</th>
<th>Prefix Bytes</th>
<th>%</th>
<th>Data Bytes</th>
<th>%</th>
<th>Total Bytes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>7,648,408</td>
<td>100.00</td>
<td>7,648,408</td>
<td>100.00</td>
<td>152,968,160</td>
<td>100.00</td>
<td>168,264,976</td>
<td>100.00</td>
<td>321,233,136</td>
<td>100.00</td>
</tr>
<tr>
<td>1</td>
<td>7,648,408</td>
<td>100.00</td>
<td>7,648,408</td>
<td>100.00</td>
<td>152,968,160</td>
<td>100.00</td>
<td>168,264,976</td>
<td>100.00</td>
<td>321,233,136</td>
<td>100.00</td>
</tr>
</tbody>
</table>

#### Partitioning for DBD GRX04

<table>
<thead>
<tr>
<th>Part</th>
<th>Roots</th>
<th>%</th>
<th>All Segments</th>
<th>%</th>
<th>Prefix Bytes</th>
<th>%</th>
<th>Data Bytes</th>
<th>%</th>
<th>Total Bytes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>3,182,169</td>
<td>100.00</td>
<td>3,182,169</td>
<td>100.00</td>
<td>63,643,380</td>
<td>100.00</td>
<td>89,100,732</td>
<td>100.00</td>
<td>152,744,112</td>
<td>100.00</td>
</tr>
<tr>
<td>1</td>
<td>3,182,169</td>
<td>100.00</td>
<td>3,182,169</td>
<td>100.00</td>
<td>63,643,380</td>
<td>100.00</td>
<td>89,100,732</td>
<td>100.00</td>
<td>152,744,112</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Figure 136. Collect DBDs report (Part 1 of 2)

The following descriptions apply to the fields in this report:

---

Chapter 27. Sample reports 281
Part
Displays the partition number. The partition number is assigned based on the order of high keys. Partition numbers in this report do not indicate partition IDs.

Roots
Displays the number of root segments and its percentage of all root segments. This shows how many database records will be assigned to that partition.

All Segments
Displays the number of segments in each partition and its percentage of all segments.

Prefix Bytes
Displays the number of bytes (and its percentage of all bytes) that are required to store the prefix. This has particular significance for index databases. For example, the report in Figure 136 on page 281 shows that the GRX01 database has 153 MB for the prefix and 145 MB for data.

Data Bytes
Displays the number of bytes (and its percentage of all bytes) required to store the data portion. This is the actual amount of data that will be stored on disk.

Total Bytes
Displays the sum of prefix bytes and data bytes.

Total
Displays the total number of bytes and segments in the database.

Runtime Options In Effect report
The Runtime Options In Effect report summarizes the runtime options that were applied to the job.

<table>
<thead>
<tr>
<th>Runtime Options in effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary DBD..................: PHIDB1</td>
</tr>
<tr>
<td>Source for Analyzer........: Database</td>
</tr>
<tr>
<td>Method of Operation.........: Analyze and Unload</td>
</tr>
<tr>
<td>Database Type...............: HALDB</td>
</tr>
<tr>
<td>Partition...................: PHIDB11</td>
</tr>
<tr>
<td>Partition...................: PHIDB12</td>
</tr>
<tr>
<td>Partitioning for primary DBD: Partition Number</td>
</tr>
<tr>
<td>Number of Partitions........: 3</td>
</tr>
<tr>
<td>Partitioning for secondary Indexes: Partition Size</td>
</tr>
<tr>
<td>Size of a Partition.........: 1024</td>
</tr>
</tbody>
</table>

Figure 138. Runtime Options In Effect report

The following descriptions apply to the fields in this report:

Primary DBD
The name of the primary DBD.

Source for Analyzer
The input provided to the Analyzer. This field shows either Database or Unload file.

Method of Operation
Whether an unload was performed. This field shows either Analyze only or Analyze and Unload.

Database Type
The type of the database. This field shows either HALDB or Not HALDB.

Partition
The name of the partition that was processed.

Partitioning for primary DBD
The method used for partitioning the primary DBD. This field shows one of the following methods:
Partition Number
Partition Size
High Keys
Add empty partition

**Partitioning for secondary Indexes**
The method used for partitioning the secondary indexes. This field shows one of the following methods:

- Partition Number
- Partition Size
- High Keys
- Along with primary DBD

**Unload report**
TheUnload report shows the number of segments and the segment size. The segment size is the true size as it is stored in the database.

It can be useful to know the average database record length when tuning your database. In this case, it is helpful for specifying the byte limit parameter of your PHDAM database.

A sample report is shown in the following example:

<table>
<thead>
<tr>
<th>Segment</th>
<th>Segment Count</th>
<th>Segment Data</th>
<th>Prefix and Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRA</td>
<td>7,648,481</td>
<td>1,541,514,136</td>
<td>1,373,247,554</td>
</tr>
<tr>
<td>GRAS</td>
<td>3,182,169</td>
<td>57,466,524</td>
<td>76,559,538</td>
</tr>
<tr>
<td>GRB</td>
<td>29,744,738</td>
<td>1,633,250,273</td>
<td>2,807,332,787</td>
</tr>
<tr>
<td>GRC</td>
<td>25,221,133</td>
<td>805,563,608</td>
<td>654,176,810</td>
</tr>
<tr>
<td>GRE</td>
<td>24,133,135</td>
<td>965,325,400</td>
<td>1,110,124,210</td>
</tr>
<tr>
<td>GRH</td>
<td>4,860,332</td>
<td>231,274,879</td>
<td>260,436,871</td>
</tr>
<tr>
<td>G</td>
<td>16,617,211</td>
<td>1,893,610,390</td>
<td>1,993,313,656</td>
</tr>
<tr>
<td>RL</td>
<td>1,998,779</td>
<td>95,669,886</td>
<td>107,662,560</td>
</tr>
<tr>
<td>GRO</td>
<td>18,415,591</td>
<td>1,214,534,914</td>
<td>1,325,028,460</td>
</tr>
<tr>
<td>GRQ</td>
<td>3,503,153</td>
<td>229,727,199</td>
<td>250,746,117</td>
</tr>
<tr>
<td>Total</td>
<td>135,324,722</td>
<td>8,268,809,017</td>
<td>13,974,016,149</td>
</tr>
</tbody>
</table>

**Figure 139. Unload for DBD GRE report**

The following descriptions apply to the fields in this report:

**Segment**
Displays the segment name

**Segment Count**
Displays the number of segments of this type in the database

**Segment Data**
Displays the total amount of data bytes for this segment type in the database

**Prefix and Data**
Displays the total bytes of this segment type in the database

**Total**
Displays the sum of the segment types

**Avg. database record length**
Displays the result of dividing the total prefix and data bytes by the number of root segments
HALDB Analyzer report

This report shows analysis information gathered by the HALDB Analyzer utility.

Report for database PHDO2

Exceptions and errors
======================
No errors or exceptions detected

Threshold detail
================

<table>
<thead>
<tr>
<th>Item</th>
<th>Low</th>
<th>High</th>
<th>Curr</th>
<th>Warn</th>
<th>Crit</th>
<th>Detail</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPUSE</td>
<td>60</td>
<td>80</td>
<td>9</td>
<td>27</td>
<td></td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>ROOTOVFL</td>
<td>1</td>
<td>30</td>
<td>3</td>
<td>1</td>
<td>30</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>ROOTHOME</td>
<td>2</td>
<td>20</td>
<td>7</td>
<td>30</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SYNONYM</td>
<td>n/a</td>
<td>n/a</td>
<td>3</td>
<td></td>
<td>30</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SPLIT</td>
<td>5</td>
<td>10</td>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>PTRHEAL</td>
<td>20</td>
<td>80</td>
<td>0</td>
<td>0</td>
<td>265</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVGFE</td>
<td>1</td>
<td>30</td>
<td>0.9</td>
<td>393</td>
<td>421</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Database datasets
==================

<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHDO20L</td>
<td>1</td>
<td>4,096</td>
<td>0</td>
<td>720</td>
<td>720</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHDO20A</td>
<td>1</td>
<td>4,096</td>
<td>329</td>
<td>1,440</td>
<td>1,316</td>
<td>5,792</td>
<td>1,325</td>
</tr>
<tr>
<td>PHDO21L</td>
<td>1</td>
<td>4,096</td>
<td>0</td>
<td>720</td>
<td>720</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHDO21A</td>
<td>1</td>
<td>4,096</td>
<td>46</td>
<td>1,440</td>
<td>184</td>
<td>4,660</td>
<td>171</td>
</tr>
<tr>
<td>PHDO22L</td>
<td>1</td>
<td>4,096</td>
<td>0</td>
<td>720</td>
<td>720</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHDO22A</td>
<td>1</td>
<td>4,096</td>
<td>46</td>
<td>1,440</td>
<td>184</td>
<td>4,660</td>
<td>171</td>
</tr>
</tbody>
</table>

Total 6,480 3,844

Database segments
==================

<table>
<thead>
<tr>
<th>Segment Name</th>
<th>Total</th>
<th>Segment Count</th>
<th>total in RAA</th>
<th>avg. length</th>
<th>Total bytes</th>
<th>Data bytes</th>
<th>Prefix bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOT</td>
<td>30</td>
<td>29</td>
<td>82</td>
<td>2,460</td>
<td>1,920</td>
<td>540</td>
<td></td>
</tr>
<tr>
<td>DEP01</td>
<td>235</td>
<td>31</td>
<td>1,022</td>
<td>248,179</td>
<td>235,000</td>
<td>5,170</td>
<td></td>
</tr>
<tr>
<td>DEP02</td>
<td>1,402</td>
<td>165</td>
<td>1,018</td>
<td>1,427,236</td>
<td>1,402,000</td>
<td>25,236</td>
<td></td>
</tr>
</tbody>
</table>

Total 1,667 225 1,669,866 1,638,920 30,946

Avg. database record length 55,662

Figure 140. HALDB Analyzer report (Part 1 of 6)
Report for partition PHDO20

Exception details

Exception details

Roots in partition...........:          24
Partition selection errors...:           0
Randomizer errors............:           0
ILKs in partition............:       1,325
Erroneous ILKs...............:           0
Number of missing ILEs.......:           0

Threshold detail

Item         Low    High    Curr   Warn Crit         Detail          Total
-----------------------------------------------------------------------------------------------------------
RAPUSE        60      80      21             60       100
ROOTOVFL       1      30       0             0       24
ROOTHOME       2      20      20             5       24
SYNONYM      n/a     n/a      12             3       24
SPLIT          5      10       0             0       0
AVGFSE         1      30     0.9            320      329
SPACE        300    2500       1    *            1,327,134      1,327,134

Partition datasets

==================================
<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHDO20L</td>
<td>1</td>
<td>4,096</td>
<td>0</td>
<td>720</td>
<td>720</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHDO20A</td>
<td>1</td>
<td>4,096</td>
<td>329</td>
<td>1,440</td>
<td>1,316</td>
<td>5,792</td>
<td>1,325</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2,160</td>
<td>2,036</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Partition segments

Segment Name Segment Count avg. in RAA length Total bytes Data bytes Prefix bytes
-----------------------------------------------------------------------------------------------------------
ROOT     24             24       82             1,968             1,536               432
DEP01   187             11    1,022           191,114           187,000            4,114
DEP02   1,114            54    1,018         1,134,052         1,114,000          20,052
Total   1,325             89                  1,327,134         1,302,536           24,598
Avg. database record length 55,297

Partition pointer

Segment Type Target Total Nonzero Pcnt Other block Pcnt Other in RAA Pcnt
-----------------------------------------------------------------------------------------------------------
n/a      RAP ROOT 100 21 21.00 5 23.80 5 23.80
ROOT TF ROOT 24 3 12.50 0 0.00 0 0.00
PCF DEP01 24 24 100.00 22 91.66 0 0.00
Split data 0 0 0.00 0 0.00 0 0.00
DEP01 TF DEP01 187 163 87.16 163 100.00 9 5.52
PCF DEP02 187 187 100.00 44 23.52 0 0.00
DEP02 TF DEP02 1,114 927 83.21 229 24.70 8 0.86
Total 1,636 1,325 80.99 463 34.94 22 1.66

Figure 141. HALDB Analyzer report (Part 2 of 6)
Report for partition PHDO21

Exception details

Roots in partition...........:           3
Partition selection errors...:           0
Randomizer errors............:           0
ILKs in partition............:         171
Erroneous ILKs...............:           0
Number of missing ILEs.......:           0

Threshold detail

<table>
<thead>
<tr>
<th>Item</th>
<th>Low</th>
<th>High</th>
<th>Curr</th>
<th>Warn</th>
<th>Crit</th>
<th>Detail</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPUSE</td>
<td>60</td>
<td>80</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>ROOTOVFL</td>
<td>1</td>
<td>30</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ROOTHOME</td>
<td>2</td>
<td>20</td>
<td>33</td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>SYNONYM</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>SPLIT</td>
<td>5</td>
<td>10</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AVGFS</td>
<td>1</td>
<td>30</td>
<td>0.7</td>
<td></td>
<td></td>
<td>36</td>
<td>46</td>
</tr>
<tr>
<td>SPACE</td>
<td>300</td>
<td>2500</td>
<td>0</td>
<td>*</td>
<td></td>
<td>171,366</td>
<td></td>
</tr>
</tbody>
</table>

Partition datasets

<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHDO21L</td>
<td>1</td>
<td>4,096</td>
<td>0</td>
<td>720</td>
<td>720</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHDO21A</td>
<td>1</td>
<td>4,096</td>
<td>46</td>
<td>1,440</td>
<td>184</td>
<td>4,660</td>
<td>171</td>
</tr>
</tbody>
</table>

Total                                              2,160            904

Partition segments

<table>
<thead>
<tr>
<th>Segment</th>
<th>Segment Count</th>
<th>in RAA</th>
<th>avg. length</th>
<th>Total bytes</th>
<th>Data bytes</th>
<th>Prefix bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOT</td>
<td>3</td>
<td>3</td>
<td>82</td>
<td>246</td>
<td>192</td>
<td>54</td>
</tr>
<tr>
<td>DEP01</td>
<td>24</td>
<td>10</td>
<td>1,022</td>
<td>24,528</td>
<td>24,000</td>
<td>528</td>
</tr>
<tr>
<td>DEP02</td>
<td>144</td>
<td>56</td>
<td>1,018</td>
<td>146,592</td>
<td>144,000</td>
<td>2,592</td>
</tr>
</tbody>
</table>

Total               171                   171,366           168,192       3,174

Avg. database record length 57,122

Partition pointer

<table>
<thead>
<tr>
<th>Segment</th>
<th>Type</th>
<th>Target</th>
<th>Total</th>
<th>Nonzero</th>
<th>Pcnt</th>
<th>Other block</th>
<th>Pcnt</th>
<th>Other in RAA</th>
<th>Pcnt</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>RAP</td>
<td>ROOT</td>
<td>100</td>
<td>3</td>
<td>3.00</td>
<td>1</td>
<td>33.33</td>
<td>1</td>
<td>33.33</td>
</tr>
<tr>
<td>ROOT</td>
<td>TF</td>
<td>ROOT</td>
<td>3</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>PCF</td>
<td>DEP01</td>
<td>3</td>
<td>3</td>
<td>100.00</td>
<td>2</td>
<td>66.66</td>
<td>1</td>
<td>33.33</td>
<td></td>
</tr>
<tr>
<td>Split data</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>DEP01</td>
<td>TF</td>
<td>DEP01</td>
<td>24</td>
<td>21</td>
<td>87.50</td>
<td>21</td>
<td>100.00</td>
<td>8</td>
<td>38.09</td>
</tr>
<tr>
<td>PCF</td>
<td>DEP02</td>
<td>24</td>
<td>24</td>
<td>100.00</td>
<td>4</td>
<td>16.66</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>DEP02</td>
<td>TF</td>
<td>DEP02</td>
<td>144</td>
<td>120</td>
<td>83.33</td>
<td>27</td>
<td>22.50</td>
<td>9</td>
<td>7.50</td>
</tr>
</tbody>
</table>

