How to Improve Performance for Data Transfer
SAP Test Data Migration Server 4.0
## Typographic Conventions

<table>
<thead>
<tr>
<th>Type Style</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Example</em></td>
<td>Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Textual cross-references to other documents.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>Emphasized words or expressions.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.</td>
</tr>
<tr>
<td>Example</td>
<td>Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.</td>
</tr>
<tr>
<td>&lt;Example&gt;</td>
<td>Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>Keys on the keyboard, for example, <strong>F2</strong> or <strong>ENTER</strong>.</td>
</tr>
</tbody>
</table>
Document History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2015-02-16</td>
<td>First version of the document</td>
</tr>
</tbody>
</table>
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1 Business Scenario

You have implemented the standard techniques to run the Data Selection and Data Transfer activities, but find that you need to further optimize the performance of these activities. You can use this document to understand the additional optimization techniques available to you to reduce the overall runtime of the Data Selection and Data Transfer activities and hence reduce the runtime of the migration package.

Very briefly, here are the performance optimization techniques available to you:

- **Data Selection Activity**: You can use a variety of selection techniques to improve the selection performance when:
  - A table in the production system contains a large volume of data and
  - The standard selection technique is running for a long time.

- **Data Transfer Activity**: You can use a number of optimization techniques, including making changes to system-level parameters, when:
  - A table, for example MARA contains a large volume of data along with unique secondary indexes and
  - The Data Transfer activity is running for a long time.

- **System Parameter Settings**: You can carry out several system parameter settings that are relevant to your database to optimize performance.
2 Performance Improvement for the Data Selection Activity

In this chapter, you can learn about the optimization techniques available to you to improve the performance of the Data Selection activity.

You can use the following techniques to help you with the performance optimization:

- Parallelization of data selection
- Reading Type 7
- Special Hints
- Specific selection logics
- System settings

Each technique is described in detail below.

2.1 Parallelization of Data Selection

By default, the Data Selection activity runs a single batch job to select a migration object.

By enabling the parallelization of data selection, you can schedule multiple batch jobs for access plan calculation, that is, to select the data of a migration object according to:

- The number of records in the application table for flat migration objects. (A flat migration object only contains one table.)
- The number of records in the TDMS header table for header migration objects.

2.1.1 Procedure

Note

Parallel processes consume significant resources and compete with other applications for system resources such as CPU power and batch processes.

You can use the following methods to carry out the parallelization of migration objects:

- Automatic method
2.1.2 Selecting Data Automatically Using the Parallel Data Selection Technique

1. Make an entry for a migration object in the table CNVMBTPRECALCOBJ using the view V_CNVMBTPRECALT.
2. Specify the following values:
   - Name of the header table if it is a structured or header migration object. This field must be left blank if it is a flat migration object.
   - Delimiter value -- maximum number of records that a single batch job should handle
   - Name of the migration object

Note
Make sure that you carry out the settings before starting the System Analysis phase.
You cannot perform the suggested settings when you carry out a force redefinition of a migration object.

Example

The number of records in the TDMS header table CNVTDMS_05_BKPF is 10 million. (You can find this information in the logs of the corresponding TDMS header activity.)
You want to schedule 5 batch jobs for the data selection of the migration object X_BKPF.

Here’s how you proceed to create an example delimiter report:
1. Enter the following information in the table:
   - Name of header table: CNVTDMS_05_BKPF
   - Delimiter value: 2000000
   - Name of migration logic: X_BKPF
2. If it is a flat migration object, leave the name of the header table as blank in the table CNVMBTPRECALCOBJ.
3. If it is a TDMS header migration object, set the parameter P_SEL to X for the corresponding TDMS header activity.

