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Using Presspack

This section provides a general description of CA IDMS Presspack, a large-volume database compression and decompression tool for CA IDMS/DB. It also gives sectionlines for using this product and sees you to other sections of this section for details.

- Advantages of Using CA IDMS Presspack (see page 6)
- What CA IDMS Presspack Compresses (see page 6)
- How CA IDMS Presspack Compresses (see page 6)

Advantages of Using CA IDMS Presspack

Compressing your database records:

- Slows the demand for new DASD.
  By compressing data you will be using your DASD more efficiently and as a result, will be able to defer the purchase of additional hardware.

- Alleviates physical space constraints in your data center.
  Additional DASD requires physical space that may not be available.

- Helps I/O bound jobs.
  Since more data is stored in the same amount of space, fewer I/Os will be required to retrieve the same amount of data.

- Reduces journaling activity.
  Since the records that are written to the journals are compressed, more records fit onto a journal and, as a result, you do not have to offload the journals as often.

- Speeds backup and restoration of your database.
  Since the same amount of data can be stored on fewer pages, the backup/restore utilities have to do fewer I/Os and, as a result, run faster.

What CA IDMS Presspack Compresses

CA IDMS/DB records or tables may contain control field data and non-control field data. This component compresses the data beyond the last control field.

How CA IDMS Presspack Compresses

CA IDMS Presspack compresses database records by:

1. Eliminating repeating character strings
2. Using the Huffman Encoding Technique

3. Applying the concept of successor tables

The result is very efficient compression of your data.

**Huffman Encoding Technique**

CA IDMS Presspack uses an algorithm called the Huffman Encoding Technique to assign bit strings of varying length to characters that are being compressed. Characters that occur most frequently are assigned the shortest bit strings and those that occur less frequently are assigned longer bit strings. The result is that instead of every character using a fixed eight bit code, some characters are represented by as few as two bits and a few characters require more than eight bits.

Since the most frequently occurring characters get the shortest bit strings, the result is that the set of data requires less space to be stored.

**Successor Tables**

The successor table concept allows for the use of multiple Huffman conversion tables. CA IDMS Presspack decides which table to use on the next character (that is, the "succeeding" character) on the basis of the type of character it expects to compress or decompress next. This technique is based on the premise that user data occurs in patterns and not in a random fashion.

By applying the concept of successor tables, CA IDMS Presspack can achieve further compression by assigning the same short bit string to more than one frequently occurring character. For example, the most frequently occurring alphabetic character and the most frequently occurring digit could both be represented by the shortest bit string. The number of successor tables used is related to the degree of compression you specify when you create a custom DCT.

**How You Can Optimize Compression**

You can optimize compression by passing selected records or tables through IDMSPASS, the compression optimization utility of CA IDMS Presspack. IDMSPASS allows you to achieve the highest degree of compression possible with CA IDMS Presspack. For further information on IDMSPASS, see Using IDMSPASS (see page 9).

**About CA IDMS Presspack**

CA IDMS Presspack is a tool for compression and decompression of CA IDMS/DB records or tables. Its compression efficiency makes it ideal for compressing large-volume databases.

- When to Use CA IDMS Presspack (see page 8)
- When Not to Use CA IDMS Presspack (see page 8)

CA IDMS Presspack consists of:

- Runtime compression and decompression routines
- A built-in data characteristic table (DCT) for use in compression and decompression functions
When to Use CA IDMS Presspack

Consider using CA IDMS Presspack for:

- Fixed length records or tables that can be compressed by more than 11 bytes. CA IDMS Presspack converts fixed-length records to variable length records, which require 8 bytes of overhead. CA IDMS Presspack also requires an additional 3 bytes per record in overhead.
- Infrequently updated records.
- Long-lived records.

Also consider using CA IDMS Presspack to compress records that contain data in unusual formats, such as binary or packed decimal. However, to obtain the most efficient compression for these records, you should first pass them through the IDMSPASS utility.

For more information on IDMSPASS, see Using IDMSPASS (see page 9).

When Not to Use CA IDMS Presspack

You do not gain the advantages of using CA IDMS Presspack if:

- CPU overhead (if any) exceeds the space savings that you can obtain for a record or table
- You cannot obtain more than 11 bytes in space savings for a fixed-length record, or 3 bytes for a variable length record or table
- The compressible portion of the record or table (that is, what follows the last index or CALC key field or column) is very small

Required Steps

These are the required steps for implementing CA IDMS Presspack:

1. Install CA IDMS Presspack. For information on how to do this, see to the CA IDMS installation section for your operating system.
2. Define or convert selected records or tables for compression and decompression. For more information, see Overview of CA IDMS Presspack”.

Optional Steps

To maximize the advantages gained from using CA IDMS Presspack, you can use the IDMSPASS utility to:
- Generate a statistical report that will tell you how much benefit you can get from using CA IDMS Presspack. For more information, see "Generating a Statistical Report".

- Create one or more custom DCTs for use with IDMSPASS. This step is optional because if you do not create a custom DCT, you can specify to use the generic DCT, BUILTIN, when compressing and decompressing records or tables. However, a custom DCT ensures more efficient compression than the BUILTIN DCT. For information on how to create a DCT, see "Creating DCTs".

Using IDMSPASS

How IDMSPASS Works

You use the IDMSPASS utility to sample selected records or tables to gather statistics on characteristics of the data. Using these statistics, IDMSPASS can then build a custom DCT.

At runtime, the custom DCT is used to compress or decompress the data in your database. Data compression and decompression are far more efficient with a custom DCT than with the generic BUILTIN DCT because the data characteristics used are specific to the data being compressed.