Total               298                   171             55           32.16       19           11.11

Figure 142. HALDB Analyzer report (Part 3 of 6)
Report for partition PHDO22

Exception details

Roots in partition.........:           3
Partition selection errors...:           0
Randomizer errors............:           0
ILKs in partition............:         171
Erroneous ILKs...............:           0
Number of missing ILEs.......:           0

Threshold detail

<table>
<thead>
<tr>
<th>Item</th>
<th>Low</th>
<th>High</th>
<th>Curr</th>
<th>Warn</th>
<th>Crit</th>
<th>Detail</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPUSE</td>
<td>60</td>
<td>80</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>ROOTOVFL</td>
<td>1</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROOTHOME</td>
<td>2</td>
<td>20</td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SYNONYM</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPLIT</td>
<td>5</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>AVGFSE</td>
<td>1</td>
<td>30</td>
<td>0.8</td>
<td></td>
<td></td>
<td>37</td>
<td>46</td>
</tr>
<tr>
<td>SPACE</td>
<td>300</td>
<td>2500</td>
<td></td>
<td>0</td>
<td></td>
<td>171,366</td>
<td>171,366</td>
</tr>
</tbody>
</table>

Partition datasets

<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHDO22L</td>
<td>1</td>
<td>4,096</td>
<td>0</td>
<td>720</td>
<td>720</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHDO22A</td>
<td>1</td>
<td>4,096</td>
<td>46</td>
<td>1,440</td>
<td>184</td>
<td>371,366</td>
<td>171</td>
</tr>
<tr>
<td>Total</td>
<td>2,160</td>
<td>904</td>
<td>171,366</td>
<td>171,366</td>
<td>171,366</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Partition segments

<table>
<thead>
<tr>
<th>Segment Name</th>
<th>Segment Count</th>
<th>avg. length</th>
<th>Total bytes</th>
<th>Data bytes</th>
<th>Prefix bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOT</td>
<td>3</td>
<td>2</td>
<td>1,022</td>
<td>246</td>
<td>192</td>
</tr>
<tr>
<td>DEP01</td>
<td>24</td>
<td>10</td>
<td>1,018</td>
<td>146,592</td>
<td>144,000</td>
</tr>
<tr>
<td>DEP02</td>
<td>144</td>
<td>55</td>
<td>1,018</td>
<td>146,592</td>
<td>144,000</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>67</td>
<td>171,366</td>
<td>168,192</td>
<td>3,174</td>
</tr>
</tbody>
</table>

Avg. database record length: 57,122

Partition pointer

<table>
<thead>
<tr>
<th>Segment Type</th>
<th>Target</th>
<th>Total</th>
<th>Nonzero</th>
<th>Pcnt</th>
<th>Other block</th>
<th>Pcnt</th>
<th>Other in RAA</th>
<th>Pcnt</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>RAP</td>
<td>100</td>
<td>3</td>
<td>3.00</td>
<td>1</td>
<td>33.33</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>ROOT</td>
<td>TF</td>
<td>3</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>PCF</td>
<td>DEP01</td>
<td>3</td>
<td>3</td>
<td>100.00</td>
<td>2</td>
<td>66.66</td>
<td>1</td>
<td>33.33</td>
</tr>
<tr>
<td>Split data</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>DEP01</td>
<td>TF</td>
<td>24</td>
<td>21</td>
<td>87.50</td>
<td>21</td>
<td>100.00</td>
<td>8</td>
<td>38.09</td>
</tr>
<tr>
<td>PCF</td>
<td>DEP02</td>
<td>24</td>
<td>24</td>
<td>100.00</td>
<td>3</td>
<td>12.50</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>DEP02</td>
<td>TF</td>
<td>144</td>
<td>120</td>
<td>83.33</td>
<td>34</td>
<td>28.33</td>
<td>15</td>
<td>12.50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>298</td>
<td>171</td>
<td>57.38</td>
<td>61</td>
<td>35.67</td>
<td>24</td>
<td>14.03</td>
</tr>
</tbody>
</table>

Figure 143. HALDB Analyzer report (Part 4 of 6)
Report for index PSIO21

Report for partition PSIO210

Exception details
===============
Total index records........: 23
Deleted index records......: 0
Pointer healing needed.....: 0
CI splits..................: 0
CA splits..................: 0
CA size (CIs).............: 180
Freespace CI (%).........: 0
Freespace CA (%).........: 0

Partition datasets
==================

<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSIO210A</td>
<td>1</td>
<td>4,096</td>
<td>23</td>
<td>1,440</td>
<td>720</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,440</td>
<td>720</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Report for partition PSIO211

Exception details
===============
Total index records........: 7
Deleted index records......: 0
Pointer healing needed.....: 0
CI splits..................: 0
CA splits..................: 0
CA size (CIs).............: 180
Freespace CI (%).........: 0
Freespace CA (%).........: 0

Partition datasets
==================

<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSIO211A</td>
<td>1</td>
<td>4,096</td>
<td>7</td>
<td>1,440</td>
<td>720</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,440</td>
<td>720</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 144. HALDB Analyzer report (Part 5 of 6)
Report for index PSIO22

Report for partition PSIO220

Exception details
=================
Total index records........: 96
Deleted index records.....: 0
Pointer healing needed....: 0
CI splits..................: 1
CA splits..................: 0
CA size (CIs)...............: 180
Freespace CI (%).........: 0
Freespace CA (%).........: 0

Partition datasets
==================
<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSIO220A</td>
<td>1</td>
<td>4,096</td>
<td>96</td>
<td>1,440</td>
<td>720</td>
<td>0</td>
<td>96</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,440</td>
<td>720</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Report for partition PSIO221

Exception details
=================
Total index records........: 139
Deleted index records.....: 0
Pointer healing needed....: 0
CI splits..................: 1
CA splits..................: 0
CA size (CIs)...............: 180
Freespace CI (%).........: 0
Freespace CA (%).........: 0

Partition datasets
==================
<table>
<thead>
<tr>
<th>DDNAME</th>
<th>Extents</th>
<th>BLKSIZE</th>
<th>Records</th>
<th>Allo (KB)</th>
<th>Used (KB)</th>
<th>Overhead</th>
<th>Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSIO221A</td>
<td>1</td>
<td>4,096</td>
<td>139</td>
<td>1,440</td>
<td>720</td>
<td>0</td>
<td>139</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,440</td>
<td>720</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 145. HALDB Analyzer report (Part 6 of 6)
### Partition Selection Exit report

This report shows information gathered by the partition selection test tool.

<table>
<thead>
<tr>
<th>Partition</th>
<th>Segment</th>
<th>Prefix-length</th>
<th>Segment</th>
<th>Prefix</th>
<th>Data</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All partitions</td>
<td>Name</td>
<td>before</td>
<td>after</td>
<td>Count</td>
<td>Bytes</td>
<td>Bytes</td>
</tr>
<tr>
<td>ROOT</td>
<td>18</td>
<td>18</td>
<td>30</td>
<td>540</td>
<td>1920</td>
<td>2460</td>
</tr>
<tr>
<td>DEP01</td>
<td>22</td>
<td>22</td>
<td>235</td>
<td>5170</td>
<td>235000</td>
<td>240170</td>
</tr>
<tr>
<td>DEP02</td>
<td>18</td>
<td>18</td>
<td>1402</td>
<td>25236</td>
<td>1402000</td>
<td>1427236</td>
</tr>
<tr>
<td>Total</td>
<td>1667</td>
<td>30946</td>
<td>1638920</td>
<td>1669866</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ILE records</td>
<td>265</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Partition 1</th>
<th>Segment</th>
<th>Prefix-length</th>
<th>Segment</th>
<th>Prefix</th>
<th>Data</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>before</td>
<td>after</td>
<td>Count</td>
<td>Bytes</td>
<td>Bytes</td>
<td>Bytes</td>
</tr>
<tr>
<td>ROOT</td>
<td>18</td>
<td>18</td>
<td>7</td>
<td>126</td>
<td>448</td>
<td>574</td>
</tr>
<tr>
<td>DEP01</td>
<td>22</td>
<td>22</td>
<td>51</td>
<td>1122</td>
<td>51000</td>
<td>52122</td>
</tr>
<tr>
<td>DEP02</td>
<td>18</td>
<td>18</td>
<td>298</td>
<td>5364</td>
<td>298000</td>
<td>303364</td>
</tr>
<tr>
<td>Total</td>
<td>356</td>
<td>6612</td>
<td>349448</td>
<td>356060</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ILE records</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Partition 2</th>
<th>Segment</th>
<th>Prefix-length</th>
<th>Segment</th>
<th>Prefix</th>
<th>Data</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>before</td>
<td>after</td>
<td>Count</td>
<td>Bytes</td>
<td>Bytes</td>
<td>Bytes</td>
</tr>
<tr>
<td>ROOT</td>
<td>18</td>
<td>18</td>
<td>23</td>
<td>414</td>
<td>1472</td>
<td>1886</td>
</tr>
<tr>
<td>DEP01</td>
<td>22</td>
<td>22</td>
<td>184</td>
<td>4848</td>
<td>184000</td>
<td>188848</td>
</tr>
<tr>
<td>DEP02</td>
<td>18</td>
<td>18</td>
<td>1184</td>
<td>19872</td>
<td>1184000</td>
<td>1123872</td>
</tr>
<tr>
<td>Total</td>
<td>1311</td>
<td>24334</td>
<td>1289472</td>
<td>1313806</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ILE records</td>
<td>207</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Database record distribution**

<table>
<thead>
<tr>
<th>Part</th>
<th>Roots</th>
<th>%</th>
<th>Data</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>23.33</td>
<td>356060</td>
<td>21.32</td>
</tr>
<tr>
<td>2</td>
<td>23</td>
<td>76.66</td>
<td>1313806</td>
<td>78.67</td>
</tr>
</tbody>
</table>

**Figure 146. Partition selection test tool report**
Chapter 28. Contents of the sample library file (SIHCSAMP)

This reference topic provides descriptions for the contents of the IMS HALDB Toolkit sample library file (SIHCSAMP).

The following members are included in sample library SIHCSAMP:

IHCHHAL
This member provides the sample skeleton CLIST for ISPF invocation.

Requirement: The ISPF data set names must match the target library names.

IHCHHAL1
This member provides the skeleton CLIST for invocation from control suite.

IHCCKSDS
This member provides the sample JCL for ISPF installation.

IHCCSET
This member provides the sample JCL for installation setup parameters that are used on a routine basis.

IHCEACBL
This member provides the sample JCL to create a list of PSBs that contain a specified DBD.

IHCEANA
This member provides the sample JCL to run the HALDB analyzer.

IHCECLON
This member provides the sample JCL to clone DBRC for test environments.

IHCECOPY
This member provides the sample JCL to copy a database to a different IMS (and RECON).

IHCECVTN
This member provides the sample JCL to convert to HALDB offline.

IHCECVTY
This member provides the sample JCL to convert to HALDB online.

Note: This member is not supported by IMS Database Utility Solution.

IHCECVT1
This member provides the sample JCL to convert to HALDB by specifying the number of partitions.

IHCECVT2
This member provides the sample JCL to convert to HALDB by specifying the partition size.

IHCECVT3
This member provides the sample JCL to convert to HALDB by specifying the high keys of the partition.

IHCEDDBK
This member provides the sample JCL to back up DBRC definitions for a specified DBD.

IHCEDBD
This member provides the sample JCL to re-create DBD source from DBDLIB.

IHCEDBRC
This member provides the sample JCL to relink the DBRC module DSPCRTR0.

IHCEDBRI
This member provides the sample JCL to set up HALDB data set name substitution outside of DBRC.

IHCEDFDS
This member provides the sample JCL to copy a database to a different IMS using DFSMSdss.
IHCEDFSH
This member provides the sample JCL to create DFSHALDB statement using keys.

IHCEDROP
This member provides the sample JCL to drop a single partition.

IHCEILK
This member provides the sample JCL to reset ILK.

IHCEIXHL
This member provides the sample JCL for the Index Pointer Healer.

IHCELOAD
This member provides the sample JCL to load a single partition.

IHCEMAI1
IHCEMAI2
IHCEMAI3
These members provide the sample JCL to run the analysis portion of the CONVERT and MAINTAIN commands.

IHCEMERG
This member provides the sample JCL to merge two HALDBs into one.

IHCEMTNN
This member provides the sample JCL to maintain HALDB partitions offline.

IHCEMTNY
This member provides the sample JCL to maintain HALDB partitions online.

Note: This member is not supported by IMS Database Utility Solution.

IHCEMTN1
This member provides the sample JCL to split two partitions into four partitions.

IHCEMTN2
This member provides the sample JCL to rearrange partitions using the partition size.

IHCEMTN3
This member provides the sample JCL to rearrange partitions using high keys.

IHCEOSAM
This member provides the sample JCL for OSAM multivolume allocation (non-SMS).

IHCEPSL
This member provides the sample JCL to create rules for substituting HALDB data set names outside of DBRC.

IHCEPSLT
This member provides the sample JCL to split an unload file on a partition boundary.

IHCEUNIT
This member provides the sample JCL to show all DASD unit names and mark VIO.
Chapter 29. Performance tips and considerations

Use this information to learn the techniques for improving the performance of ANALYZEPART, CONVERT, and MAINTAIN function jobs.

Generally, the performance of an IMS HALDB Toolkit job is not affected by IHCSYSIN command parameters. However, you can improve the IMS HALDB Toolkit job performance by tuning the processes of other IMS Tools products that IMS HALDB Toolkit calls. Such IMS Tools products include IMS High Performance Unload, IMS High Performance Load, and IMS High Performance Image Copy.

The following table summarizes the IMS Tools products that IMS HALDB Toolkit functions call.

<table>
<thead>
<tr>
<th>IMS Tools product</th>
<th>ANALYZEPART</th>
<th>CONVERT</th>
<th>MAINTAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS HP Unload</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>IMS HP Load</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>IMS HP Image Copy</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Improving the performance of the unload process (IMS HP Unload)

If IMS High Performance Unload is used for unloading data, you can tune and improve the performance of the unload process. To do so, create an IMS High Performance Unload default option table (FABHOPT) with HSSROPT control statements that improve the performance of the HSSR Engine and concatenate the FABHOPT to the STEPLIB DD of the IMS HALDB Toolkit JCL job.

For more information about creating an IMS High Performance Unload default option table, see the topic “Site default options” in the IMS High Performance Unload User’s Guide.

Improving the performance of the load process (IMS HP Load)

If IMS High Performance Load is used for loading data, you can tune and improve the performance of the load process. To do so, provide IMS High Performance Load control statements with the following methods:

- Specify RELOAD.xxxx parameters in the IHCSYSIN DD. RELOAD.xxxx parameters are applied to the load process as FRRIN control statement keywords to control the behavior of the load processing.
- Create an IMS High Performance Load default option table (HPSROPT) with FRRIN control statements that improve the performance of the load processing and concatenate the HPSROPT to the STEPLIB DD of the IMS HALDB Toolkit JCL job.