TDMS Header Migration Objects
You can enable an automatic technique for parallel data selection if the TDMS header object is related to the following TDMS headers:
2.1.3 Selecting Data Manually Using the Parallel Data Selection Technique

If you are in the Data Transfer phase and you want to enable the parallelization of a particular migration object that already has data selection running for a long time, here’s what you can do:

1. Stop and terminate any data selection jobs that are already running in the sender system.
2. Use the appropriate troubleshooter to force redefines the migration object.
3. Execute the report DMC_GENERATE_ACPLAN_DELIMITER in the central system. The report automatically generates another report in the sender system that calculates the variables of the parallelization. In other words, the report in the sender system determines the key field values to be used as boundaries of the selections applied to the multiple and parallel jobs).
4. Execute the report generated in the sender system by running the report DMC_GENERATE_ACPLAN_DELIMITER in the batch mode.
5. After the batch job in the sender system is complete, start the report DMC_CREATE_PRECALC_ACP_W_DELIM in the central system to retrieve the results.
6. Select the Data Selection activity and change the number of maximum jobs for the migration object using the troubleshooter Change Technical Settings.
7. Start the Data Selection activity in the process tree.

Note
From a technical perspective, you can configure any migration object for parallelization. However, if the migration object has a large number of tables, a significant load is placed on the database server of the sender system.
2.2 Reading Type 7

You can use this technique of optimization if the number of records in a child table for each header table record is high.

In other words, the header table and the child table records have a 1: N relationship where N exceeds 10 on an average.

Note
Using this technique for a large number of records could result in memory overflows.

2.2.1 Prerequisites

- You are working with structured migration objects.
- You want to transfer migration objects that have a 1:1 hierarchy in the CNVMBTTABLES table (one header table: one child table).

2.2.2 Procedure

1. If your selection is already running and you have observed a poor performance, terminate the batch job in the sender system.
2. Using the Change Read Behavior troubleshooter related to the Data Transfer activity, change the reading type to the cluster technique by selecting the Cluster-Technique (Child Table Full Table) radiobutton.
3. Activate the settings.
4. Alternatively, you can change the reading type of a migration object to 7 in the view V_CNVMBTCOBJ and force redefine the migration object using the Force Redefinition troubleshooter.
5. Restart the Data Selection activity.

Note
You need to force redefine an object to change the reading type after the Generation of Runtime Objects activity is complete. You are required to generate new runtime objects according to the Reading Type 7 (Cluster Technique - Child Table Full Table).
2.3 Database Hints

If the application table contains a large number of records, you can use database hints to run several parallel database processes to carry out a full table scan.

Implementation

Make an entry in the table DMC_PERF_OPTIONS for the following fields:

2.3.1 Mass transfer ID (MT_ID)

Enter the mass transfer ID of the current migration package.

2.3.2 Migration object (MIGR_OBJ_ALIAS)

Enter the name of the migration object.

2.3.3 PACKAGE_SIZE (Package Size for the Fetch Statement)

You can customize the package size used in the Fetch statement.

SAP TDMS provides the following default values for the package size:

- If nothing is specified in the table DMC_PERF_OPTIONS, the default is set to 1000 records.
- If you activate FOR ALL ENTRIES, the default is 100, to ensure that the FAE SELECT does not yield too many records.
- If this logic is considered as not optimal, customers can specify any value in the PACKAGE_SIZE field for a particular migration object.

2.3.4 FOR_ALL_ENTRIES

FOR_ALL_ENTRIES ensures a single SELECT for all header table records selected in a FETCH statement. Including FOR ALL ENTRIES additionally selects all related child table records as well.

If you are sure that the number of child table records for each header table is not too large, you can use this technique to improve the selection performance.
The selection process is more efficient if the Data Selection picks up more records (for example 50) for each DB operation.

You can change the number of records in the MAX_IN_BLOCK field.

Since FOR_ALL_ENTRIES and MAX_IN_BLOCK fields are related, specifying a value for MAX_IN_BLOCK is meaningful if you also set FOR_ALL_ENTRIES to X.

2.3.5 PARALLEL_HINT (Parallel Hints)

You can enter the number of parallel hints to be used in a select query.

1 Note
This parameter is applicable only for the Oracle and DB6 databases.
3 Performance Improvement for the Data Transfer Activity

In this chapter, you can learn about the optimization techniques available to you to improve the performance of the Data Transfer activity.