Using BUILTIN

You can compress data that has not been passed through the IDMSPASS utility by specifying BUILTIN, the generic DCT, in the record or table definition.

For more information on defining records or tables for compression, see Section 2, “Enabling CA IDMS Presspack Compression”.

The information in BUILTIN consists of statistics that describe a general mix of data. This allows efficient compression at runtime, though less efficient than use of a custom DCT created with IDMSPASS.

Enabling CA IDMS Presspack Compression

This section tells you how to define database records or tables for compression and decompression, including:

- How to use the syntax required to define records or tables for compression.

- How to convert existing records or tables to (or from) compression.

- How CA IDMS Presspack executes at runtime.

For more information, see the following topics:

- Defining Records and Tables for Compression (see page 10)
- Converting Schema Records (see page 12)
Defining Records and Tables for Compression

Contents
- Using SCHEMA RECORD Syntax (see page 10)
- Using CREATE TABLE Syntax (see page 12)

Defining Schema Records for Compression

You define schema records for compression by specifying a DCTABLE parameter on the SCHEMA RECORD statement for each record that you select. In the DCTABLE parameter you can specify the data characteristic table to be used for compression and decompression.

For more information on the SCHEMA RECORD statement and the DCTABLE parameter, see "Using SCHEMA RECORD Syntax."

Defining Tables for Compression

You identify SQL-defined tables to be compressed by specifying the COMPRESS parameter on the CREATE TABLE statement for each table that you select to compress. Following the COMPRESS parameter, you can specify in the USING parameter the data characteristic table to be used for compression and decompression.

For more information on the CREATE TABLE statement and its compression parameters, see "Using CREATE TABLE Syntax."

Converting Records and Tables

To specify compression for records or tables that have already been defined in a CA IDMS™ /DB, you perform a conversion procedure to make the specified data available for use by CA IDMS Presspack.

For information on how to convert schema records, see "Converting Schema Records."

For information on how to convert SQL-defined tables, see “Converting Tables”.

Using SCHEMA RECORD Syntax

Specifying the DCTABLE Parameter

You specify the DCTABLE parameter of the SCHEMA RECORD statement to compress and decompress the record at runtime.

For more information on complete syntax documentation of the SCHEMA RECORD statement, see to CA IDMS Database Administration Section.

These considerations apply to the DCTABLE parameter:
Specify `dctable-name` if you want to use a custom DCT for the schema record, or `BUILTIN` if you want to use the generic DCT. You can specify `dctable-name` before you create the DCT. However, you cannot specify `dctable-name` before you install CA IDMS Presspack (that is, before CA IDMS Presspack module IDDPRST is linked with the schema compiler).

Specify `IS USED FOR COMPRESSION` or `IS USED FOR DECOMPRESSION` only if you need to convert existing schema records to or from CA IDMS Presspack compression; otherwise, specify `IS USED FOR BOTH`.

For more information on converting records, see Converting Schema Records.

**DCTABLE Parameter Example**

In this example, the DCTABLE parameter of a MODIFY statement names JOBDCT as the DCT used both to compress and decompress all JOB records:

```plaintext
MODIFY RECORD NAME IS JOB
   DCTABLE NAME JOBDCT IS USED FOR BOTH.
```

**Associated Defaults for Other Parameters**

The DCTABLE parameter has associated defaults for the `MINIMUM ROOT LENGTH` and `MINIMUM FRAGMENT LENGTH` parameters of the SCHEMA RECORD statement. These defaults are:

- **MINIMUM ROOT IS CONTROL LENGTH.**
- **MINIMUM FRAGMENT LENGTH IS**
  - `Fragment-length` for fixed compressed records whose fragmentable length is less than or equal to 40 bytes (a record's fragmentable length is the record's total length less its control length)
  - 40, for fixed compressed records whose fragmentable length is greater than 40 bytes (a record's fragmentable length is the record's total length less its control length)
  - 4, for variable compressed records

The schema compiler automatically uses these parameter values when it processes a DCTABLE parameter.

**Overriding the Defaults**

You can override the defaults by specifying your own values for the `MINIMUM ROOT LENGTH` and `MINIMUM FRAGMENT LENGTH` parameters of the SCHEMA RECORD statement.

For example, to prevent fragmentation, you can specify `RECORD LENGTH` for both `MINIMUM ROOT LENGTH` and `MINIMUM FRAGMENT LENGTH` in the SCHEMA RECORD statement. Fragmentation is valuable as an alternative to compression, not in place of compression.
Using CREATE TABLE Syntax

Using the COMPRESS Parameter

You specify the COMPRESS parameter of the CREATE TABLE statement to compress and decompress a table at runtime.

More Information: For complete documentation of CREATE TABLE statement syntax, see to CA IDMS SQL Section.

What COMPRESS Means

When you specify COMPRESS on a CREATE TABLE statement, you direct the DBMS to call CA IDMS Presspack both to compress and to decompress data in the table when DML functions are performed.

If you do not specify the USING parameter to name a DCT in conjunction with the COMPRESS parameter, BUILTIN is used at runtime.

Changing the Compression Specification

You cannot change the compression specification with an ALTER TABLE statement. To change the compression specification, you convert the table.

For more information on table conversion, see 23 (see page 15).

Specifying a DCT

Specify USING dctable-name in conjunction with the COMPRESS parameter to use a custom DCT at runtime. You create a custom DCT for the table using the IDMSPASS utility.