HPSROPT, if concatenated to the STEPLIB DD, is always referred to. All RELOAD.xxxx parameters in IHCSYSIN DD and applicable FRRIN control statement keywords in HPSROPT are applied to the load process. If the same parameter is present in both IHCSYSIN DD and HPSROPT, for example, RELOAD.HPIO=YES in IHCSYSIN DD and HPIO=N in HPSROPT, the parameter in IHCSYSIN is applied.

For more information about creating an IMS High Performance Load default option table, see the topic “Setting installation default options” in the IMS High Performance Load User’s Guide.

Improving the performance of the image copy process (IMS HP Image Copy)

If IMS High Performance Image Copy is used for creating image copies, you can tune and improve the performance of the image copy process. To do so, provide IMS High Performance Image Copy control statements with the following methods:

- Specify IC.xxxx parameters in the IHCSYSIN DD. IC.xxxx parameters are applied to the image copy process as ICEIN control statement keywords to control the behavior of the image copy processing.
- Create an IMS High Performance Image Copy default option table (FABJGLI0) with ICEIN control statements that improve the performance of the image copy processing and concatenate the FABJGLI0 to the STEPLIB DD of the IMS HALDB Toolkit JCL job.
FABJGLI0, if concatenated to the STEPLIB DD, is always referred to. All IC.xxxx parameters in IHCSYSIN DD and applicable ICEIN control statement keywords in FABJGLI0 are applied to the load process. If the same parameter is present in both IHCSYSIN DD and FABJGLI0, for example, IC.VIC(Y) in IHCSYSIN DD and VIC=N in FABJGLI0, the parameter in IHCSYSIN is applied.

For more information about creating an IMS High Performance Image Copy default option table, see the topic "Setting default values for the FABJMAIN program" in the *IMS High Performance Image Copy User's Guide*. 
Part 10. Troubleshooting

The topics in this section provide you with technical references to help you troubleshoot and diagnose IMS HALDB Toolkit problems.

Topics:

- Chapter 30, “Messages and codes,” on page 297
- Chapter 31, “Gathering diagnostic information,” on page 347
Chapter 30. Messages and codes

This section provides detailed information about IMS HALDB Toolkit messages and codes.

Topics:
• “Return and abend codes” on page 297
• “Trace file or trace panel” on page 297
• “ISPF messages” on page 298
• “Batch messages” on page 298

Return and abend codes

This reference section provides detailed information about IMS HALDB Toolkit return and abend codes.

You might encounter the following return or abend codes during processing.

A return or abend code other than 0 is an unusual condition.

An abend code of U 999 is issued after a subtask abends. The subtask abend code is also shown in the messages.

Either of the following return codes is issued:

0
  Function completed successfully.

4
  One or more of the following is true:
  • Not all functions completed.
  • You may need to perform an IMS online change to complete the requested function.
  • TAKEOVER(DELAY) was specified.

Trace file or trace panel

In a normal situation, a trace file is automatically attached to batch processing.

In the event of an error situation, you should attach the trace file to your error documentation to assist IBM Software Support in resolving the problem.

A trace panel is a screen containing trace information which depicts an error situation. When you submit error documentation, print the screen and attach it to the documentation to assist IBM Software Support.

For more information about the diagnostic information that you should attach when contacting IBM Software Support, see Chapter 31, “Gathering diagnostic information,” on page 347.
ISPF messages

For explanations of ISPF messages, see the appropriate ISPF publication.

Batch messages

This reference section provides detailed information about IMS HALDB Toolkit batch messages.

Message format

IMS HALDB Toolkit messages adhere to the following format:

IHC0nnnnnx

Where:

IHC0
  Indicates that the message was issued by IMS HALDB Toolkit

nnnn
  Indicates the message identification number

x
  Indicates the severity of the message:

  A
  Indicates that operator intervention is required before processing can continue.

  E
  Indicates that an error occurred, which might or might not require operator intervention.

  I
  Indicates that the message is informational only.

  W
  Indicates that the message is a warning to alert you to a possible error condition.

Each message also includes the following information:

Explanation:
  The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
  The System action section explains what the system will do in response to the event that triggered this message.

User response:
  The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

IHC01000E text

Explanation
  The text of this message provides information about the error.

System action
  None.

User response
  None.

IHC01000I text

Explanation
  The text of this message provides information about the error.

System action
  None.
IHC01001E Control cards used in this run

Explanation
Displays the control statements that you supplied.

System action
None.

User response
None. This message is informational.

IHC01002I Utility driver [started | ended | terminated] with error.

Explanation
This message indicates the start or termination of a batch run. Previous messages indicate a possible error reason.

System action
None.

User response
None. This message is informational.

IHC01003I Highest return code is nnnn

Explanation
The highest return code of the utilities and functions is nnnn.

System action
None.

User response
None. This message is informational.

IHC01004E Error return code is nnnn, reason code rrrr

Explanation
A utility function ended with an error. The return code is indicated by nnnn, and the reason code is indicated by rrrr.

System action
The utility has been terminated.

User response
Evaluate the preceding error messages to determine the cause of the problem and resolve the error condition.

IHC01005E Expected continuation not received.

Explanation
The control statements are in error. A continuation was indicated, but no additional control statement was found.

System action
Processing terminates.

User response
Correct the control statement error and resubmit the job.

IHC01006E No commands found.

Explanation
The IHCSYSIN file was specified, but no control statements were specified.

System action
Processing terminates.

User response
Provide the necessary control statements.

IHC01007E Invalid command cmd found in line nnn.

Explanation
The command cmd is invalid. The control statement line is indicated by nnn.

System action
Processing terminates.

User response
Correct the control statement and resubmit the job.

IHC01008E Invalid keyword key found in line nnn.

Explanation
The keyword key is not valid for the specified command.
**System action**
Processing terminates.

**User response**
Correct the control statement and resubmit the job.

**IHC01009E**  Invalid syntax for keyword key in line nnn.

**Explanation**
The keyword requires syntax rules. Syntax rules are: numeric, ddname, dsname, or simply yes, or no.
Message IHC01014I is issued to show the reason for the error.

**System action**
Processing terminates.

**User response**
Correct the control statement and resubmit the job.

**IHC01010E**  Duplicate keyword key in line nnn.

**Explanation**
The keyword key is being used more than once in the same command.

**System action**
Processing terminates.

**User response**
Remove the duplicate keyword and resubmit the job.

**IHC01011E**  No command found in line nnn.

**Explanation**
A command must start within the first 20 bytes of a control statement. No command was found.

**System action**
Processing terminates.

**User response**
Correct the control statement and resubmit the job.

**IHC01012E**  Command cmd requires keyword key.

**Explanation**
The indicated keyword key is required for this command cmd.

**System action**
Processing terminates.

**User response**
Add the keyword and resubmit the job.

**IHC01013E**  Keyword key and key are mutually exclusive.

**Explanation**
Mutually exclusive keywords have been specified.

**System action**
Processing terminates.

**User response**
Correct the control statement and resubmit the job.

**IHC01014I**  Reason is rsn

**Explanation**
This message explains control statement errors. The variable rsn provides information about the control statement errors.

**System action**
None.

**User response**
None. This message is informational.

**IHC01015E**  Keyword key requires keyword key

**Explanation**
Both of the specified keywords are required and must be specified.

**System action**
Processing terminates.

**User response**
Add the missing keyword and resubmit the job.

**IHC01016I**  Command cccccc started/ended/terminated
Explanation
Command cccccc has either started or ended.

System action
None.

User response
None. This message is informational.

IHC01017E Nothing to schedule
Explanation
After all control cards have been checked, there was no command to be processed.

System action
Processing stops.

User response
Keep the output listing and contact IBM Software Support.

IHC01018E No control cards specified.
Explanation
The file IHCSYSIN is empty.

System action
Processing terminates.

User response
Provide control statements.

IHC01019I IMS batch driver started/ended
Explanation
The IMS batch driver component is used to run IMS applications in a shell. This is done to support additional functionality.

System action
None.

User response
None. This message is informational.

IHC01020E DBD nnnnn is in error, reason: rrr
Explanation
The DBD decoder found errors for DBD nnnnn. These errors are probably due to one of the following reasons rrr:

- DBD has logical relation.
- The DBD version is not supported.
- The DBD type is not supported.
- DBD nnnnn is not a valid DBD.
- The DBD name is different from the member name. The member name in the DBD library and the name inside the DBD are different. The name inside the DBD is the valid name.
- DOS does not support this DBD.
- The index DBD has no primary DBD.
- The index DBD has more than one target DBD. IMS HALDB Toolkit does not support multiple target DBDs.
- The target DBD is an IMS HALDB Toolkit DBD, but the index DBD is not.
- The index DBD is an IMS HALDB Toolkit DBD, but the target DBD is not.

System action
Processing stops.

User response
Correct the invalid DBDs and restart the process.

IHC01021E IMS or DBDLIB DD-statment missing
Explanation
The JCL is missing one or both of these statements.

System action
Processing stops.

User response
Add the IMS DD statement describing the appropriate DBDLIBs.

IHC01022E RESLIB not in STEPLIB concatenation
Explanation
The IMS SDFSRESL is not available to this job step.

System action
Processing stops.
User response
Add the IMS SDFSRESL to the STEPLIB.

IHC01023E Unsupported level of IMS is being used

Explanation
IMS HALDB Toolkit is run under an unsupported version of IMS.

System action
Processing stops.

User response
Run IMS HALDB Toolkit with a supported version of IMS.

IHC01024E DBD is not a PSINDEX DBD

Explanation
A HALDB function was requested, but the selected DBD is not a PSINDEX DBD.

System action
The function (step) ends.

User response
Select a PSINDEX DBD. This is a secondary index DBD which has been converted to HALDB.

IHC01025E DBD nnnnn not found

Explanation
DBD nnnnn was requested, but is not in the DBD library.

System action
The job step ends.

User response
Ensure that you are using the correct DBD library; the IMS DD statement is pointing to those files.

IHC01026E KEYLEN + KEYOFF exceeds root key length of nnn

Explanation
The PSEXIT command is used to show the results of the partition selection exit IHCPSEL0.

System action
The job step ends.

User response
Correct the KEYLEN, KEYOFF, or both specifications, and restart the process.

IHC01027E DBD xxxxx is already HALDB

Explanation
The PSEXIT command is used with full function databases to test the functionality and distribution of a partition selection exit. The specified DBD is already HALDB.

System action
The job step ends.

User response
None.

IHC01028E No keys specified

Explanation
The partition selection exit, IHCPSEL0, requires that key strings be specified. No keys were found.

System action
The job step ends.

User response
Provide keys in the //KEYS DD statement.

IHC01029E Error during initialization of nnnnn

Explanation
The partition selection exit, nnnnn, returned an error during its initialization phase.

System action
The job step ends.

User response
If the exit is IHCPSEL0, the reason is located in the messages job log. Otherwise, check with the author of the identified exit to determine the reason for the error.

IHC01030E DBRC not operational
Explanation
DBRC was requested; however, DBRC initialization failed.

System action
Processing stops.

User response
Keep the output listing and contact IBM Software Support.

IHC01031I DBRC subsystem nnnnn signon/ signoff successful/failed

Explanation
This message is displayed at the start or the end of the DBRC connection. nnnnn indicates the specified subsystem name.

System action
None.

User response
If no request to DBRC is required, this message might be appropriate. However, if subsequent errors are displayed, the reason might be an error in DBRC connection.

IHC01032E HALDB master DBD nnnnn is not in the RECON

Explanation
The master DBD definition of a HALDB is kept in the RECON. A HALDB DBD named nnnnn was requested. The RECON does not have a record for this DBD.

System action
Processing stops.

User response
Correct the DBD name if this is the error. Otherwise, you might be using the wrong RECON.

IHC01033E DBD nnnnn is not HALDB

Explanation
The DBD nnnnn is expected to be a HALDB DBD. However, this is not the case.

System action
Processing stops.

User response
You might be using the wrong DBDLIB. If not, you must convert the specified DBD to HALDB.

IHC01034E Partition nnnnn is not in master DBD ddddd

Explanation
Partition nnnnn was requested. However, nnnnn is not defined within its master DBD ddddd.

System action
Processing stops.

User response
Either the partition name or the DBD name is wrong. You might also be using the wrong RECON.

IHC01035I Partition pppp authorized nnnn

Explanation
Partition pppp has been authorized with DBRC. nnnn is the authorization scope. It may be read, read exclusive, update, or exclusive.

System action
The DBRC authorization for the indicated partition has been performed.

User response
None. This message is informational.

IHC01036E Partition pppp not authorized, reason is nn

Explanation
Partition pppp could not be authorized with DBRC. The reason code nn can be found in message DFS047I.

System action
Processing stops.

User response
Make the database available by issuing the appropriate IMS commands.

IHC01037I Partition pppp authorization released
**Explanation**
Partition *pppp* is no longer authorized for the current function.

**System action**
None.

**User response**
None. This message is informational.

---

**IHC01038E**  
Error during START of ISPF, reason code is *xx*

**Explanation**
The ISPF application failed during startup. The code can be 20 to 24.

**System action**
The application terminated.

**User response**
Apply the appropriate action based on the reason code:
- Reason code 20: A previous error occurred.
  - Save the trace screen and contact IBM Software Support.
- Reason code 21: A trace screen was displayed.
  - Save the trace screen and contact IBM Software Support.
- Reason code 22 to 24: An internal error occurred.
  - Contact IBM Software Support.

---

**IHC01039E**  
Orphaned split data is *nnn*

**Explanation**
When IMS Online Reorganization Facility scanned the primary database to build a shadow copy of the primary index, it detected that there were data portions of split root segments that did not have the corresponding segment portions.

**System action**
The IMS Online Reorganization Facility job continues.

**User response**
The number of orphaned split data segments should be small. If you receive this message and the number that is displayed as *nnn* is 10 or more, it indicates that the primary database might have a problem. Check the primary database.

---

**IHC01040I**  
Data set *dsname* not found

**Explanation**
Dynamic allocation returned an error when allocating the data set named *dsname*. The data set was not found.

**System action**
If the data set is essential, the process terminates with error.

**User response**
The data set name comes from the MDALIB or from the RECON. Correct the data set name in those places and resubmit the job.

---

**IHC01041I**  
Data set *dsname* in use

**Explanation**
Dynamic allocation returned an error when allocating the data set. The data set is allocated in an exclusive state by a different job.

**System action**
The process terminates.

**User response**
Wait until the other job releases the data set and resubmit your job.

---

**IHC01042E**  
Subtask *task id* has terminated abnormally.

**Explanation**
The functions of IMS HALDB Toolkit run as subtasks. Some of them might be in parallel. The subtask did not complete normally.

**System action**
The process is terminated. The final abend code will be U999.

**User response**
Collect the job output, including the dump, and contact IBM Software Support.

---

**IHC01043E**  
Abend code is *code*
Explanation
This message follows IHC01042E to display the abend code.

System action
The process terminates.

User response
Collect the job output, including the dump, and contact IBM Software Support.

IHC01044E Unexpected end of service task

Explanation
The service task task terminated unexpectedly.

System action
The process terminates.

User response
Collect the job output, including the dump, and contact IBM Software Support.

IHC01045I Return code is nnnn

Explanation
The command ended with return code nnnn.

System action
None.

User response
None. This message is informational.

IHC01046E Data set nnnn is migrated

Explanation
The data set named nnnn could not be accessed.

System action
Processing stops.

User response
Recall the prior data set and rerun it.

IHC01047E Partition selection module nnnn not found

Explanation
The PSEXIT command could not find the specified partition selection exit.

System action
Processing stops.

User response
Provide the library containing the exit in the STEPLIB.