You can use the following techniques to help you with the performance optimization:

- **Drop Indexes and Recreate Solution**: The standard Data Transfer activity does not drop the indexes in the receiver system. Using this technique, however, you can now drop indexes in the receiver system.
- **System Settings**: A few system-level and database-level settings are available to optimize the data transfer process.

3.1 Troubleshooter: Drop Indexes in the Receiver System

By default, SAP TDMS does not drop any indexes in the receiver system. However, if a very large table containing several unique secondary indexes is set for transfer, the data transfer process is accelerated by:

- Dropping the indexes in the receiver system before data transfer and
- Recreating the indexes after the transfer

SAP TDMS provides a troubleshooter activity to facilitate the dropping and recreating of the indexes.

3.1.1 Prerequisites

- You have ensured that no other user is working on any other client of the receiver system during data transfer.
- If you want to drop a primary index, (which is always a unique), you have made the following settings:
  - Set the Write behavior to INSERT for the migration object for which you have dropped the primary index.
  - Ensured that no other user has set the tables (for which indexes are to be dropped) to SELECT during the data transfer.
3.1.2 Procedure

To drop the table indexes, use the troubleshooter Drop Indexes in Receiver System for the activity Start Data Transfer.

1. Enter the table name and select the Delete All Indexes (also include primary index) radiobutton or the Delete Non-Unique Only radiobutton for the type of indexes to be dropped.

2. A new activity, Recreate the Dropped Indexes in the Receiver System, is dynamically inserted in the process tree if you have dropped the index using the troubleshooter Dropped Indexes in the Receiver System. The new activity recreates the indexes that were deleted using SAP TDMS.

3. Alternatively, after the data transfer is complete, you can recreate the dropped indexes manually by using the troubleshooter Recreate the Dropped Indexes in the Receiver System for the activity Start Data Transfer.

**Note**

If you use the Oracle database system, use the client field to define the partitioning of the primary index. We recommend that you only drop the index partition referring to the client set for data transfer. Retain the partitions that refer to other clients.

If the primary and secondary indexes are absent and you attempt to delete or modify the records, the database automatically initiates a full table scan.

**Duplication of Records**

If duplicates occur, set the value for the parameter P_DUPL as X before executing the activity Recreate the Dropped Indexes in the Receiver System.

**Oracle Database System**

You can optimize the performance of index recreation by setting the following parameters using the view V_CNVMBTACTPAR for an activity id TD05P_CREATE_INDEX_TS and TD05P_CREATE_INDEX:

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_HINT</td>
<td>Mention the number of hints</td>
</tr>
<tr>
<td>P_ONLINE</td>
<td>X</td>
</tr>
</tbody>
</table>

3.2 Receiver System Settings

The TDMS control system accesses the receiver system by synchronous Remote Function Calls that require a large number of dialog work processes. To improve the performance of the work processes in Remote Function Calls to the receiver system, you can use the profile parameters listed here.
Recommendations for profile parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>REC/CLIENT</td>
<td>OFF</td>
</tr>
<tr>
<td>RDISP/BTCTIME</td>
<td>60</td>
</tr>
</tbody>
</table>

- For all larger tables in the receiver system, ensure that the switch LOG DATA CHANGES in the technical settings in the SAP DDIC is not active. Otherwise, the database writes the data records in the single record mode, which would consume more time during data transfer.
- If you cannot deactivate the logging switch, update the parameter SUPPRESS_DBTABLOG_UPDATE in the database table DMC_RT_PARAMS to ‘X’ in the central system. For more information, see SAP Note 1549208.
- Set the database parameter in the receiver system to NOARCHIVELOGMODE to optimize the data transfer.
- Switch off the mirroring of the REDO log files.