COMPRESS Parameter Example

In this example, the COMPRESS parameter of a CREATE TABLE statement names JOBDCT as the DCT used both to compress and decompress the JOB table:

```
CREATE TABLE DEMOEMPL.JOB
.
.
.
 IN DEMODB.EMPAREA
 COMPRESS USING JOBDCT;
```

Converting Schema Records

What You Can Do

You can convert your database records by changing them from non-CA IDMS Presspack use to CA IDMS Presspack use, or by removing them from CA IDMS Presspack use.

Converting Records to CA IDMS Presspack Use
If you just installed CA IDMS Presspack, the schema records in your existing CA IDMS™ /DB may be:

- Uncompressed records, either fixed-length or variable-length
- Records compressed with IDMSCOMP and decompressed with IDMSDCOM

In either case, you can convert records that you select for compression and decompression.

**Conversion Methods**

The method to use for converting existing database records to CA IDMS Presspack depends on your objective.

**To reduce area size** when converting to CA IDMS Presspack:

1. Unload the database using the UNLOAD utility
2. Modify the compression specifications of the schema records
3. Reload the database using the RELOAD utility

![Note: When using UNLOAD and RELOAD to convert records to CA IDMS Presspack, be sure that the DCTABLE specification in the new schema record definition includes the parameter IS USED FOR BOTH.]

For more information on the UNLOAD and RELOAD utilities and about the unload/reload process, see to *CA IDMS Utilities Section*.

**To convert from fixed-length, uncompressed records** to CA IDMS Presspack without reducing the size of the area:

1. Change the DCTABLE specification in the schema records
2. Use the RESTRUCTURE utility on the area or areas containing the records

For more information on the RESTRUCTURE utility and about the restructure process, see to *CA IDMS Utilities Section*.

**To convert from variable-length, uncompressed records** without reducing the size of the area:

1. Specify the DCTABLE parameter for each record, including IS USED FOR COMPRESSION.
2. Run a database sweep program, performing the OBTAIN and MODIFY functions for each record.

![Note: If you perform a database sweep to convert your records, you should put normal restart and recovery procedures into effect. This will help preserve the integrity of your database if problems arise during conversion.]

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3. Change the DCTABLE parameter for each record, specifying that the named DCT is used for both compression and decompression.

Converting from IDMSCOMP

Your existing database records may be compressed with calls to IDMSCOMP. To convert IDMSCOMP-compressed records to CA IDMS Presspack:

1. For each record’s SCHEMA RECORD statement:
   - Specify the DCTABLE parameter, including IS USED FOR COMPRESSION.
   - Code CALL IDMSDCOM AFTER GET.
2. Run a database sweep program, performing the OBTAIN and MODIFY functions for each record.
3. Change the DCTABLE parameter for each record, specifying that the named DCT is used for both compression and decompression.

Changing the DCT

You can change the DCT that is used to compress and decompress a record using the following steps:

1. Specify two DCTABLE parameters in the SCHEMA RECORD statement for each record:
   - In one DCTABLE parameter, specify that the old DCT named is used for decompression.
   - In the other DCTABLE parameter, specify that the new DCT named is used for compression.
2. Run a database sweep program, performing the OBTAIN and MODIFY functions for each record.
3. Alter the DCTABLE parameter for each record, specifying that the new DCT is used for both compression and decompression.

Ways of Converting from CA IDMS Presspack

After your records have been converted to CA IDMS Presspack use, you may occasionally want to remove selected records from CA IDMS Presspack use. This involves converting the records from CA IDMS Presspack compression and decompression to uncompressed format, either fixed-length or variable-length.

To convert from CA IDMS Presspack to variable-length, uncompressed records:

1. Specify the DCTABLE parameter for each record, including the dctable-name of the record's existing DCT and IS USED FOR DECOMPRESSION.
2. Run your database sweep program, performing the OBTAIN and MODIFY functions for each record.
3. Change the SCHEMA RECORD statement for each record, specifying:
   - Appropriate values for the MINIMUM ROOT and MINIMUM FRAGMENT parameters
   - EXCLUDE ALL CALLS

To convert from CA IDMS Presspack to fixed-length, uncompressed records:

1. Decompress each record and use the RESTRUCTURE utility to store each record as fixed-length without compression.
2. Change the SCHEMA RECORD statement for each record, specifying:
   - MINIMUM ROOT NULL
   - MINIMUM FRAGMENT NULL
   - EXCLUDE ALL CALLS

Converting Tables

What You Can Do

You can convert existing SQL-defined tables to or from CA IDMS Presspack use. The basic steps are the same for each conversion.

How to Convert Tables to CA IDMS Presspack

You can specify compression for a table only in the CREATE TABLE statement. To specify compression for a table that contains data:

1. Create an interim table with same characteristics as the table to be converted but with a different name.

2. Copy the data from the table to be converted to the interim table, using an INSERT statement. For example, if the table to be converted is DEMOEMPL.JOB and the interim table is DEMOEMPL.TMPJOB, you submit a form of this statement:

   ```sql
   insert into demoempl.tmpjob
   values (select * from demoempl.job);
   ```

3. Delete DEMOEMPL.JOB with a DROP TABLE statement.

4. Re-create the DEMOEMPL.JOB table using the COMPRESS parameter:

   ```sql
   create table demoempl.job
   .
   .
   .compress using job_dct;
   ```

5. Copy the data from DEMOEMPL.TMPJOB into the newly-defined DEMOEMPL.JOB table using an INSERT statement:
insert into demoempl.job
values (select * from demoempl.tmpjob);

6. After verifying successful execution of the previous step, drop the DEMOEMPL.TMPJOB table.

⚠️ **Note:** If you perform the conversion in a single SQL transaction, consider using the CREATE TEMPORARY TABLE statement to create the interim table.