IHC01048I Partition selection size set to 2048MB

Explanation
Simulation, conversion, or maintenance of a HALDB was requested, specifying a fixed number of target partitions. However, one of the following conditions occurred:

ANALYZE
The size of the partitions would exceed 8 GB.

CONVERT
The size of the partitions would exceed 4 GB.

MAINTAIN
- For a VSAM or OSAM HALDB whose maximum data capacity is 4 GB, the size of the partitions would exceed 4 GB.
- For an OSAM HALDB whose maximum data capacity is 8 GB, the size of the partitions would exceed 8 GB.

System action
The selection of a fixed number of partitions is ignored. Processing continues with partition size set to 2 GB. This increases the number of partitions beyond the requested number.

User response
None. The simulation, conversion, or maintenance is valid. It is not necessary to restart with a different parameter.

IHC01049E Pointer error detected. Index must be rebuilt.

Explanation
The index pointer healer detected that an index EPS pointer requires healing. The corresponding ILE (the record in the target partition ILDS) was not found.

System action
Index pointer healer stops.
User response
Rebuild the invalid index or ILDS. If the index is invalid, rebuild it using either recovery or a PSINDEX rebuild tool. If the ILDS is invalid, rebuild it using the ILDS tool.

IHC01050E DD statement ddname not found in JCL

Explanation
The DD statement named ddname is required. It is not present in the JCL.

System action
Processing terminates.

User response
Provide the specified DD statement and resubmit the job.

IHC01051E HD unload file is from HALDB database

Explanation
The PSEXIT command is using an unload file which is already from a HALDB.

System action
Processing stops.

User response
Provide an unload file from a full-function database.

IHC01052E Error from Sort

Explanation
Standard sort is used. The sort returned with an error.

System action
Processing terminates.

User response
Collect the sort job output, including the dump, and contact IBM Software Support.

IHC01053E VSAM func error DD=ddname, RC=rc, RPL feedback=fdbk.

Explanation
The indicated VSAM function experienced an error.

System action
Processing terminates.

User response
Collect the VSAM job output, including the dump, and contact IBM Software Support.

IHC01054E Key table xxxxx not in project KSDS

Explanation
This is a should-not-occur situation.

System action
Processing stops.

User response
Keep the output listing and contact IBM Software Support.

IHC01055E Errors in control cards.

Explanation
This message is preceded by other messages that identify errors in control statements.

System action
Processing terminates.

User response
Correct control statement errors and resubmit the job.

IHC01056E Project KSDS is invalid

Explanation
The project KSDS has been provided through the IHCPROJ DD statement. This data set does not contain the required project information.

System action
Processing stops.

User response
Keep the output listing, and contact IBM Software Support. This JCL has been created by a conversion or maintenance project.

IHC01057E Data set dsname ignored
**Explanation**
The IDCAMS rebuild process is attempting to retrieve the data set attributes from existing data sets. The specified data set name `dsname` could not be found.

**System action**
No IDCAMS statements are created for the target file.

**User response**
You must manually allocate the file that is to be copied.

**IHC01058I** 
No pointer to heal in file `ddname`

**Explanation**
The pointer healer function was requested. The file indicated that its DD name did not have a pointer to heal.

**System action**
None.

**User response**
None. This message is informational.

**IHC01059I** 
File `ddname` has `nn1` pointer. `nn2` needed healing.

**Explanation**
The pointer healer function was requested. The index file `ddname` has `nn1` pointer. However, only `nn2` pointer needed healing.

**System action**
None.

**User response**
None. This message is informational.

**IHC01060I** 
Total records in index `xxxxx` are `nnnn`

**Explanation**
The message displays the number of records in index `xxxxx`.

**System action**
None.

**IHC01061I** 
Initial load for DBD `dbd`

**Explanation**
The specified DBD is loading the database using a `PROCOPT=L PSB`.

**System action**
None.

**User response**
None. This message is informational.

**IHC01062I** 
Loading index DBD `dbd`

**Explanation**
While the primary database is loaded (see `01061I`), the secondary index `dbd` is also loaded.

**System action**
None.

**User response**
None. This message is informational.

**IHC01063I** 
Loading index file `ddname`

**Explanation**
The PSINDEX file `ddname` is loaded as part of loading the secondary index.

**System action**
None.

**User response**
None. This message is informational.

**IHC01064I** 
Number of records in file `ddname` is `nnn`

**Explanation**
The PSINDEX file `ddname` has been loaded. The number of records in this file is `nnn`.

**System action**
None.
User response
None. This message is informational.

IHC01065I Application program pgm started/ended
Explanation
The application program pgm is participating in the PROCOPT=L support function. The message shows the start and the end of the program.
System action
None.
User response
None. This message is informational.

IHC01066I PSB is psb
Explanation
The message shows the PSB used by this application.
System action
None.
User response
None. This message is informational.

IHC01067I Application program return code is nnnn
Explanation
The application ended with the specified return code.
System action
None.
User response
None. This message is informational.

IHC01068I IMS version is vers
Explanation
The message shows the IMS version that is currently being used.
System action
None.
User response
None. This message is informational.

IHC01069I DDname ddn is not part of the DBD dbd
Explanation
The DD name ddn was found in the MDA member, but does not belong to the given DBD.
System action
None required; however, you might want to check the DBD to ensure that all other members belong there.
User response
None. This message is informational.

IHC01070E DBD dbd is OSAM, but file allocated is VSAM
Explanation
During data set verification, a mismatch was found between the DBD type and the file type.
System action
Processing stops.
User response
Verify that both your MDA library and your DBD library are correct.

IHC01071E DBD dbd is VSAM, but file allocated as OSAM
Explanation
During data set verification, a mismatch was found between the DBD type and the file type.
System action
Processing stops.
User response
Verify that both your MDA library and your DBD library are correct.

IHC01072E File ddn is OSAM/KSDS/ESDS but should be OSAM/KSDS/ESDS
Explanation
The DD name ddn has an invalid file type.
**System action**
Processing stops.

**User response**
Assign the correct data set to the file indicated by ddn.

**IHC01073I**  
IMS region controller started or ended

**Explanation**
This message is issued to indicate the start or the end of an IMS Batch region.

**System action**
None.

**User response**
None. This message is informational.

**IHC01074I**  
Sorting index file ddn

**Explanation**
This part of the initial load support function. The PSINDEX file ddn is now being sorted and created.

**System action**
None.

**User response**
None. This message is informational.

**IHC01075E**  
Database record key out of range

**Explanation**
The current function unloads a DBD participating in a user-partitioning conversion, when multiple identical DBDs are converted to one HALDB. The high-level qualifier key of each DBD has been specified. The unload function of this DBD now detects that a key is not within its boundaries.

**System action**
Processing stops.

**User response**
Begin the boundary selection process again. The initial boundary selection might be incorrect.

**IHC01076I**  
Key: kkkkkkkkkk

**Explanation**
This message is related to IHC01075E. It shows the key in process.

**System action**
Processing stops.

**User response**
Begin the boundary selection process again. The initial boundary selection might be incorrect.

**IHC01077I**  
Low key: kkkkkkkkkkkkkkk

**Explanation**
This message is related to IHC01075E. It shows the lowest key that this DBD is allowed to accept.

**System action**
Processing stops.

**User response**
Begin the boundary selection process again. The initial boundary selection might be incorrect.

**IHC01078I**  
High key: kkkkkkkkkkkkkkk

**Explanation**
This message is related to IHC01075E. It shows the highest key that this DBD is allowed to accept.

**System action**
Processing stops.

**User response**
Begin the boundary selection process again. The initial boundary selection might be incorrect.

**IHC01079I**  
HSSR region controller started or ended

**Explanation**
This message is issued during the unload phase. HSSR is used to assist the unload function.

**System action**
None.

**User response**
None. This message is informational.
IHC01080I  Start of ddname listing

Explanation
The specified file is being listed. The possible DD names are DFSVSAMP and DFSHA1DB.

System action
None.

User response
None. This message is informational.

IHC01081I  End of ddname listing

Explanation
This message indicates that the listing of the specified file has ended.

System action
None.

User response
None. This message is informational.

IHC01082I  Unloading DBD dbd

Explanation
The database dbd is currently being unloaded.

System action
None.

User response
None. This message is informational.

IHC01083I  Loading DBD dbd

Explanation
The database dbd is currently being loaded.

System action
None.

User response
None. This message is informational.

IHC01084I  nnnn database records read [FINAL]

Explanation
This is a progress message that is issued every 250,000 database records (root segments). The indication of FINAL shows the total amount of database records.

System action
None.

User response
None. This message is informational.

IHC01085E  Error in partition part part, data set ddn

Explanation
This message is accompanied by 01086E or 01087E.

System action
Processing stops.

User response
Keep the output listing, and contact IBM Software Support.

IHC01086E  Expected partition part part

Explanation
The partitioning scheme is out-of-order.

System action
Processing stops.

User response
Keep the output listing, and contact IBM Software Support.

IHC01087E  Status code cc received

Explanation
The status code cc was received as a response from an IMS call.

System action
Processing stops.

User response
The status code may indicate an unavailable database. If this is the case, make the database available and
rerun. In all other cases, keep the output listing and contact IBM Software Support.

**IHC01088E** Utility terminates with error

**Explanation**
An error condition has occurred. Previous messages have been issued to explain the error.

**System action**
Processing stops.

**User response**
Proceed as instructed in previous messages that were issued to explain the error.

**IHC01089I** Analyzing DBD *dbdname*

**Explanation**
The specified DBD is analyzed.

**System action**
None.

**User response**
None. This message is informational.

**IHC01090E** Last partition is already empty

**Explanation**
The last partition does not contain any data.

**System action**
The request to add an empty partition is discarded.

**User response**
None.

**IHC01091E** MDA *dbdname* DDname *ddname* not found

**Explanation**
The MDA member *dbdname* does not have the specified DD defined.

**System action**
The process terminates.

**User response**
Add the specified DD statement and resubmit the job.

**IHC01092I** DBDGEN complete for DBD *dbdname*

**Explanation**
The specified DBD has been compiled and linked.

**System action**
None.

**User response**
None. This message is informational.

**IHC01093E** DBD *dbdname* has external logical relationship.

**Explanation**
The specified DBD has a logical relationship to a different DBD. This type of relationship is not supported by IMS Online Reorganization Facility therefore, the specified DBD cannot be reorganized with IMS Online Reorganization Facility.

**System action**
Processing terminates.

**User response**
None.

**IHC01094E** DBD *dbdname* has HALDB OLR active.

**Explanation**
IMS OLR is currently reorganizing this partition. IMS Online Reorganization Facility cannot run with OLR active. This situation can also occur when OLR is
paused. The indication is that both the A-J and M-V data sets are active.

**System action**

Processing terminates.

**User response**

Reorganize a different partition or wait until OLR completes to resubmit your job.

**IHC01096E**  
**DBD dbdname is HALDB with logical relationship**

**Explanation**

The specified DBD is a HALDB and also has a logical relationship. IMS Online Reorganization Facility can process a HALDB with a logical relationship only if all partitions are processed in the IMS Online Reorganization Facility job.

**System action**

Processing terminates.

**User response**

To process all partitions in one IMS Online Reorganization Facility job, specify the PARTITION(*) keyword and resubmit the job.

**IHC01097E**  
**DBD dbdname is not registered.**

**Explanation**

The specified DBD is not in DBRC. IMS Online Reorganization Facility requires that the DBDs must be registered. This requirement also applies to the index DBDs.

**System action**

Processing terminates.

**User response**

Register this DBD and all its index DBDs and resubmit the job.

**IHC01098E**  
**DBD dbdname has conflicting DBRC definitions.**

**Explanation**

The specified DBD does not match its DBRC definition.

**System action**

Processing terminates.

**User response**

Compare your DBD to a LIST.RECON of that DBD. Correct the errors and resubmit the job.

**IHC01099E**  
**DBD dbdname has dbrc status.**

**Explanation**

The specified DBD has a DBRC status that does not allow the processing of this DBD.

**User response**

Correct the DBRC exception and resubmit the job.

**IHC01100I**  
**process started in sub address space**

**Explanation**

The specified process started in a dependent address space.

**User response**

None. This message is informational.

**IHC01101I**  
**process ended in sub address space, return code code**

**Explanation**

The specified process ended in a dependent address space.

**User response**

None. This message is informational.

**IHC01102E**  
**Sub address space terminated abnormally**

**Explanation**

The dependent address space did not end normally.
System action
The primary address space terminates. The messages will be displayed in the message file.

User response
This message is accompanied by another message that indicates the cause of the error. If you cannot resolve the problem, contact IBM Software Support.

IHC01103E DBD dbdname does not have DBDS ddname in DBRC

Explanation
The specified DBD does not have the DBDS record defined in DBRC. The DBD definition in DBRC is incomplete.

System action
The process terminates.

User response
Add the specified DBDS to the RECON. Use the INIT.DBDS function of the DBRC utility.

IHC01104E Dynamic allocation failed, DSN dsname

Explanation
The data set that is indicated by dsname is probably a database data set. The data set name was obtained from the RECON. Additional messages explain the reason for the allocation failure.

System action
Processing terminates.

User response
Correct the reason for the allocation failure and resubmit the job.

IHC01105E DSN dsname is too long.

Explanation
The length of the specified database data set name exceeds the maximum allowable length. Database data set names are appended with ".S", which means that database data set names can be a maximum of 42 characters.

System action
Processing terminates.
System action
The process continues.

User response
None. This message is informational.

IHC01110E  HIDAM root segment has compressed key.

Explanation
The root segment of a HIDAM or PHIDAM database is compressed. The compression is not only DATA, but also KEY. IMS Online Reorganization Facility does not allow compressed root keys for HIDAM databases.

System action
Processing terminates.

User response
The database must not have key compression. Remove the key compression by using the offline utilities and perform a DBD change between unload and reload.

IHC01111E  Software for product not available.

Explanation
The named product is required for IMS Online Reorganization Facility to do the reorganization.

System action
Processing terminates.

User response
Add the program library for the specified product to the STEPLIB. Make sure that the library is APF authorized.

IHC01112I  Reloading DD ddname DSN dsname

Explanation
The target data sets that are identified in this message will be used to load the database.

System action
None.

User response
None. This message is informational.

IHC01113E  OPEN failed for DDname ddname.

Explanation
The OPEN operation failed for the DD name indicated by ddname.

System action
Processing terminates.

User response
Collect the output and contact IBM Software Support.

IHC01114I  Secondary index build started or ended.

Explanation
This message indicates that a secondary index build process has either started or has ended.

System action
None.

User response
None. This message is informational.

IHC01115I  DDname ddname found in JCL. It is deallocated.

Explanation
The specified DD statement is allocated internally.

System action
None.

User response
Remove the DD statement from the JCL and resubmit the job.

IHC01116I  Shared index written with index DBD dbdname.

Explanation
The shared secondary index will be assigned to the first DBD.

System action
None.

User response
None. This message is informational.
IHC01117I Pre Reorganization Utility started or ended

Explanation
This message indicates that the prereorganization utility has either started or has ended.

System action
None.

User response
None. This message is informational.

IHC01118I Prefix Resolution started or ended.

Explanation
This message indicates that the prefix resolution has either started or has ended.

System action
None.

User response
None. This message is informational.

IHC01119I Prefix Update started or ended.

Explanation
This message indicates that the prefix update has either started or has ended.

System action
None.

User response
None. This message is informational.

IHC01120E Primary DBD dbdname is NONRECOV.

Explanation
The primary DBD is defined as NONRECOV in DBRC. This is not permitted.

System action
Processing terminates.

User response
Correct the ICDDN keyword and resubmit the job.