1. **Note**

   Ensure that you update the parameter SUPPRESS_DBTABLOG_UPDATE before executing the Generation of Run-Time Objects for Data Transfer activity.
General System and Database specific Settings for the overall Optimization of SAP TDMS:

ORACLE SPECIFIC-SETTINGS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Recommended Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>V$LOG</td>
<td>Indicates whether mirroring is active in the system. If the number of members is 2, the mirroring of redo logs is active. If the number of members is 1 in the receiver system, the mirroring of redo logs is disabled.</td>
</tr>
<tr>
<td>Time/User Call &amp; Busy Wait Time: CPU time</td>
<td>This ratio should be 60:40 for a tuned system.</td>
</tr>
<tr>
<td>Number of DB writers</td>
<td>The higher the value, the better the Write performance.</td>
</tr>
<tr>
<td>Archive Logging</td>
<td>Set the NOARCHIVELOG MODE in the receiver system.</td>
</tr>
<tr>
<td>Rollback segments / Undo segments</td>
<td>Approximately equal to the number of background processes.</td>
</tr>
</tbody>
</table>

In addition, the rollback segments must be distributed to different disks to avoid input-output bottlenecks.

Here are the recommended values for the parameters in Rollback Segments/Undo Segments.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIAL</td>
<td>0.2 GB</td>
</tr>
<tr>
<td>NEXT</td>
<td>0.2 GB</td>
</tr>
<tr>
<td>MINEXTENTS</td>
<td>6</td>
</tr>
<tr>
<td>OPTIMAL SIZE</td>
<td>Not set</td>
</tr>
</tbody>
</table>

If you are on an Oracle Release equal to or higher than 9.x with automatic Undo Management, make sure that the available space in Undo Tablespace PSAPUNDO is around 2% of the estimated data to be transferred in the receiver system.

If you have less space available, make sure that the value of UNDO RETENTION TIME is set appropriately to avoid the danger of Undo Tablespace overflow.

The recommended setting for UNDO Retention Time is \( (2 \times \text{RDISP/\text{MAX_WPRUN\_TIME}}) \).

MAX DB SPECIFIC-SETTINGS

<table>
<thead>
<tr>
<th>Settings</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Trigger</td>
<td>Enabled</td>
</tr>
<tr>
<td>Mirroring</td>
<td>Disabled</td>
</tr>
</tbody>
</table>
How to Improve Performance for Data Transfer

Performance Improvement for the Data Transfer Activity

<table>
<thead>
<tr>
<th>Settings</th>
<th>Recommended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archive Logging</td>
<td>Disabled</td>
</tr>
<tr>
<td>Logging</td>
<td>Activate the OVERWRITE mode.</td>
</tr>
</tbody>
</table>

For more information about logging for MAX DB, see SAP Note 869267.

**MS SQL SPECIFIC-SETTINGS**

Minimize logging. For more information, see SAP Note 421644.

⚠️ Caution

Do not change the default values of the following critical settings.

<table>
<thead>
<tr>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>max degree of parallelism</td>
</tr>
<tr>
<td>affinity mask</td>
</tr>
<tr>
<td>c2 audit mode</td>
</tr>
<tr>
<td>cost threshold for parallelism</td>
</tr>
<tr>
<td>cursor threshold</td>
</tr>
<tr>
<td>default full-text language</td>
</tr>
<tr>
<td>default language</td>
</tr>
<tr>
<td>fill factor (%)</td>
</tr>
<tr>
<td>index create memory (KB)</td>
</tr>
<tr>
<td>lightweight pooling</td>
</tr>
<tr>
<td>Locks</td>
</tr>
<tr>
<td>max text repl size (B)</td>
</tr>
<tr>
<td>media retention</td>
</tr>
<tr>
<td>min memory per query (KB)</td>
</tr>
<tr>
<td>nested triggers</td>
</tr>
<tr>
<td>open objects</td>
</tr>
<tr>
<td>query governor cost limit</td>
</tr>
<tr>
<td>query wait (s)</td>
</tr>
<tr>
<td>recovery interval (min)</td>
</tr>
<tr>
<td>remote access</td>
</tr>
<tr>
<td>remote login timeout (s)</td>
</tr>
<tr>
<td>remote proc trans</td>
</tr>
<tr>
<td>remote query timeout (s)</td>
</tr>
<tr>
<td>scan for startup procs</td>
</tr>
<tr>
<td>two digit year cutoff</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>user connections</td>
</tr>
<tr>
<td>user options</td>
</tr>
<tr>
<td>priority boost</td>
</tr>
</tbody>
</table>