More Information: For documentation of all CA IDMS™ SQL statements see to *CA IDMS SQL seeence Section*.

**How to Convert Tables to a New DCT**

To convert tables to a new DCT, follow the steps for converting to CA IDMS Presspack. Do not include a COMPRESS parameter when creating the interim table.

**How to Convert Tables from CA IDMS Presspack**

To convert tables from CA IDMS Presspack, follow the steps for converting to CA IDMS Presspack, but omit the COMPRESS parameter when you re-create the table you are converting.

---

**CA IDMS Presspack Runtime Execution**

**When CA IDMS Presspack Routines Are Executed**

After you implement CA IDMS Presspack, data compression and decompression take place automatically when the application program performs data manipulation language (DML) functions against the CA IDMS™ /DB at runtime. The DBMS executes CA IDMS Presspack’s runtime routines to:

- Compress a record or table on one of these update functions:
  - STORE (navigational DML)
  - MODIFY (navigational DML)
  - ERASE (navigational DML)
  - INSERT (SQL DML)
  - UPDATE (SQL DML)
  - DELETE (SQL DML)
- Decompress a record or table on one of these retrieval functions:
  - GET (navigational DML)
  - OBTAIN (navigational DML)
SELECT (SQL DML)

For more information on DML functions in application programs, see to CA IDMS Navigational DML Programming Section or CA IDMS SQL Programming Section.

Use of the DCT

Compression and decompression functions are performed on record or table data using either BUILTIN or a custom DCT to translate the compressed data to decompressed data and to translate decompressed data into compressed data.

The same DCT must be used to decompress a given record or table as it did to compress the record or table.

Runtime Processing

The following figure shows how compression and decompression are performed at runtime.
Creating DCTs with IDMSPASS

IDMSPASS is a utility provided with CA IDMS Presspack. With IDMSPASS you can accumulate database record or table statistics, create custom DCTs, and print out a report containing compression information on your database records or tables.

This section describes the following IDMSPASS topics:
- Running IDMSPASS (see page 19)
- IDMSPASS Syntax (see page 21)
- What You Can Do with IDMSPASS (see page 25)
- Create DCTs (see page 31)
Running IDMSPASS

IDMSPASS Execution Environment

Accessing a non-SQL defined database:
You can run IDMSPASS against a non-SQL defined database as a batch job either under the CA IDMS /DC central version or in local mode.
If you run IDMSPASS under the central version, the DBMS loads a subschema into the local region to make it available for extracting information. Make sure that this subschema is the same as the subschema used by your central version run unit. This will prevent discrepancies that may result from using different versions of a subschema.

Accessing an SQL-defined database:
You can run IDMSPASS against an SQL-defined database in local mode. You specify the dictionary containing the SQL definitions in a SYSIDMS DBNAME parameter.

IDMSPASS Execution

At runtime, IDMSPASS samples the records or tables that you specify in IDMSPASS input parameters. To sample records, you must begin the input parameter stream with PROCESS SUBSCHEMA. To sample tables, you must begin the input parameter stream with PROCESS SQL.

IDMSPASS uses statistical information in its sample to build a DCT and/or print the IDMSPASS report. You can save the statistics in a SYS002 file for use in a subsequent run of IDMSPASS.

For documentation of IDMSPASS input parameters, see IDMSPASS Syntax.

For an example of specifying a SYS002 file in IDMSPASS JCL, see Sample JCL.

How IDMSPASS Creates a DCT

To create a DCT, IDMSPASS uses sampling statistics to create assembler source code for the DCT and punches the code into SYSPCH. You can then assemble and link this code to produce a DCT load module.

You can modify the generated assembler source code to set AMODE=31 and RMODE=ANY. This eliminates warnings during the linkedit about mismatched AMODEs.

You must define the DCT to the CV just like a program.

Note: Always save a copy of the source code for each DCT load module. For more information, see Creating DCTs.

After you specify compression using a SCHEMA RECORD or CREATE TABLE statement, the DBMS uses the custom DCTs that you have created with IDMSPASS at application program runtime.

Summary of IDMSPASS Execution
The following flow chart summarizes IDMSPASS execution.

IDMSPASS parameters

Database

IDMSPASS

SYS002 statistics

SYSLST
IDMSPASS report

SYSPCH

Assembler listing

Assembler

Link map

Linkage editor

DCT load module

IDMSDB--Running IDMSPASS
IDMSPASS Syntax

Contents

- Usage (see page 23)
- Examples (see page 24)

IDMSPASS syntax is submitted as input to the system through JCL to control a run of the IDMSPASS utility.

For sample IDMSPASS JCL, see Sample JCL.

Authorization

To run IDMSPASS, you must hold DBAREAD privilege on each area accessed.

Syntax

```
►─┬────────────────────────────────────────────────────────────────►
  │  PROCESS  ──►
  └─┬─SQL─▼─┬─TABLE
  │  │  └─AREA
  └─schema-name table-identifier

►─┬─AREA 称
  └─segment-name area-name

►─┬─SUBSCHEMA─▼─DBNAME
  │  └─subschema-name
  └─database-name

►─┬─RECORD─▼─AREA
  │  └─record-name
  └─area-name

►─┬─DCT─▼─DBNAME
  │  └─dctable-name

►─┬─START─▼─DBNAME
  │  └─start-number

►─┬─SKIP─▼─DBNAME
  │  └─skip-number

►─┬─NRECS─▼─DBNAME
  │  └─sample-number

►─┬─DEGREE─▼─DBNAME
  │  └─compression-degree-number

►─┬─USCNTS─▼─DBNAME
  │  └─Y
  └─N

►─┬─COMPARE─▼─DBNAME
  │  └─COMPARE
```

Parameters

- **SQL**
  Indicates that IDMSPASS is to process tables in a CA IDMS/DB SQL-defined database.