IHC01121E DBD dbdname is not supported for this function.

Explanation
The specified DBD has an unsupported DBD type. HSAM, DEDB, or Index DBDs are not supported.

System action
Processing terminates.

User response
The specified DBD cannot be reorganized with this tool.

IHC01122I IC ddname specified but ignored.

Explanation
The specified database DDNAME was specified to be image copied. However, the DBD is defined as NONRECOV. Therefore, an image copy is unnecessary.

System action
None.

User response
If you need an image copy, run the offline utility.

IHC01123E IC ddname is not a valid DDname.

Explanation
The ICDDN keyword specifies a database DD statement. Neither the Primary DBD nor its index DBDs contain this DD.

System action
Processing terminates.

User response
Correct the ICDDN keyword and resubmit the job.

IHC01124E IC ddname Ddname icddn specified, but not in JCL.

Explanation
The ICDDN keyword specifies an image copy DD icddn for the database DD ddname. The icddn was not found in the JCL.
**System action**
Processing terminates.

**User response**
Provide a DD statement for the image copy and resubmit the job.

**IHC01125E** Duplicate DDname ddname in ICDDN keyword.

**Explanation**
The ICDDN keyword is used to describe the image copies. The specified DDNAME is used more than once.

**System action**
Processing terminates.

**User response**
Provide a unique DD statement for each image copy and resubmit the job.

**IHC01126E** Inconsistent shared index dbdname DBD. Reason rsn.

**Explanation**
Shared secondary indexes are being used. They must point to the same primary DBD to be supported by IMS Online Reorganization Facility. Additionally, all shared secondary indexes must have the same DBDS in DBRC.

**System action**
Processing terminates.

**User response**
IMS Online Reorganization Facility does not support shared secondary indexes that point to different primary DBDs.

**IHC01127E** No IC1 found for ddname.

**Explanation**
The ICDDN keyword for the database DD ddname does not have a primary image copy specified.

**System action**
Processing terminates.

**User response**
You cannot specify a secondary IC without a primary IC. Change the ICDDN keyword and resubmit the job.

**IHC01128E** IC ddname DSN for icddn too long.

**Explanation**
Dynamic allocation for image copy data sets is being used. The generated ddname is too long.

**System action**
Processing terminates.

**User response**
Create a shorter IC data set name and resubmit the job.

**IHC01129E** IC DDName ddname is for database.

**Explanation**
The ICDDN keyword specified a database as target for image copy.

**System action**
Processing terminates.

**User response**
Provide a unique file for the image copy and resubmit the job.

**IHC01130E** DSname for ddname is the same as for ddname.

**Explanation**
The image copy data sets that are identified by the ICDDN keyword have different DD statements, but have the same data set name.

**System action**
Processing terminates.

**User response**
Provide different data sets for the image copies and resubmit the job.

**IHC01131E** dsname for icddn is the same as for database ddname.

**Explanation**
The data set name that was used for an image copy is a database data set name.
System action
Processing terminates.

User response
Provide a different data set name for the image copy and resubmit the job.

IHC01132E  GDG *gdgbase* not defined.

Explanation
GDG was specified as a data set name for image copy. However, the GDG base does not exist.

System action
Processing terminates.

User response
Provide a DBD and resubmit the job.

IHC01133E  Index DBD *dbdname* for primary DBD *dbdname* in error.

Explanation
The index DBD that is indicated by *dbdname* for the primary DBD that is indicated by *dbdname* is in error.

System action
Processing terminates.

User response
Create the GDG base and resubmit the job.

IHC01134E  NEWDBD DD not in JCL.

Explanation
The NEWDBD keyword was specified in the control statements. The specified DD statement has not been provided.

System action
Processing terminates.

User response
Collect the output, the specified DBD source, and contact IBM Software Support.

IHC01135E  No DBD specified.

Explanation
No DBD keyword was specified in the control statements.

System action
Processing terminates.

User response
Provide the DD statement that specifies the library that contains the changed DBDs and resubmit the job.

IHC01136E  Multiple REORG commands specified

Explanation
More than one REORG command was found in IHCSYSIN.

System action
Processing terminates.

User response
Run each REORG as separate job step.

IHC01137E  DBD *dbdname* compare error.
Reason is: *rsn*

Explanation
The NEWDBD keyword was specified in the control statement. The old and new DBD are compared. The new DBD contains changes that are not supported. The reason text provides an explanation.

System action
Processing terminates.

User response
The changes that can be made to the DBD are restricted when IMS Online Reorganization Facility is used. Use offline utilities for this reorganization.

IHC01138E  Primary DBD *dbdname* is not in NEWDBD.

Explanation
The NEWDBD keyword was specified in the control statements. However, the library does not have the primary DBD in it.

System action
Processing terminates.
User response
If you intended to make a DBD change, move your changed DBD to the file that is identified by the NEWDBD keyword.

Explanation
Post reorganization processing failed in phase:

IHC01139E

User response
Post reorganization processing failed in phase:

User response
The takeover process failed.

System action
Processing terminates.

User response
Use the RESTART parameter to restart the takeover process. The database is still in prohibit authorization status. Do not change the prohibit authorization status. The takeover phase must complete. The takeover process will restart where the last operation stopped.

IHC01140I

Explanation
This informational message is issued at the point that the RESTART function continues the takeover process.

User response
None. This message is informational.

IHC01141I

Explanation
This message is issued during restart. The last phase completed is indicated by phase.

User response
None. This message is informational.

IHC01142E

Explanation
During the takeover phase, the data sets are to be renamed. In this case, none of the data sets were found.

System action
The process terminates.

User response
This error typically occurs during a RESTART process. Because a database data set has been deleted, the database must be recovered.

IHC01143E

Explanation
A secondary index has been changed, but the new DBD has not been provided.

System action
The process terminates.

User response
Correct the changed DBD and resubmit the job.

IHC01144E

Explanation
The NEWDBD keyword has been specified. The new DBD added external logical relationships which are not supported.

System action
Use offline utilities for this process.

IHC01145I

Explanation
This message is issued after unload has completed.

User response
None. This message is informational.
**IHC01146I**  
_Prior job _jobname at time for DBD dbdname in phase phase_

**Explanation**

This message indicates a pending restart. A previous job ran at the specified time for the specified DBD and stopped at the specified phase.

**System action**

None.

**User response**

None. This message is informational.

**IHC01147I**  
_(param) specified for this execution._

**Explanation**

The RESTART function is used.

**System action**

None.

**User response**

None. This message is informational.

**IHC01148I**  
_DBD dbdname has non-unique segments_

**Explanation**

The DBD has segment types that do not have a sequence field or that have a non-unique sequence field.

**System action**

None.

**User response**

None. This message is informational.

**IHC01149E**  
_IMSACB DD required with NEWDBD and ONLINECHANGE(Y)._  

**Explanation**

The new DBD will be propagated to the online system, which requires the staging library ACBLIB.

**System action**

Processing terminates.

**User response**

Add the ACBLIB DD to the JCL and resubmit the job.

**IHC01150E**  
_Invalid attrib for ddname DD_

**Explanation**

The attributes for a KSDS are invalid.

**System action**

The process terminates.

**User response**

Correct the attributes for the shadow data sets and resubmit the job.

**IHC01151I**  
_Temporary RECON created or deleted._

**Explanation**

A HALDB partition was specified. A temporary RECON was created to define the partitions and the shadow data set names. This RECON is used for the reorganization process.

**System action**

None.

**User response**

None. This message is informational.

**IHC01152E**  
_NEWDBD specified with HALDB database._

**Explanation**

IMS Online Reorganization Facility does not support DBD changes for HALDB databases.

**System action**

Processing terminates.

**User response**

Use an offline utility and reorganize all partitions.

**IHC01153E**  
_ddname DD cannot be a temporary data set._

**Explanation**

A temporary data set was specified for the indicated DD.
**IHC01154E** Unable to load module *modname*.

**Explanation**
The specified module *modname* was not found.

**User response**
Increase the size of the specified data set and resubmit the job.

**IHC01155I** Rebuilding primary index.

**Explanation**
A HIDAM or PHIDAM database is being used. The primary index is created in the shadow data set.

**User response**
Make the user exit available in the JCL and resubmit the job.

**IHC01156E** Error creating interim LOG

**Explanation**
IMS Online Reorganization Facility was unable to allocate a data set for use as a batch log during the apply process. The allocation parameters of this interim data set are based on the IEFRDER DD statement in the JCL.

**User response**
Review the preceding messages to determine why the allocation failed. Resolve the allocation problems and resubmit job.

**IHC01157E** Shadow data set for *ddname* too small

**Explanation**
The space allocation for the specified predefined shadow data set was insufficient.

**User response**
Increase the size of the specified data set and resubmit the job.

**IHC01158E** Partition keyword required for HALDB

**Explanation**
A HALDB was specified; however, no partition was specified. You must specify the partition that you want reorganized.

**User response**
Specify a partition with the PARTITION IHCSYSIN DD statement keyword and resubmit the job.

**IHC01159E** Invalid component DSN *dsname*

**Explanation**
The specified *dsname* is a component name of a VSAM cluster. The *dsname* is too long to use to create shadow data sets.

**User response**
Shorten the data set name and resubmit the job.

**IHC011560E** Primary DSN *dsname* and shadow have different attributes

**Explanation**
Preallocated shadow data sets were used. The data set attributes of the shadow data sets must match the original data sets. The specified data set attributes and the attributes of the shadow data sets do not match.

**User response**
Review the preceding messages to determine why the allocation failed. Resolve the allocation problems and resubmit job.
User response
Provide the correct attributes. If this data set is an index data set, you probably specified the wrong keylen, key offset, or record length and resubmit the job.

IHC01161E  HALDB partition name is on M-V data sets

Explanation
The partition that is identified by name is currently on the M-V data sets. IMS Online Reorganization Facility was unable to create a copy of the data sets on the shadow file.

System action
IMS Online Reorganization Facility processing terminates.

User response
Use an offline reorganization or another IMS Online Reorganization to switch the active data sets, to make them the A-J data sets, and resubmit the job.

IHC01162E  Invalid subparameter for PTRCHECK keyword

Explanation
The PTRCHECK keyword has a Y or N in the first position and up to four additional parameters. The specified parameters are invalid.

System action
The process terminates.

User response
Provide valid parameters for the PTRCHECK keyword and resubmit the job.

IHC01163E  Pointer error detected

Explanation
IMS High Performance Pointer Checker detected a pointer error during the image copy process of the newly reorganized shadow database data sets.

System action
Processing terminates.

User response
Collect the job output, including the IMS High Performance Pointer Checker output, and contact IBM Software Support.

IHC01164E  Dynamic allocation failed, DD ddname

Explanation
IMS Online Reorganization Facility was unable to dynamically allocate a required DD. Messages that are issued prior to this one explain the reason for the allocation failure.

System action
Processing terminates.

User response
Correct the reason for the allocation failure and resubmit the IMS Online Reorganization Facility job.

IHC01165E  Invalid PARTITION specified

Explanation
A name was entered in the PARTITION keyword, but the partition name is not part of the master DBD.

System action
Processing terminates.

User response
Correct the partition name and resubmit the IMS Online Reorganization Facility job.

IHC01166I  DBD dbdname has internal logical relationship

Explanation
This is an informational message that informs you that the dbdname that you specified contains at least one internal logical relationship.

System action
Processing continues. IMS Online Reorganization Facility performs any prefix resolution and update processing that is required for the process that is being performed.

User response
None. This message is informational.

IHC01169E  More than 255 RAPS
**Explanation**
More than 255 RAPS have been specified for a partition, which exceeds the limit in IMS.

**System action**
The process terminates.

**User response**
Specify a smaller amount of RAPS.

**IHC01170E**  **Byte limit too large**

**Explanation**
The byte limit exceeded the maximum size, which is 16 MB.

**System action**
The process terminates.

**User response**
Specify a smaller byte limit.

**IHC01171E**  **DBD dbdname has logical relationship**

**Explanation**
The purpose of the current function is to convert an entire DBDLIB. However, this function does not allow for logically related DBDs.

**System action**
The DBD is excluded from this process.

**User response**
Specify a primary DBD.

**IHC01172I**  **DBD dbdname was excluded, reason is: reason**

**Explanation**
The current function is to convert an entire DBDLIB. The specified DBD will be excluded from this function due to one or more of the following reasons:

- Primary database is missing
- MDA library member missing
- MDA DDname not in member
- Data set not cataloged
- Index DBD in error

- DBD construct error
- DBD is not supported
- DBD is HALDB
- DBD has logical relation
- Primary index is missing
- Secondary index is missing

**System action**
The process terminates.

**User response**
When this message is issued, it likely indicates that there is a pointer error in the original database data set. Run IMS High Performance Pointer Checker or an equivalent tool against the original database to determine the pointer errors. Resolve the pointer errors and resubmit the IMS Online Reorganization Facility job.

**IHC01173I**  **DBD dbdname is an index**

**Explanation**
The specified DBD is a PSINDEX or a secondary index. The selected function does not allow for an index DBD.

**System action**
The process terminates.

**User response**
Use a different method to process this DBD.

**IHC01174E**  **Orphaned split segment found**

**Explanation**
When scanning the primary database to build a shadow copy of the primary index, IMS Online Reorganization Facility detected that there was a root that had been split, and the pointer to the data portion was invalid.

**System action**
Processing terminates.

**User response**
When this message is issued, it likely indicates that there is a pointer error in the original database data set. Run IMS High Performance Pointer Checker or an equivalent tool against the original database to determine the pointer errors. Resolve the pointer errors and resubmit the IMS Online Reorganization Facility job.

**IHC01175E**  **All partitions required for NONRECOV DBD**
**Explanation**
A nonrecoverable HALDB was specified in the DBD keyword. The command that was specified requires that IMS Online Reorganization Facility change the database to be recoverable during the IMS Online Reorganization Facility processing. IMS Online Reorganization Facility can be run only at the master DBD level for a HALDB, so all partitions must be included in the IMS Online Reorganization Facility processing.

**System action**
Processing terminates.

**User response**
Either remove the PARTITION keyword from the command so that all partitions are processed, or manually change the DBD to recoverable and resubmit the IMS Online Reorganization Facility job.

**IHC01176E Data set found empty**

**Explanation**
This message is preceded by IHC01085, which identifies the primary database DDname and DSNname. One record containing the partition ID and the reorg number should be found.

**System action**
The process terminates.

**User response**
Either remove the PARTITION keyword from the command so that all partitions are processed, or manually change the DBD to recoverable and resubmit the IMS Online Reorganization Facility job.

**IHC01177E Shadow data set dsname defined as NOREUSE but data set is not empty**

**Explanation**
The specified data set must be empty.

**System action**
The process terminates.

**User response**
Either specify the data set as REUSE or DELETE/DEFINE it prior to this process.

**IHC01178E Dynamic allocation limit reached. Specify larger DYNAMNBR.**

**Explanation**
The maximum dynamic allocation limit has been reached.

**System action**
The process terminates.

**User response**
Specify the DYNAMNBR parameter on your EXEC statement. A value of DYNAMNBR=999 typically resolves this problem.

**IHC01179E VIO has been allocated to ddname**

**Explanation**
The current process does not support VIO data sets.

**System action**
The process terminates.

**User response**
Specify a unit name that is not VIO. Use the IHCEUNIT member in SIHCSAMP file to locate other unit names that are non-VIO.

**IHC01180E Sort work ddname has not enough disk space**

**Explanation**
*ddname* cannot allocate enough sort work space. The system might be low on work space.

**System action**
The job fails.

**User response**
Override the DD with sufficient disk space so that the system can allocate enough sort work space for the DD.