- **TABLE schema-name.table-identifier**
  Specifies a table for IDMSPASS to sample. *Table-identifier* identifies a table created with a CREATE TABLE statement. *Schema-name* specifies the schema with which the table is associated.
- **AREA segment-name.area-name**
  Specifies an area that contains tables for IDMSPASS to process. IDMSPASS will process all user-defined tables in the area.

- **SUBSCHEMA subschema-name**
  Names the subschema for IDMSPASS to use for accessing the records specified in AREA or RECORD parameters that follow.
  If you specify SUBSCHEMA, you must specify at least one AREA or RECORD parameter following it.

- **DBNAME database-name**
  Specifies the database to which subschema-name allows access.
  The value in this parameter overrides the SYSIDMS DBNAME parameter (if any).
  If you do not specify DBNAME in the PROCESS statement, you must specify it in a DBNAME SYSIDMS parameter.
  For documentation of SYSIDMS parameters, see to **CA IDMS Common Facilities Section**.

- **RECORD record-name**
  Specifies a record for IDMSPASS to sample.

- **AREA area-name**
  Specifies an area that contains records for IDMSPASS to process. IDMSPASS will process all user-defined records in the area.

- **DCT dctable-name**
  Names a data characteristic table.
  **Dctable-name** must contain 1 to 8 alphanumeric characters. It cannot begin with the characters **BUILTIN**.
  This parameter is required if you specify a value greater than 0 in the DEGREE parameter.

- **START start-number**
  Specifies the record occurrence or table row that IDMSPASS will use to start sampling the record or table.
  **Start-number** must be an integer between 1 and the number of record occurrences or table rows that exist when you run IDMSPASS.
  If you omit the START parameter, IDMSPASS will start sampling with the first record occurrence or table row.

- **SKIP skip-number**
  Specifies the number of record occurrences or table rows that IDMSPASS skips in sampling.
  If you omit the SKIP parameter, IDMSPASS skips no records.

- **NRECS sample-number**
  Specifies the maximum number of record occurrences or table rows that IDMSPASS will sample in the current run.
  **Sample-number** must be an integer.
  If you specify NRECS=0, IDMSPASS will not sample any record occurrences.
  If you omit the NRECS parameter, IDMSPASS continues sampling until it processes either all record occurrences or table rows.

- **DEGREE compression-degree-number**
  Specifies the degree to compress records using the DCT created in the current run of IDMSPASS.
  **Compression-degree-number** must be an integer in the range of 0 to 8. If the value is 0, IDMSPASS
will not create a DCT.
If you omit the DEGREE parameter, IDMSPASS assumes a default value of 4 for compression-degree-number. Degree 4 yields good compression and a medium-sized (13K) DCT.

- **USCNTS**
  Specifies whether IDMSPASS merges statistics from the current run with statistics from the previous run, if any. Y and N are the only valid values you can enter following the USCNTS keyword.
  Y specifies that statistics from the current run (if requested) will be merged with statistics in the SYS002 file.
  N specifies that only statistics from the current run will be used and will replace statistics in the SYS002 file, if specified in the JCL.
  If you omit the USCNTS parameter, only statistics calculated in the current run will be used.

- **COMPARE**
  Specifies that the Compression Summary of the IDMSPASS report will include a column that shows the actual savings, if any, of using the BUILTIN DCT for compressing the selected records.

**Usage**

**Data That Can Be Accessed in One Run**

IDMSPASS can access in one run any data that is defined in:

- One subschema
- The catalog component of one dictionary

You can build a DCT that samples data defined in multiple subschemas or in catalog components of multiple dictionaries, or a combination of both, with multiple runs of IDMSPASS specifying USCNTS Y.

**Limiting the Sample**

After a sampling of 64K bytes of data (not including keys), the rate at which the sample improves begins to diminish.

You can use any one or more of the NRECS, SKIP, and START parameters to limit sample size.

**Considerations in Sampling an Area**

Before specifying an AREA parameter to IDMSPASS, be aware of these considerations:

- A custom DCT for data with similar physical characteristics is desirable; an area is usually defined for data with similar logical characteristics
- It is redundant to specify a RECORD parameter for a record in the same area
- Specifying two areas and limiting the sampling with an NRECS parameter may bias the sampling toward the data in first area IDMSPASS processes because the NRECS limit may be reached before some (or any) of the second area is processed

**Specifying NRECS, DEGREE, and USCNTS**
Your specifications for NRECS, DEGREE, and USCNTS determine whether IDMSPASS:

- Creates a statistical report only, or a report and a DCT
- Uses statistics from only the current sampling
- Uses statistics from only the previous sampling
- Merges statistics from the previous sampling with statistics from the current sampling

This table shows the values required for each parameter depending on what you want IDMSPASS to do:

<table>
<thead>
<tr>
<th>IDMSPASS functions</th>
<th>NRECS</th>
<th>DEGREE</th>
<th>USCNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report only, using statistics from currently sampled database</td>
<td>&gt; 0</td>
<td>0</td>
<td>N</td>
</tr>
<tr>
<td>Report only, using statistics from previous sampling merged with current sampling</td>
<td>&gt; 0</td>
<td>0</td>
<td>Y</td>
</tr>
<tr>
<td>Report and DCT, using statistics from currently sampled database</td>
<td>&gt; 0</td>
<td>&gt; 0</td>
<td>N</td>
</tr>
<tr>
<td>Report and DCT, using statistics from previous sampling merged with current sampling</td>
<td>&gt; 0</td>
<td>&gt; 0</td>
<td>Y</td>
</tr>
<tr>
<td>Report, using statistics from previous sampling (report file unchanged)</td>
<td>0</td>
<td>0</td>
<td>Y</td>
</tr>
<tr>
<td>Report and DCT, using statistics from previous sampling (report file unchanged)</td>
<td>0</td>
<td>&gt; 0</td>
<td>Y</td>
</tr>
</tbody>
</table>

Invalid Parameter Combinations

The combination of USCNTS N and NRECS 0 is invalid because it excludes statistics from both a previous sampling (USCNTS N) and the current sampling (NRECS 0).

Examples

**IDMSPASS Run Against Records**

In this example, the input parameters direct IDMSPASS to:

- Access the database using the EMPSS01 subschema
- Sample records of the record type named JOB
- Create a DCT named EMPDCT
- Start sampling with the first record (this is the default)
- Skip four record occurrences after each one sampled
- Sample no more than 1000 record occurrences
- Create a DCT compresses records by degree 6
Use only statistics calculated in the current run to build a DCT (this is the default)

PROCESS SUBSCHEMA EMPSS01
  RECORD JOB
  DCT EMPDCT
  START 1
  SKIP 4
  NRECS 1000
  DEGREE 6
  USCNTS N

IDMSPASS Run Against Tables

This example is comparable to the previous example except that the accessed data is in an SQL-defined database:

PROCESS SQL
  TABLE DEMOEMPL.JOB
  DCT EMP_DCT
  START 1
  SKIP 4
  NRECS 1000
  DEGREE 6
  USCNTS N

What You Can Do with IDMSPASS

Contents
- Generating a Statistical Report (see page 26)
- Reading the IDMSPASS Report (see page 26)
- Creating DCTs (see page 29)

Making Decisions About Compression

You can use IDMSPASS to help you make these decisions about how to use CA IDMS Presspack:

- Which records or tables in your database to compress --
  - Using BUILTIN
  - Using a custom DCT
- How many DCTs to create
- What degree of compression to specify for each DCT

Options for an IDMSPASS Run

When you run IDMSPASS, you specify at least one record or table and you request that IDMSPASS generate one or both of these:

- A statistical report on the possible degrees of compression that can be attained (you specify a value greater than 0 in the NRECS parameter)
- A DCT (you specify a value greater than 0 in the DEGREE parameter)
For complete documentation of IDMSPASS syntax and usage, see IDMSPASS Syntax.

Generating a Statistical Report

What Can Be Reported

IDMSPASS allows you to generate an IDMSPASS report that provides information on the prepassed records or tables, without creating a DCT.

This information includes projections about how much your records could be compressed at each of eight degrees of compression.

You can specify two or more records or tables to pass through IDMSPASS. Statistics on the specified records or tables are merged.

Using Data on Degrees of Compression

You can use the data on projected degrees of compression in an IDMSPASS report to:

- Select a degree of compression for your records
- Decide whether to:
  - Compress records or tables you selected
  - Use the BUILTIN DCT for compression
  - Use a custom DCT for compression

Contents of an IDMSPASS Report

An IDMSPASS report, part of the IDMSPASS output, contains:

- The IDMSPASS input parameters that you specified for the run
- Detailed information on the areas that IDMSPASS accessed during the run
- Detailed information on the records or tables that IDMSPASS accessed during the run
- Run totals
- Projected percentage of record compression for each of eight degrees of compression

Reading the IDMSPASS Report

The Beginning Section

The beginning section:
CA IDMS - 19.0

- Echoes input parameters
- Displays a message confirming the binding of the run unit
- Displays a message for each area accessed

IDMSPASS volser Displays a message confirming the binding of the run unit
mm/dd/yy hhmmss
PAGE 1

P R E S S T O - COPYRIGHT (C) 1985 BY IRONWOOD SOFTWARE, INC

SUBSCHEMA=EMPSS01,
AREA=INS-DEMO-REGION,
RECORD=DEPARTMENT,
DCT=DEMODCT,START=1,SKIP=0,DEGREE=4,USCNTS=N

UT000018 RUN UNIT HAS BEEN BOUND
SUBSCHEMA NAME ------ EMPSS01
COMPILE DATE -------- yy-mm-dd
COMPILE TIME -------- hh.mm.ss
SCHEMA VERSION ------ 1100
SUBSCHEMA VERSION --- 1200

UT002017 Starting Scan - Area EMPDEMO.INS-DEMO-REGION
UT002017 Starting Scan - Area EMPDEMO.ORG-DEMO-REGION

For documentation of all messages issued by IDMSPASS, see to CA IDMS Messages and Codes Section.