**IHC01181W ORF must take IC for ONLINE(Y) work. ICOFF(N) set.**

**Explanation**
ICOFF(N) must be set to process an online database. IMS HALDB Toolkit changed the ICOFF keyword to ICOFF(N).

**System action**
ICOFF(N) is set and processing continues.
User response
None.

IHC01183E All partitions required for NOOSAM8G(Y)

Explanation
IMS HALDB Toolkit found the NOOSAM8G(Y) parameter on the MAINTAIN command but no PARTITION(*) parameter. You must specify PARTITION(*) when you specify the NOOSAM8G(Y) parameter.

System action
The process terminates.

User response
Either remove the NOOSAM8G(Y) parameter from the command or specify PARTITION(*)

IHC01184E NOOSAM8G(Y) cannot be specified for a database registered as NOOSAM8G in RECON

Explanation
The NOOSAM8G(Y) parameter cannot be specified for a database that is registered as NOOSAM8G in the RECON data sets.

System action
The process terminates.

User response
Remove the NOOSAM8G(Y) parameter from the command.

IHC01185E PARTSIZE must be less than 4096 for a database registered as NOOSAM8G in RECON

Explanation
The PARTSIZE value must be less than 4096 for a database that is registered as NOOSAM8G in the RECON data sets.

System action
The process terminates.

User response
Specify a value that is less than 4096 for PARTSIZE.

IHC01186E PARTSIZE must be less than 4096 when you specify NOOSAM8G(Y)

Explanation
The PARTSIZE value must be less than 4096 when you specify NOOSAM8G(Y).

System action
The process terminates.

User response
Either remove the NOOSAM8G(Y) parameter or specify a value that is less than 4096 for PARTSIZE.

IHC01188E DBRCOUT for a non-HALDB requires DSNPREF

Explanation
The database that is identified from the DBD parameter is a non-HALDB. When a non-HALDB is provided as the input for ANALYZEPART and the DBRCOUT parameter is specified, the DSNPREF parameter must also be specified.

System action
The process terminates.

User response
Specify the DSNPREF parameter and resubmit the job.

IHC01189E ddname is not APF authorized

Explanation
One or more libraries in the ddname concatenation are not APF authorized.

System action
The process terminates.

User response
APF authorize all the libraries that are concatenated to the ddname and rerun the job.

IHC01200E FROMDBD ddname1 TODBD dbdname2 compare failed: reason

Explanation
The merge process detected one or more errors. Potential reasons include:
- DBD names are identical
• Segment structure is different
• Segment definition is different
• DBD type is different
• DBD has secondary index
• DBD has logical relation
• DBD has different partition selection exits
• IHCPSEL0 is defined different

System action
The process terminates.

User response
None. Merging these two HALDBs is not possible.

IHC01201E  DBD ddname is PSINDEX

Explanation
The specified DBD is an index DBD.

System action
The process terminates.

User response
A PSINDEX DBD cannot be specified for merging.

IHC01202E  PGM name not found

Explanation
The specified program was not found.

System action
The process terminates.

User response
Correct the program name and resubmit the job.

IHC01203E  PSB name not found

Explanation
The specified PSB was not found.

System action
The process terminates.

User response
Correct the PSB name and resubmit the job.

IHC01204E  PSB not found or valid

Explanation
The specified PCB is not in the PSB or does not have PROCOPT=L.

System action
The process terminates.

User response
Correct the PSB/PCB parameter and resubmit the job.

IHC01205E  DFSRESLB DD is required to MAINTAIN PSINDEX.

Explanation
When the MAINTAIN function processes PSINDEXes, the function uses DFSURGL0 (HD Reorganization Reload utility) in the DFSRESLB DD to reload databases. Because the DFSRESLB DD statement is not coded in the JCL, IMS HALDB Toolkit attempted to dynamically allocate the DFSRESLB DD statement using the IMS RESLIB library. However, the IMS RESLIB library containing IMS SVC modules was not found in the STEPLIB concatenation so IMS HALDB Toolkit did not allocate the DFSRESLB DD statement.

System action
Processing terminates.

User response
Specify the IMS RESLIB library containing IMS SVC modules to the STEPLIB DD statement or the DFSRESLB DD statement and rerun the job.

IHC01206I  A GDG base entry is being created.
            NAME: GDG_base, LIMIT: nnn

Explanation
The IDCAMS utility is creating a GDG base entry. GDG_base shows the name of the GDG base entry data set, and nnn shows the maximum number of data sets that can be associated with the GDG.

System action
None.

User response
None. This message is informational.

IHC01207I  DBD is a HALDB. DBDSRCONLY(Y) is ignored.
Explanations

DBDSRCONLY(Y) is specified. However, IMS HALDB Toolkit ignored this parameter because the DBD is for a HALDB.

System action
None.

User response
None. This message is informational.

IHC01208I  DBDSRCONLY(Y) is specified.

Explanation
DBDSRCONLY(Y) is specified. Because the DBD is for a non-HALDB, the parameter is effective and IMS HALDB Toolkit generates DBD source without simulating HALDB conversion.

System action
None.

User response
None. This message is informational.

IHC01209I  Parameters not related to DBD source generation are ignored.

Explanation
Because DBDSRCONLY(Y) and DBDSOURCE parameters are specified, IMS HALDB Toolkit generates DBD source without simulating HALDB conversion. IMS HALDB Toolkit ignores all the parameters that are not related to DBD source generation. This message is issued even when such parameters are not specified.

System action
None.

User response
None. This message is informational.

IHC01210E  DBDSOURCE is not specified.

Explanation
DBDSRCONLY(Y) parameter is specified without the DBDSOURCE parameter. DBDSRCONLY parameter must be used with the DBDSOURCE parameter.

System action
Processing stops.

User response
Specify the DBDSOURCE parameter and rerun the job.

IHC01211I  DBD is a HALDB. DBDSOURCE is ignored.

Explanation
DBDSSOURCE parameter is specified. However, IMS HALDB Toolkit ignored this parameter because the DBD is for a HALDB.

System action
None.

User response
None. This message is informational.

IHC01212I  Any DFSMDA members can be deleted for the old database

Explanation
The conversion process is complete. If you are certain that you will not need to revert the database to its non-HALDB state, you can delete any DFSMDA members for the old database. This message is also issued when the original_dbds DD is specified in CONVERT function JCL.

System action
None.

User response
None. This message is informational.

IHC01301W  Dynamic allocation failed, SVC 99 reason code 'xxxx'

Explanation
IMS Online Reorganization Facility was unable to dynamically allocate a data set. You can find information about the SVC 99 reason codes in the z/OS MVS Authorized Assembler Services Guide.

System action
If the data set is a required data set, then processing terminates. Otherwise, processing continues.
**User response**

Correct the reason for the allocation failure and resubmit the IMS Online Reorganization Facility job.

**IHC01500W** Online Reorg Facility [initialization for imsid | logger exit initialization] failed, RC=xxxx

**Explanation**

During IMS control region startup, IMS Online Reorganization Facility was not initialized in the IMS subsystem, imsid.

**System action**

IMS startup continues but IMS Online Reorganization Facility will be active for the IMS subsystem, imsid, only when it is restarted.

**User response**

Review the previous error messages and try to correct the problem. If you are unable to correct the problem, contact IBM Software Support.

The following table lists the IHC01500W return codes and their meanings.

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<th>Meaning</th>
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</tr>
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<td>3</td>
<td>Unable to locate IMS Online Reorganization Facility anchor. Logger exit initialization failed.</td>
</tr>
<tr>
<td>4</td>
<td>IEANTRT call failed. The error was returned from IEANTRT.</td>
</tr>
<tr>
<td>5</td>
<td>BDL failed for the required module. Unable to load IMS Online Reorganization Facility module into ECSA. Verify that the complete IMS Online Reorganization Facility library is in the STEPLIB.</td>
</tr>
<tr>
<td>6</td>
<td>LOAD failed for required module. Verify that the complete IMS Online Reorganization Facility library is in the STEPLIB.</td>
</tr>
<tr>
<td>7</td>
<td>Unable to obtain ECSA.</td>
</tr>
<tr>
<td>8</td>
<td>Unsupported IMS release.</td>
</tr>
<tr>
<td>9</td>
<td>Logger exit initialization failed.</td>
</tr>
<tr>
<td>17</td>
<td>Unable to load the HRFYOFxx module or the HRFYOFxx module is not reentrant. Ensure that the IMS Online Reorganization Facility library is in the STEPLIB.</td>
</tr>
</tbody>
</table>

**IHC015001W** DEBUG setup failed: reason, RC=xxxx

**Explanation**

IMS Online Reorganization Facility was unable to start up additional debugging options. The reason specified explains why setup failed.

**System action**

Processing continues with DEBUG off.

**User response**

Report the reason and RC to IBM Software Support.

**IHC01502I** Online Reorg Facility DEBUG status

**Explanation**

This informational message indicates that the DEBUG services have been activated or stopped.

**System action**

None.

**User response**

None. This message is informational.

**IHC01503I** action XCF group groupname as member membername

**Explanation**

This informational message indicates that the job has either joined or left an XCF group.

**System action**

None.
User response
Verify that groupname is the same group name as other address spaces to be able to communicate with them.

IHC01504E Target IMS system imsid is not active on this host

Explanation
An IMS Online Reorganization Facility maintenance utility was run on an MVS™ system and the target IMS subsystem, imsid, is not active on that MVS system.

System action
The IMS Online Reorganization Facility job terminates.

User response
Resubmit the job on the same MVS system where the target IMS subsystem is active.

IHC01505E Online Reorg Facility is not active in target IMS system

Explanation
An IMS Online Reorganization Facility maintenance utility was run but IMS Online Reorganization Facility is not active in the target IMS subsystem.

System action
The IMS Online Reorganization Facility job terminates.

User response
Verify that the target IMS subsystem is correct. IMS Online Reorganization Facility must initially be activated in an IMS subsystem with a restart of the IMS control region. Verify that this was done and that the IHC01500I message was issued to indicate that the IMS Online Reorganization Facility was initialized successfully.

IHC01506W DEBUG status for IMS imsid already state

Explanation
An IMS Online Reorganization Facility utility was run to set the DEBUG state. The DEBUG state for the IMS subsystem was already in the requested state.

System action
None. DEBUG status is left in previous state.

User response
Verify that the DEBUG status is in the appropriate state.

IHC01507I DEBUG action request for IMS imsid completed

Explanation
An IMS Online Reorganization Facility utility was run and has successfully changed the DEBUG state for an IMS subsystem.

System action
The requested DEBUG state is now in effect for the target IMS subsystem.

User response
None. This message is informational.

IHC01508W Unable to install new maintenance: reason

Explanation
The IMS Online Reorganization Facility maintenance utility was unable to install new maintenance into an IMS online subsystem.

System action
The previous maintenance level is still in effect for the IMS subsystem.

User response
Correct the reason that new maintenance was unable to be installed and resubmit the job.

IHC01509W IMS using ORF library datasetname, new maintenance being loaded from datasetname

Explanation
IMS Online Reorganization Facility maintenance utility is being executed with a different library than the IMS control region was initially started with.

System action
New maintenance is installed into the IMS control region from the different library.

User response
The next time the IMS subsystem is restarted it will activate IMS Online Reorganization Facility from the library in the control region STEPLIB. If you want the
installation of the new maintenance level to be permanently installed into the IMS subsystem, the new maintenance level must either be copied into the STEPLIB data set for the IMS control region, or the library with the new maintenance level must be added to the STEPLIB of the IMS control region.

IHC01510I Online Reorg Facility Vv.r maintenance successfully installed in imsid

Explanation
This informational message indicates that a new maintenance level has successfully been installed into the imsid online IMS subsystem.

System action
The new maintenance level is now in effect in the target IMS subsystem.

User response
None. This message is informational.

IHC01511E Target member membername action reason

Explanation
An attempt to connect to the IMS Online Reorganization Facility or IMS Tools Online System Interface component in an IMS control region address space failed for the specified reason.

System action
The IMS Online Reorganization Facility job terminates.

User response
If the IMS subsystem is down, it must either be restarted or the SUBSYS record must be removed from DBRC. If the IMS subsystem is active, verify that either the IMS Online Reorganization Facility or IMS Tools Online System Interface component was successfully initialized in that subsystem and that the component joined the same XCF group.

IHC01512I Connected with target member membername

Explanation
This informational message indicates that the job has successfully connected to the corresponding member.

System action
Processing continues.

User response
None. This message is informational.

IHC01513E ORF subtask failed RC=xxxx

Explanation
The IMS Online Reorganization Facility subtask in the IMS control region terminated unexpectedly.

System action
IMS Online Reorganization Facility processing in the IMS control region is no longer available.

User response
Contact IBM Software Support. The IMS subsystem must be restarted to reactivate IMS Online Reorganization Facility in that IMS subsystem.

IHC01514I capturetype capture for DBD(dbdbname) action

Explanation
This informational message indicates that capturing log or change records for the DBD has either been started or has just ended.

System action
If capture has been activated, the captured records will begin being sent to the remote IMS Online Reorganization Facility utility. If capture has been stopped, no more change records for the DBD will be sent to the IMS Online Reorganization Facility utility.

User response
None. This message is informational.

IHC01515W message_type from member membername

Explanation
An unexpected XCF message was received from the corresponding member. message_type shows one of the following values:

NEWMBR
The member that newly joined the XCF group. This type of message is typically received when an IMS subsystem is started during the reorganization.

LOSTCONN
The connection to the member was lost. This type of message is typically received when an IMS subsystem terminates during the reorganization or the reorganization job abnormally terminates.
System action
If the IMS Online Reorganization Facility job receives the message, that job terminates. If the message is received in the IMS control region, capturing changes for the remote IMS Online Reorganization Facility utility ends.

User response
None.

IHC01516E  XCF buffer limit exceeded

Explanation
The maximum amount of storage for incoming XCF messages has been exceeded; no further incoming XCF messages can be received.

System action
The IMS Online Reorganization Facility job terminates.

User response
The maximum amount of storage that is used for incoming XCF messages is controlled by the XCFMAX parameter in the HRFSETOP member.

This situation is usually the result of the IMS Online Reorganization Facility utility’s inability to process the number of captured change records from the IMS control regions. It might be the result of an extreme amount of online activity and of the IMS Online Reorganization Facility utility running at a priority at which it cannot obtain any CPU cycles to receive pending XCF messages.

Resubmit the IMS Online Reorganization Facility job at a higher priority and at a less active time, or set the XCFMAX value slightly higher. This situation might also occur if the IMS Online Reorganization Facility utility does not receive the pending messages when it should. This situation would likely be an outstanding WTOR or CPU loop.

IHC01519I  Number of records captured was 1234

Explanation
Number of records captured was xxxx.

System action
None.

User response
None. This message is informational.

IHC01520E  calltype call ended with ’status code’

Explanation
When applying captured changes to the reorganized shadow data sets, the IMS Online Reorganization Facility utility encountered an unexpected status code.

System action
The IMS Online Reorganization Facility job abends.

User response
Contact IBM Software Support.
**IHC01521W**  
Error from modulename:  
FUNC=function RC=xxxx RSN=xxxx

**Explanation**  
An error was encountered while capturing records in the IMS control region.

**System action**  
The IMS Online Reorganization Facility job abends.

**User response**  
Contact IBM Software Support.

**IHC01522E**  
DBRC request request for DBD dbdname DDN ddname failed, RC=xxxx

**Explanation**  
A DBRC request failed.

**System action**  
The IMS Online Reorganization Facility job abends.

**User response**  
Review the return and reason code listed in the *IMS Messages and Codes, Volume 4: IMS Component Codes* to see whether it can be corrected. The IMS Online Reorganization Facility job can be restarted and as part of that restart. The DBRC request is also reattempted. If the error cannot be corrected, contact IBM Software Support.

**IHC01523E**  
DBRC request request for LOGDSN datasetname failed, RC=xxxx

**Explanation**  
A DBRC request for a log data set failed.

**System action**  
The IMS Online Reorganization Facility job abends.

**User response**  
Review the return and reason code listed in the *IMS Messages and Codes, Volume 4: IMS Component Codes* to see whether it can be corrected. The IMS Online Reorganization Facility job can be restarted and the DBRC request will be retried. If the error cannot be corrected, contact IBM Software Support.

**IHC01524I**  
The following jobs currently have DBD dbdname allocated:

**IHC01525I**  
Jobname jobname IMSID imsid Reg# regionnumber

**Explanation**  
This message is issued with messages IHC01525I and IHC01526I.

**System action**  
None.

**User response**  
None. This message is informational.

**IHC01526I**  
The jobs must be stopped before jobname can continue

**Explanation**  
This message is issued in conjunction with messages IHC01524I and IHC01525I when an IMS Online Reorganization Facility job needs to run the /STOP or /DBRECOVERY command on a DBD and it is unable to do so until the jobs that are listed relinquish control of the DBD. Message IHC01526A follows this message.

**System action**  
None.

**User response**  
None. This message is informational.

**IHC01526A**  
(jobname): Waiting for BMPs (imsid): Reply 'RETRY' or 'CANCEL'

**Explanation**  
This WTOR message is issued after messages IHC01524I, IHC01525I, and IHC01526I. This message indicates that IMS Online Reorganization Facility is trying to issue the /STOP or /DBRECOVERY command on a DBD but the attempt to do so is failing because active BMP jobs exist.
System action
The IMS Online Reorganization Facility job waits for the operator reply. During the wait, the IMS Online Reorganization Facility job makes retry attempts in the background and deletes the WTOR message after a successful retry attempt.

User response
Take one of the following actions:

• Type RETRY to make IMS Online Reorganization Facility immediately retry the attempt.
• Type CANCEL to cancel the reorganization job.
• Type nothing and wait for the listed BMP jobs to end or to be paused, or manually end the BMP jobs so that the control of the DBD is released.

IHC01527W reply is an invalid reply

Explanation
An invalid response to the previous WTOR was entered.

System action
The previous WTOR is reissued.

User response
Take one of the following actions:

• Type RETRY to make IMS Online Reorganization Facility immediately retry the attempt.
• Type CANCEL to cancel the reorganization job.
• Type nothing and wait for the listed BMP jobs to end or to be paused, or manually end the BMP jobs so that the control of the DBD is released.

IHC01528I The reply was reply

Explanation
This informational message indicates the operator response for the previous outstanding WTOR.

System action
Processing continues according to reply.

User response
Enter a valid reply.

IHC01529W Takeover processing delayed due to TAKEOVER(DELAY)

Explanation
TAKEOVER(DELAY) was specified in the control statements. The IMS Online Reorganization Facility job ends without doing takeover processing.

System action
Restart information is saved and the IMS Online Reorganization Facility job ends with RC=4. The original database is left in a DB recovery needed state with PROHIBIT AUTH status set in DBRC.

User response
Determine the reason for delaying the takeover processing. When takeover processing is required, resubmit the IMS Online Reorganization Facility job with TAKEOVER(YES) specified.

IHC01530I datasetname allocated to DD ddname

Explanation
During restart, IMS Online Reorganization Facility allocates certain DD statements to the data sets that were in effect at the time the previous job terminated. If the ddname is in the JCL that is used to restart the job, it will be deallocated first.

System action
Processing continues.

User response
None. This message is informational.

IHC01531I TOIrequest request for DBD dbdname action

Explanation
This informational message indicates that IMS Tools System Interface requests have been made and have completed to an IMS control region.

System action
Processing continues.

User response
None. This message is informational.

IHC01532I Restart information save

Explanation
This informational message is issued before takeover processing to indicate that restart information has been successfully saved in the IMS Online Reorganization Facility restart data set.
System action
Takeover processing begins unless TAKEOVER(DELAY) was specified.

User response
None. This message is informational.

IHC01533W  TOI request request for DBD 
dbdname action RC=xxxx 
RSN=xxxx

Explanation
An IMS Tools Online System Interface request to the target IMS subsystem failed.

System action
The IMS Online Reorganization Facility job abends.

User response
Review the IMS Tools Online System Interface return and reason codes. There might also be additional messages in the IMS control region that describe why the request failed. The most likely cause is the status of a DBD in the IMS control region. If the problem can be corrected, resubmit the IMS Online Reorganization Facility job. If you are unable to correct the problem, contact IBM Software Support.

IHC01534E  Unknown segment segmentname in change record

Explanation
When applying captured change records to the shadow data sets, IMS Online Reorganization Facility encountered a change record that involved a segment that is not in the DBD for which the IMS Online Reorganization Facility job is running.

System action
The IMS Online Reorganization Facility job abends.

User response
Verify that the DMB used in the online IMS subsystems corresponds to the DBD for which the IMS Online Reorganization Facility job is running.

IHC01535E  DBRC command request for 
Partition partitionname failed, 
RC=xxxx

Explanation
A DBRC request failed.

System action
The IMS Online Reorganization Facility job abends.

User response
Review the return and reason code listed in the IMS Messages and Codes, Volume 4: IMS Component Codes to determine whether it can be corrected. You can restart the IMS Online Reorganization Facility job and the DBRC request will be reattempted. If the error cannot be corrected, contact IBM Software Support.

IHC01536I  Online Reorg Facility Vv.r 
maintdate maintime

Explanation
This informational message indicates the version, release, maintenance date, and maintenance time of IMS Online Reorganization Facility for the job or IMS control region.

System action
Processing continues.

User response
None. This message is informational.

IHC01537E  Change capture already active for 
DBD dbdname on imsid

Explanation
An IMS Online Reorganization Facility job for a DBD was started and there is already an IMS Online Reorganization Facility job for the same DBD active in the IMS subsystem. Only one IMS Online Reorganization Facility job can be executing for a DBD or HALDB partition.

System action
The duplicate IMS Online Reorganization Facility job abends.

User response
Wait for the current IMS Online Reorganization Facility job for the DBD to end before resubmitting a subsequent IMS Online Reorganization Facility job if it is still needed.

IHC01538E  AOI command request to imsid 
failed, RC=return code RSN=reason
IHC01539I Caught up with applying changes, waiting for TAKEOVER Window

Explanation
IMS Online Reorganization Facility has reached the point in the job where it can begin the takeover process. A TAKEOVER window was specified and the begin takeover time has not been reached.

System action
IMS Online Reorganization Facility begins idling until the begin takeover time that was specified is reached. During this idling time, any changes being applied to the original database are still captured and applied to the shadow database.

User response
If no action is taken, IMS Online Reorganization Facility begins the takeover process at the specified time. If you want the takeover performed sooner, you can enter a TAKEOVER command with an MVS MODIFY command. This will cause the takeover process to begin.

IHC01540I command command was entered

Explanation
An MVS MODIFY or STOP command was entered by an operator for the IMS Online Reorganization Facility job.

System action
If the command is valid, IMS Online Reorganization Facility processes the command.

User response
None. This message is informational.

IHC01541I Current phase is: phase started at hh:mm:ss

Explanation
This message indicates the current status of the IMS Online Reorganization Facility job. The message is the result of the MONITOR keyword being specified or a MONITOR request on the MODIFY command by an operator.

System action
Processing continues.

User response
None. This message is informational.

IHC01542I nnnnn type records captured, nnnnn type records applied – nnn %

Explanation
This message is the second part of monitor information. It indicates the number of log records or change records that were captured by the online systems, and how many and what percentage of those records have been applied to the shadow data sets being reorganized. The message is the result of the MONITOR keyword being specified or a MONITOR request on a MODIFY command by an operator.

System action
Processing continues.

User response
None. This message is informational.

IHC01543W Takeover window has expired

Explanation
The end time that was specified by the TAKEOVER.WINDOW parameter has been reached and IMS Online Reorganization Facility is not yet ready to perform takeover processing for the job.

System action
IMS Online Reorganization Facility will take the action specified by the endaction operand of the TAKEOVER.WINDOW parameter.

User response
If WTOR was specified as the action to take when the takeover window expired, determine the action that
you want to take and reply to message IHC01544I accordingly.

IHC01544I Specify action to take: N - keep idling until next window, T - do TAKEOVER when ready, C - continue until TAKEOVER then ask again, A - abend job

Explanation
The specified TAKEOVER window has expired and WTOR was specified as the action to take.

System action
The IMS Online Reorganization Facility job continues processing and waits for an operator response.

User response
Determine the action that you want to take at this time and enter a response through the operator console. The options are:

N Indicates that the IMS Online Reorganization Facility job continues processing and tries to perform takeover during the same window on the following day.

T Indicates that you want to finish reorganizing the shadow data sets and perform takeover when the job reaches that point.

C Indicates that you want to finish reorganizing the shadow data sets and then ask the operator what to do when the takeover point is reached.

A Indicates that you want to abend the job.

IHC01545I Ready for Takeover

Explanation
The IMS Online Reorganization Facility job is ready for takeover.

System action
The IMS Online Reorganization Facility job issues IHC01544I and waits for an operator response.

User response
See message IHC01544I.

IHC01546W Unable to complete ONLINECHANGE – reason

Explanation
The Online Reorganization Facility job detected DBD changes. ONLINCHANGE(Y) was in effect, but IMS Online Reorganization Facility was unable to locate any IMSACBA or IMSACBB data sets to copy new ACBs into.

System action
The IMS Online Reorganization Facility job continues takeover processing but ends with RC=4. The databases are left in PROHIBIT AUTH state.

User response
The new ACBs have been generated into the IMSACB data set. You must manually copy these ACBs into the appropriate IMSACBA and IMSACBB data sets. After copying the ACBs, reset the PROHIBIT AUTH flag in DBRC. In future runs of IMS Online Reorganization Facility, if all online IMS subsystems are down, you can supply the appropriate IMSACBA and IMSACBB DD statements in the IMS Online Reorganization Facility job to identify the appropriate data sets.

IHC01547E Backout failed for DBD dbname on imsid – original database is in inconsistent state

Explanation
When IMS Online Reorganization Facility was replicating changes that were made to the original database in the online IMS subsystems to the shadow database, the online IMS subsystem encountered an error when it attempted to backout some of the changes that were made to the original database.

System action
IMS stops the original database and leaves it with some changes that have not been backed out. The IMS Online Reorganization Facility job cannot determine which changes should or should not be applied to the shadow database, so the job terminates.

User response
Correct the problem with the original database and resubmit the IMS Online Reorganization Facility job.

IHC01548E Change capture terminated with inflight changes

Explanation
IMS Online Reorganization Facility is terminating the apply phase; however, it cannot determine if some of
the captured changes should be committed or if they should be backed out.

**System action**
The IMS Online Reorganization Facility job terminates abnormally.

**User response**
This is likely a logic error in IMS Online Reorganization Facility. Contact IBM Software Support.

**Explanation**
Unexpected return code (return code) from USEREXIT

**System action**
The IMS Online Reorganization Facility job terminates abnormally.

**User response**
Correct the problem with the USEREXIT that caused it to return the invalid return code, and resubmit the IMS Online Reorganization Facility job.

**Explanation**
During the apply phase, IMS Online Reorganization Facility received the return code from the USEREXIT that was specified in the RELOAD.USEREXIT keyword. The return code is an invalid return code from the USEREXIT.

**System action**
The IMS Online Reorganization Facility job terminates abnormally.

**User response**
Either resubmit the job without the USEREXIT, or change the USEREXIT so that it does not delete any index source segments.

**Explanation**
Another ORF job already running for DBD dbdname

**Explanation**
 IMS Online Reorganization Facility is already running for this DBD.

**System action**
The process terminates.

**User response**
None.

**Explanation**
Error saving information in restart data set

**System action**
The process terminates.

**User response**
Contact IBM Software Support.

**Explanation**
 userID requested source (segment name) in HALDB database be deleted

**System action**
The IMS Online Reorganization Facility job terminates abnormally.

**User response**
Contact IBM Software Support.

**Explanation**
A database data set that should have been in the catalog was not found.

**System action**
The process terminates.

**User response**
Contact IBM Software Support.
**Explanation**

This message is followed by messages IHC01556E and IHC01557E. The allocated and cataloged data sets have discrepancies.

**System action**

The process terminates.

**User response**

Contact IBM Software Support.

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**IHC01556E  type in catalog is/are: text**

**Explanation**

See message IHC01555E.

**System action**

The process terminates.

**User response**

Contact IBM Software Support.

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**IHC01557E  type in this job is/are: text**

**Explanation**

See message IHC01555E.

**System action**

The process terminates.

**User response**

Contact IBM Software Support.

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**IHC01558W  DBs are left in prohibit auth state**

**Explanation**

The takeover process did not finish completely. The databases are left in a prohibit authorization (PROHIBIT AUTH = ON) state.

**System action**

The process ended.

**User response**

Complete one of the following tasks depending on the situation:

- If the takeover was delayed because you specified TAKEOVER(DELAY), specify the RESTART(AUTO) keyword and resubmit the job. The process restarts from the Takeover phase to finish the job.

---

**IHC01559E  DB dbname is not in prohibit auth state**

**Explanation**

The specified DBD should still be in prohibit authorization state. However, it is not in that state anymore. The previous IMS Online Reorganization Facility operation did not finish normally.

This problem is probably detected during an IMS Online Reorganization Facility restart operation during which the database was activated by an operator command. The database might have been updated in between two IMS Online Reorganization Facility runs. The current status of the database is not known.

**System action**

The process terminates.

**User response**

Collect all output, including output from the previous runs, and check the IMS messages from the CTL and DLISAS region for information that might be related to this database. A time stamp recovery also might be necessary. Contact IBM Software Support.

---

**IHC01560E  SORT|IDCAMS failed, Return code is reetcode**

**Explanation**

The call to the specified utility failed. Additional error messages are issued.

**System action**

The process terminates.

**User response**

Refer to the additional messages for information about how to resolve this error.

---

**IHC01561E  RESTART data set can only be single volume**

**Explanation**

The file allocation of the restart data set is invalid.
**IHC01562E** Unable to locate RECON data sets

**Explanation**
The RECON data sets were not allocated.

**System action**
The process terminates.

**User response**
Resubmit the IMS Online Reorganization Facility restart data set definition.

**IHC01563E** Captured change records out of sequence

**Explanation**
A sequence error was detected when the captured change records were applied.

**System action**
The process terminates.

**User response**
Provide RECON data sets by:
- Specifying RECONx DDs, or
- Specifying IMSDALIB that has the RECON MDAs

**IHC01564W** Unable to imscmd DBD dbdname on IMS imsid

**Explanation**
The specified IMS command failed on the indicated IMS system for this DBD. This message is followed by message IHC01565A and a WTOR to ask for an action.

**System action**
Respond to the reply message.

**User response**
Act on the WTOR.

**IHC01565A** text

**Explanation**
This message follows message IHC01564W and is self-explanatory.

**System action**
None.

**User response**
None.

**IHC01566E** DBD dbdname has been allocated by unknown subsystem since IMS Online Reorganization facility stopped capturing changes

**Explanation**
The database has been allocated since the changes have been applied, but before the takeover process has been started.

**System action**
The function ends abnormally.

**User response**
The original database might have been updated. These updates will be lost if a takeover is performed; therefore, restart the process from the beginning.