Summary of the Records or Tables Sampled

The summary of records or tables sampled consists of this information:

- Record/Table NAME -- Name of the record type or table sampled
- F/V -- Record or table type (fixed-length/variable-length)
- Avg. Length -- Average length of record occurrences or table rows, including noncompressible portion
- Number Sampled -- Number of record occurrences or rows sampled
- Percent Compressible -- The percentage of a record occurrence or table row that is eligible for compression
- Number of Bytes Compressible -- The actual number of bytes of a record occurrence or table row that can be compressed

Summary of Records Sampled

<table>
<thead>
<tr>
<th>Record Name</th>
<th>F/V</th>
<th>Avg. Length</th>
<th>Number Sampled</th>
<th>Percent Compressible</th>
<th>Number of Bytes Compressible</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFFICE</td>
<td>F</td>
<td>100</td>
<td>5</td>
<td>73.0%</td>
<td>73</td>
</tr>
<tr>
<td>NON-HOSP-CLAIM</td>
<td>V</td>
<td>824</td>
<td>2</td>
<td>30.0%</td>
<td>248</td>
</tr>
<tr>
<td>INSURANCE-PLAN</td>
<td>F</td>
<td>148</td>
<td>4</td>
<td>87.1%</td>
<td>129</td>
</tr>
<tr>
<td>HOSPITAL-CLAIM</td>
<td>F</td>
<td>308</td>
<td>2</td>
<td>94.8%</td>
<td>292</td>
</tr>
<tr>
<td>DEPARTMENT</td>
<td>F</td>
<td>80</td>
<td>9</td>
<td>65.0%</td>
<td>52</td>
</tr>
<tr>
<td>DENTAL-CLAIM</td>
<td>V</td>
<td>824</td>
<td>2</td>
<td>15.7%</td>
<td>130</td>
</tr>
</tbody>
</table>
The Compression Summary

The Compression Summary estimates the average length of the record occurrence or table row after compression and the percentage of the original length that this figure represents. This information is provided for each of the eight possible degrees of compression you can choose.

If you specify the COMPARE parameter to IDMSPASS, the Compression Summary also gives the actual savings, if any, of using the BUILTIN DCT for compression.

For more information on IDMSPASS syntax, see IDMSPASS Syntax (see page 21).

'NO COMP' indicates that no gain would result from compression because the reduction would be less than the addition of 8 bytes of overhead associated with variable-length records.

<table>
<thead>
<tr>
<th>Record Name</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFFICE</td>
<td>72%</td>
<td>68%</td>
<td>64%</td>
<td>64%</td>
<td>64%</td>
<td>64%</td>
<td>64%</td>
<td>64%</td>
</tr>
<tr>
<td>NON-HOSP-CLAIM</td>
<td>16%</td>
<td>15%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>INSURANCE-PLAN</td>
<td>88%</td>
<td>59%</td>
<td>56%</td>
<td>51%</td>
<td>51%</td>
<td>51%</td>
<td>51%</td>
<td>51%</td>
</tr>
<tr>
<td>HOSPITAL-CLAIM</td>
<td>50%</td>
<td>45%</td>
<td>42%</td>
<td>42%</td>
<td>42%</td>
<td>42%</td>
<td>42%</td>
<td>42%</td>
</tr>
<tr>
<td>DEPARTMENT</td>
<td>64%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>DENTAL-CLAIM</td>
<td>84%</td>
<td>76%</td>
<td>76%</td>
<td>76%</td>
<td>72%</td>
<td>72%</td>
<td>72%</td>
<td>72%</td>
</tr>
<tr>
<td>COVERAGE</td>
<td>NO COMP</td>
<td>NO COMP</td>
<td>NO COMP</td>
<td>NO COMP</td>
<td>NO COMP</td>
<td>NO COMP</td>
<td>NO COMP</td>
<td>NO COMP</td>
</tr>
</tbody>
</table>

You chose Degree 4

SQL Example

The IDMSPASS report on an SQL-defined database is similar to a report on a non-SQL defined database, as in this example:

```
IDMSPASS volser Database Prepass and DCT generate utility
      mm/dd/yy hhmsss
PAGE 1

P R E S S T O   -   COPYRIGHT (C) 1985 BY IRONWOOD SOFTWARE, INC

PROCESS SQL
AREA SQLDEMO.EMPLAREA
DCT=DMODDCT,START=1,SKIP=0,DEGREE=4,USCNTS=N,COMPARE
UT000018 RUN UNIT HAS BEEN BOUND
  SUBSCHEMA NAME ------ PASSSSOS1
  COMPILE DATE ------- yy-mm-dd
  COMPILe TIME ------- hh.mm.ss
  SCHEMA VERSION ------ 1100
  SUBSCHEMA VERSION --- 1200

UT002017 Starting Scan - Area SQLDEMO.EMPLAREA

Summary of Tables Sampled

<table>
<thead>
<tr>
<th>Table Name</th>
<th>F/V</th>
<th>Avg. Length</th>
<th>Number Sampled</th>
<th>Percent Compressible</th>
<th>Number of Bytes Compressible</th>
</tr>
</thead>
</table>
Creating DCTs

Selecting a DCT for Compression

A DCT is a conversion table built from data that IDMSPASS sampled from database records. It is used at runtime to perform compression and decompression functions.

Part of the decision to compress a record or table is to select a DCT for CA IDMS Presspack to use. Your choices are:

- Use the generic DCT (BUILTIN) provided with the product
- Create a custom DCT for the selected records or tables

How to Create a DCT

To create a DCT, you specify these IDMSPASS parameters:

- For **tables**:
  - The keyword SQL
  - TABLE `table-name` for each selected table (or AREA `segment-name.area-name` for all tables in each selected area)

- For **records**:
  - SUBSCHEMA `subschema-name`
  - RECORD `record-name` for each selected record (or AREA `area-name` for all records in each selected area)

- DCT, to name the DCT
- DEGREE, with a value greater than 0, to specify the degree of compression

With additional optional parameters, you can make specifications about how IDMSPASS takes the sampling that it uses to create the DCT.
For complete documentation of IDMSPASS syntax and usage, see IDMSPASS Syntax.

**Effect of Degree**

You specify an integer in the range 1 through 8 in the DEGREE parameter to create a DCT. DEGREE determines the number of successor tables used in the sampling process. The higher the degree value, the more finely tuned the DCT is to the data sampled.

The size (in bytes) of the DCT that IDMSPASS creates will be 3.3K multiplied by the degree that you specify. In other words, the higher the degree of compression that you select, the larger the DCT created by IDMSPASS.

A higher degree of compression does not mean compression routines do more work; it means that they have more successor tables to work with. There is no extra processing.

The higher the degree of compression, the greater the compression efficiency, but on a diminishing scale. Thus, compression efficiency increases the most from 1 to 2, less from 2 to 3, and so on. It increases the least from 7 to 8.

**Creating Custom DCTs**

If you specify one record or table when you run IDMSPASS, IDMSPASS creates a DCT for just that record or table. If you pass two records or tables when you run IDMSPASS, IDMSPASS creates a DCT for both. In other words, IDMSPASS creates one DCT for just what you select to pass in an IDMSPASS run.

The more specific that a DCT is to a record or table, the more effective the compression. One DCT for each record or table achieves the most effective compression for the record or table.

**Deciding How Many DCTs**

To decide how many DCTs to create, balance the high degree of efficiency obtained from using many custom DCTs with the storage and loading requirements of many DCTs. Also consider whether the record or table is worth the effort to compress -- a few hundred record occurrences or table rows probably are not worth the effort.

A rule of thumb is to create one DCT for all records that contain similar data (for example, one DCT for records or tables with text data, one for predominantly packed data, one for mixed data, and so on).

**Saving DCTs**

Once you compress a record with a DCT, you can use only that DCT to decompress the record. Therefore, be sure that the source code module and the load module for each DCT are backed up in secure fashion to safeguard against losing access to compressed data.

Using saved source code or a backup copy of the load module is the only way to recreate a DCT because IDMSPASS does not create a duplicate DCT unless you use it with exactly the same sampling.

**Generating a DCT Load Module**

You generate the DCT load module by assembling the DCT source code that IDMSPASS creates and writes to the SYSPCH file.
You can modify the generated assembler source code to set AMODE=31 and RMODE=ANY. This eliminates warnings during the linkedit about mismatched AMODEs.

You must define the DCT to the CV just like a program.

For more information on incorporating DCT load module generation in the JCL stream for IDMSPASS, see Sample JCL.

Create DCTs

How Database Changes Are Journaled

Before and after images of compressed data are journaled in compressed format. Therefore, journaled data must be decompressed to be readable.

For example, a program (such as an audit program) that reads compressed data in the journal must be able to decompress the data.

Calling IDMSUNPS

To decompress journal images of records that were compressed, a program must call IDMSUNPS.

⚠️ Note: IDMSUNPS mimics a database procedure, but it is not a database procedure and cannot be called as such.

Prerequisite for a Call to IDMSUNPS

To use IDMSUNPS, the user-written program must read the journal, deblock individual journal records, and piece together any spanned journal images. IDMSUNPS should be called only when the program has identified a record to be decompressed.

Call Procedure

The program that needs the journal image decompressed calls UNPSEP1, the entry point to IDMSUNPS, using standard calling IBM conventions.

The IDMSUNPS module requires five parameters to be passed:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Usage</th>
<th>Length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure control block</td>
<td>Alphanumeric</td>
<td>1 byte</td>
<td>(Filler -- unused)</td>
</tr>
<tr>
<td>Application control block</td>
<td>Alphanumeric</td>
<td>1 byte</td>
<td>(Filler -- unused)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 bytes</td>
<td>Name of the DCT to be used for compression1</td>
</tr>
<tr>
<td>Parameter</td>
<td>Usage</td>
<td>Length</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Application program information block</td>
<td>Alphanumeric</td>
<td>40</td>
<td>(Filler -- unused)</td>
</tr>
<tr>
<td>Record control block</td>
<td>Binary</td>
<td>2</td>
<td>Control length -- length of the data portion of the record (including the RDW field) up to and including the last CALC or sort-control field</td>
</tr>
<tr>
<td>Record occurrence block</td>
<td>Binary</td>
<td>2</td>
<td>Maximum length of the variable length record (decompressed size) including the RDW</td>
</tr>
</tbody>
</table>

1 This information can be found in the dictionary or a subschema, or can be coded in the calling program.

**The Record Occurrence Block**

Be aware of these considerations for the Record Occurrence block:

- The program passes the compressed record in this block, and IDMSUNPS returns the decompressed record to it. Therefore, the area must be large enough to hold the decompressed record.

- A prefix-only journal record should not be passed.

- The information passed in this block must be the portion of the compressed journal record that begins with the record's RDW. This example shows where the starting point is in a typical journal record:

  RDW of journal record
  Journal type (BFOR/AFTFR)
  Journal sequence number
  Run unit ID
  Area type
  Verb number
  Page group
  Dbkey format word
  Dbkey
  Record ID
  Displacement on page
  Record length
  Prefix length
  Displacement in DBMS of journal call
  Offset
  Prefix points
CA IDMS™ Presspack includes software developed by third-party software providers. This appendix provides information regarding these third-party software providers.

**PRESSTO**

CA IDMS™ Presspack utilizes the data compression program PRESSTO™ a proprietary product of Ironwood Software, Inc.