**IHC01567E** Not all DBDs defined to imsid

**Explanation**
The database definition in the online system is inconsistent. The primary DBD or some index DBDs might be missing.

**System action**
The process terminates.

**User response**
Correct the IMS GEN.

**IHC01568I** DBDs not defined to imsid

**Explanation**
The requested DBDs are not defined in the specified IMS system.

**System action**
The XCF connection to this IMS system is terminated.
IHC01569I  DLI batch job: jobname active

Explanation
IMS Online Reorganization Facility detected that the database to reorganize is being accessed by a DLI batch job. This message is followed by message IHC01569A or IHC01571E.

System action
None.

User response
See the subsequent message IHC01569A or IHC01571E.

IHC01569A  (jobname): Waiting for DLI batch jobs to finish. Reply 'C' to cancel

Explanation
This WTOR message is issued after message IHC01569I. This message indicates that the IMS Online Reorganization Facility job is waiting for the DLI batch jobs to stop.

System action
Processing waits for the DLI batch jobs to stop. During the wait, the IMS Online Reorganization Facility job makes retry attempts in the background and deletes the WTOR message after all the DLI batch jobs stop.

User response
Take one of the following actions:
- Type 'C' to cancel the reorganization job.
- Type nothing and wait for the listed DLI batch jobs to end, or manually end the DLI batch jobs so the reorganization job can proceed.

IHC01570E  Waiting for BMPs has expired

Explanation
The number of retry attempts to stop BMP jobs reached the maximum number set by the BMPRETRY parameter in the base configuration module.

System action
None.

User response
See the subsequent message IHC01569A or IHC01571E.

IHC01571E  Waiting for DLI batch jobs has expired

Explanation
The number of retry attempts to wait for DLI batch jobs reached the maximum number set by the DLIRETRY parameter in the base configuration module.

System action
The process terminates.

User response
Wait for the DLI batch jobs that are shown in the preceding message IHC01569I to end, and resubmit the IMS Online Reorganization Facility job. You can increase the maximum number of retry attempts by specifying the DLIRETRY parameter in the base configuration module.

IHC01572E  Waiting for database pause has expired

Explanation
An attempt to pause the database has timed out.

System action
The process terminates.

User response
Wait for the DL/I batch jobs that are shown in the preceding message IHC01569I to end, and resubmit the IMS Online Reorganization Facility job. You can increase the maximum number of retry attempts by specifying the DLIRETRY parameter in the base configuration module.

IHC01573E  Logical DBD dbdname is not specified by the LOGICALDBD keyword.

Explanation
The database was updated by using a PCB that references the indicated logical DBD, but the LOGICALDBD keyword does not specify the logical DBD. Any logical DBD that applications use for update
during the reorganization must be specified with the LOGICALDBD keyword.

**System action**
Processing terminates.

**User response**
Use the LOGICALDBD keyword to specify the logical DBD.

**IHC01574E**
**DBD dbdname** has insert, delete, or replace rules that are not supported.

**Explanation**
Unsupported path type is specified in the insert, delete, or replace rules of the indicated DBD. For HALDB databases that have internal logical relationships, the following restrictions apply to the insert, delete, and replace rules. The rules are specified by using the RULES= keyword of a SEGM statement in the physical DBD.

- Insert rules L and V are not supported for logical parents. Only the P insert rule is supported.
- Delete rules L and V are not supported for logical parents. Only the P deletion rule is supported.
- Replace rule V is not supported for logical parents.

No restrictions apply to the insert, delete, and replace rules of full-function databases.

**System action**
Processing terminates.

**User response**
None. You cannot use IMS Online Reorganization Facility to process a HALDB DBD with these rules.

**IHC01575E**
Internal message buffer allocation failed

**Explanation**
IMS Online Reorganization Facility cannot allocate the internal message buffers for receiving XCF messages.

**System action**
Processing terminates.

**User response**
Adjust the size of the internal message buffers by specifying the XCFMAX parameter in the base configuration module. For more information, see the topic “Base configuration parameters” in the *IMS Database Solution Pack IMS Online Reorganization Facility User’s Guide*.

**IHC01576E**
Internal message buffers are exhausted

**Explanation**
The internal message buffers that receive XCF messages are full.

**System action**
Processing terminates.

**User response**
Increase the size of the internal message buffers by specifying the XCFMAX parameter in the base configuration module. For more information, see the topic “Base configuration parameters” in the *IMS Database Solution Pack IMS Online Reorganization Facility User’s Guide*.

**IHC01577E**
ONLINECHANGE(N) required because PSBs must be rebuilt

**Explanation**
The specified DBD change involves changes to PSBs, which requires the ONLINECHANGE(N) keyword.

**System action**
Processing terminates.

**User response**
Specify ONLINECHANGE(N) and resubmit the job. After the job ends, perform any required post-processing tasks.

**IHC01578W**
IMS online change is required

**Explanation**
IMS Online Reorganization Facility updated the staging ACB library with the new database definition, but the ACBs in online IMS subsystems are not updated.

**System action**
Processing continues.

**User response**
Use the Online Change Copy utility to copy the ACBs from the staging ACB library to the inactive ACB library. Then perform a standard IMS online change.
Unable to change DEBUG status: reason

Explanation
IMS Online Reorganization Facility could not change the DEBUG state for the target IMS subsystem.

System action
The previous DEBUG state is still in effect for the target IMS subsystem.

User response
Correct the condition reported in the message and resubmit the job.

Database database was not allocated on STA request

Explanation
Database was started on online IMS subsystems, but the database was not allocated due to a dynamic allocation failure. The database will be allocated when it is scheduled. This message might be issued when a job step that follows the IMS Online Reorganization Facility job step attempts to statically allocate the database data sets. After the database data sets are reorganized, the job will have exclusive use of the database data sets until the job completes. Therefore, even if DISP=SHR is specified in the allocation job step, the online IMS subsystem fails to allocate the database data sets.

System action
Processing continues.

User response
If static allocation of database data set is requested in a subsequent job step, remove that job step and included it in another job.

Number of online IMS subsystems has changed

Explanation
The IMS Online Reorganization Facility job detected a change in the number of online IMS subsystems during reorganization. See the preceding IHC01515W message to determine whether IMS subsystem was started or terminated.

System action
Processing terminates.

One of dual image copy data sets was not created

Explanation
Dual image copy was requested but either the primary or the secondary image copy data set was not created due to an error in the image copy process.

System action
Processing continues.

User response
To create another copy, use the Create Image Copy (CRC) function of IMS High Performance Image Copy. For more information, see the IMS High Performance Image Copy User's Guide.

Unexpected return code from partition selection exit, FUNC=function, RC=rc

Explanation
The partition selection exit returned an unexpected return code. function is the function code, and rc is the return code from the exit.

System action
Processing stops.

User response
Correct the error in the partition selection exit, and resubmit the IMS Online Reorganization Facility job.

Unexpected return code from TOSI client, MOD=module, FUNC=function, RC=rc, RSN=rsn

Explanation
The IMS Tools Base IMS Tools Online System Interface (TOSI) client returned an unexpected return code. module is the module name, function is the function code, and rc is the return code.
System action
Processing terminates.

User response
Contact IBM Software Support.

IHC01585E TOSI command security check failed for imsid, CLASS=class, COMMAND=command

Explanation
The IMS HALDB Toolkit job is not authorized to execute the indicated command on the IMS subsystem imsid. class is the security class that is used on the IMS subsystem.

System action
Processing terminates.

User response
Make sure that your user ID has the required authority to issue the command.

IHC01601I Notification for dbname [partname] has been sent to AD server

Explanation
A system notification was sent to the Autonomics Director server.

System action
Processing continues.

User response
None. This message is informational.

IHC01602W Notification failed, FUNC=function, RC=rc, RSN=rsn

Explanation
IMS Online Reorganization Facility failed to send the system notification to the Autonomics Director server.

System action
Processing continues.

User response
Ensure that the Autonomics Director server, which the ADXCFGRP keyword specifies, is started correctly.

IHC01603W Notification to AD was canceled: reason

Explanation
IMS Online Reorganization Facility did not send a system notification to the Autonomics Director server.

System action
Processing continues. But the system notification to the Autonomics Director server is not sent.

User response
Complete one of the following tasks depending on the reason indicated in the message:

IAVNTFY0 LOAD FAILURE
Ensure that the SHKTLOAD library of IMS Tools Base is specified in the STEPLIB concatenations correctly.

INITIALIZATION FAILURE
Ensure that the XCF group name specified with the ADXCFGRP keyword is correct and the specified Autonomics Director server is correctly configured.

UNSupported FUNCTION
Ensure that all the conditions for using the ADXCFGRP keyword are met. For the conditions, see the topic "ADXCFGRP keyword" in the IMS Database Solution Pack IMS Online Reorganization Facility User's Guide.

INTERNAL ERROR
Contact IBM Software Support.

IHC01604I Utility history data for dbname [partname] stored

Explanation
IMS Online Reorganization Facility stored the utility history data for the indicated resource in the IMS Tools KB Sensor Data repository. If the database is a full-function database, dbname is the name of the database. If the database is a HALDB, dbname is the master DBD name, and partname is the name of the HALDB partition.

System action
Processing continues.

User response
None. This message is informational.

IHC01605W An error occurred in HKTEXT call, FUNC=function, RC=rc, RSN=rsn
Explanation
An error occurred during the IMS Tools KB job statistics API (HKTEXST) call. function is the function code, and rc and rsn are the return code and the reason code from the API.

System action
Processing continues, but the utility history data is not stored in the IMS Tools KB Sensor Data repository.

User response
Contact IBM Software Support.

IHC01606W Utility history data process was canceled. REASON: reason

Explanation
An error occurred and the utility history data process was canceled. reason is one of the following texts:

• INITIALIZATION FAILURE
• INTERNAL ERROR

System action
Processing continues, but the utility history data is not stored in the IMS Tools KB Sensor Data repository.

User response
Complete one of the following tasks depending on the reason:

INITIALIZATION FAILURE
Ensure that the SHKTLOAD library of IMS Tools Base is included in the STEPLIB concatenation and that the IMS Tools KB server is configured correctly.

INTERNAL ERROR
Contact IBM Software Support.

IHC01611I Reorganization starts for [database dbname | partition partname]

Explanation
The Conditional Reorganization Support Service (CRSS) determined that the database or the partition requires a reorganization. IMS Online Reorganization Facility is starting the reorganization process for the indicated database or partition.

System action
Processing continues.

User response
Complete the following steps:

1. Check the output from the job.
   
   If the reorganization policy was customized to send exception notification messages by using the z/OS WTO service, the TSO/E SEND command, or through email or texting, check those messages that are issued by the job. Those messages include a job summary message (policy evaluation summary message) that summarizes the result of policy evaluation performed by Policy Services during the job.
   
   For more information, see the topic “Checking the policy evaluation summary message” in the IMS Database Reorganization Expert User’s Guide. For information about finding the Diagnosis report that was created by this job and that is stored in the Output repository of IMS Tools Knowledge Base, see the topic “Finding Diagnosis reports by using report completion codes” in the IMS Database Reorganization Expert User’s Guide.

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2. Check the exceptions in the Diagnosis report and identify the cause of the database exceptions.

For more information, see the topic "Identifying the cause of database exceptions" in the IMS Database Reorganization Expert User's Guide.

**IHC01614I**  
No exception is detected in [database dbname | partition partname]

**Explanation**

The Conditional Reorganization Support Service (CRSS) evaluated the indicated database or partition and detected no database exceptions.

**System action**

Processing continues.

**User response**

None. This message is informational.

**IHC01615I**  
[Database dbname | Partition partname] is reorganized because REORGDIAG is specified

**Explanation**

The indicated database or partition is reorganized regardless of its status because the job runs in Reorganization Diagnosis mode.

**System action**

Processing continues.

**User response**

None. This message is informational.

**IHC01616W**  
An error occurred in BBECRAPI call, FUNC=function, RC=rc, RSN=rsn

**Explanation**

An error occurred during the Conditional Reorganization Support Service (CRSS) API call. function is the function code, and rc and rsn are the return code and the reason code from the API.

**System action**

Processing continues.

**User response**

The detail of the error or the warning is recorded in the journal messages that are issued by the CRSS. Correct the error and rerun the job.

**IHC01617W**  
Conditional Reorg service is deactivated. REASON: reason

**Explanation**

The Conditional Reorganization Support Service (CRSS) cannot continue the job because of the reason displayed.

**System action**

The processing continues without the CRSS. If the job runs in either Conditional Reorganization mode or Reorganization Diagnosis mode, IMS Online Reorganization Facility reorganizes the database regardless of database status, but the CRSS does not generate a Diagnosis report.

**User response**

Complete one of the following tasks depending on the reason:

- **BBECRI00 LOAD FAILURE**
  Ensure that the IMS Database Reorganization Expert load library is included in the STEPLIB concatenation.

- **INITIALIZATION FAILURE**
  Ensure that Policy Services is configured correctly.

- **ITKBSERVER NOT SPECIFIED**
  Ensure that the ITKBSERVER keyword is specified in the HRFSYSIN DD statement.

- **UNSUPPORTED FUNCTION**
  Ensure that all of the following conditions for the CRSS are met:
  - The primary database to reorganize is a full-function database or a single partition of a HALDB.
  - The primary database to reorganize is not an index database.
  - TAKEOVER(N) is not specified in the REORG HRFSYSIN DD statement.
  - DBD change is not requested.

- **INTERNAL ERROR**
  Contact IBM Software Support.
IHC01701E  HPSCCATI API failed, RC=rc, RSN=rsn

Explaination
Received an error from the HPSCCATI API. rc and rsn are the return code and the reason code in decimals.

System action
Processing terminates.

User response
Contact IBM Software Support.

IHC01702I  IMS management of ACBs is enabled

Explaination
The IMS management of ACBs is enabled.

System action
Processing continues.

User response
None. This message is informational.

IHC01703E  GEX$CATQ API failed, RC=rc, RSN=rsn, DBD=dbd

Explaination
Received an error from the GEX$CATQ API. The return code from the macro call was rc and the reason code was rsn. For the reason of the error, see the preceding messages with the GEX prefix that were issued by GEX $CAQ API.

System action
Processing terminates.

User response
Locate preceding error messages and identify the cause of the error.

IHC01704E  The specified DBD is for an IMS catalog database. IMS DD statement is required.

Explaination
The database specified on the DBD parameter is the IMS catalog database, and the IMS management of ACBs is enabled.

System action
Processing terminates.

User response
If you want to process the IMS catalog database, disable the IMS management of ACBs, specify the IMS DD statement and rerun the job.

IHC01705E  Failed to process IMS-managed ACBs. REASON: reason

Explaination
IMS HALDB Toolkit failed to process IMS managed ACBs because of the reason displayed.

System action
Processing terminates.

User response
Perform the action that corresponds to the reason shown in the message and rerun the job.

CATALOG OPEN FAILURE
Ensure that the IMS Tools Generic Exits load library is included in the STEPLIB concatenation.

If the reason is not in this list, contact IBM Software Support.
Before you report a problem with IMS HALDB Toolkit to IBM Software Support, you need to gather the appropriate diagnostic information.

Procedure
Provide the following information for all IMS HALDB Toolkit problems:

• A clear description of the problem and the steps that are required to re-create the problem
• All messages that were issued as a result of the problem
• The trace file or trace panel. For more information, see “Trace file or trace panel” on page 297.
• Product release number and the number of the last program temporary fix (PTF) that was installed
• The version of IMS that you are using and the type and version of the operating system that you are using
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