



Installation and Configuration Manual

Running Processes in Parallel

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Contents

1	Overview	4
2	Standard Parallel Run	5
3	Advanced Parallel Run	8
3.1	Configuring process parameters	8
3.2	Repartitioning the DM_RECORD_LF Table	9

This document is for system administrators.

Familiarity with the following documents is recommended before working with this document:

- "Daily Procedures" (Daily_Procedures.pdf).
- "WAY4™ Housekeeping" (housekeeping.pdf).

The following notation can be used in the document:

- Field labels in screen forms are shown in *italics*.
- Key combinations are shown in angular brackets, for example, <Ctrl>+<F3>.
- Names of screen form buttons and tabs are shown in square brackets, for example, [Approve].
- Sequences for selecting user menu items or context menu items are shown using arrows as follows: "Issuing → Contracts Input & Update".
- Sequences for selecting system menu items are shown using arrows as follows: Database => Change password.
- Variables that differ for each local instance, such as directory and file names, as well as file paths are shown in angular brackets, as in <OWS_HOME>.

Warnings and information are marked as follows:



Warnings about potentially hazardous situations or actions.



Messages with information about important features, additional options, or the best use of certain system functions.

1 Overview

There are some processes in Way4 (for example, "Posting", "Accept Documents", "Contr Daily Update", etc.) that can be run in several parallel threads.

The following options are supported:

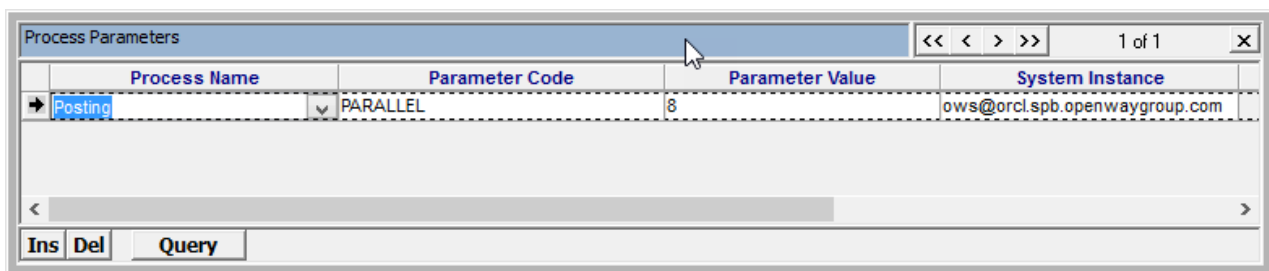
- [Standard Parallel Run](#).
- [Advanced Parallel Run](#).

Processes that can be run in parallel are listed in the section "Parallel Run" of the document "Daily Procedures".

2 Standard Parallel Run

In the standard mode for running a parallel process, the required number of Oracle jobs is created. Data are read directly from the table being processed, records are distributed between threads based on a hash expression (by default, records in one physical block of objects being processed will go into one thread).

Process parameters are set in the "Process Parameters" form, menu item "Full → Configuration Setup → Main Tables → Process Parameters".



Process Name	Parameter Code	Parameter Value	System Instance
Posting	PARALLEL	8	ows@orcl.spb.openwaygroup.com

Fig. Example of a process parameter

Set the following in the "Process Parameters" form:

- **Process Name** – process name. This value is selected from a list. If the list does not contain the process name, the name can be copied from the *Process Name* field of the PROCESS_LOG table (menu item "Full → Process Log → Process Log").
- **Parameter Code** – parameter name. This value is either selected from a list or set manually.
- **Parameter Value** – parameter value.
- **System Instance** – node in which this parameter value must be used. If a value is not specified in this field, the parameter value is used in all nodes, otherwise, it is only used in the specified node.
- **Object Type** – name of the table whose row will be processed. This field is not filled in for the majority of processes.
- **Object ID** – identifier (ID) of the table row to be processed. This field is not filled in for the majority of processes.

List of parameters and possible values:

- "DELAY" – number of commits after which execution of a process is stopped for one second.
- "EXCEPTION_LIMIT" – maximum number of exceptions when executing each parallel thread in a process. If an exception occurs during execution of a process, the process continues to work until the number of exceptions exceeds the limit set in the parameter. All exceptions go into Process Log → Messages. The parameter's default value is "0". This means that a process will be stopped on the first exception.
- "JOB_CLASS" – name of the Oracle job class for redirecting required processes to another Oracle instance when Oracle RAC is used. By default, all parallel processes are executed as Oracle jobs with the "<OWS_Owner>_DJC" class. If some processes must be redirected to another node, do as follows:

- Using Oracle Enterprise Manager, create a new job class with the correct value in the Service name field. Specify "LOW_GROUP" in the Resource Consumer Group field.
- Set the JOB_CLASS parameter for the required processes.
- "HASH_EXPR" – hash expression used by the corresponding process to distribute records between parallel processing threads. Each thread will contain records whose remainder from dividing the hash expression by the number of threads is equal to the thread number. The parameter is only used in parallel mode (PARALLEL>1 for the process). For example, when the process for processing and accepting a document is executed in parallel ("Accept Documents" process) the parameter value "abs(sy_cycle.HASH_FROM_STR(target_number,16))" determines that documents for the same card will be processed in the same thread. The default value is dbms_rowid.BLOCK_NUMER (rowid). This means that records will be distributed between threads so that records in one physical block will go into the same thread.
- "HINT" – hints added to a SELECT statement to optimize queries that select rows for processing or count rows. A hint is specified along with comments in brackets. For example, "/*+ index (doc, doc_outward) */". By default, no hint is set.
- "PARALLEL" – number of parallel processes when operating in parallel mode. Using prime numbers as a value will help to avoid uneven distribution of the processed data over parallel threads of the process. The default value of the parameter is "1".
- "MAX_NUMBER" – number of records that will be processed for each parallel process. The default value is "0" (all records are processed). As a result, MAX_NUMBER*PARALLEL number of records is processed. The parameter is only used for load testing (so that each time the same number of records will be processed) and must not be used in a production system.
- "TIMING" – tracks the length of executing commit. When the parameter value is "Y", in each commit a record specifying the time spent on the processed portion of records is generated in the Process Log.
- "TO_COUNT" – when the parameter value is "Y" (default value), before starting, the number of records to be processed is counted and this value is put in the NUMBER_OF field of the PROCESS_LOG table. When the value is "N", the number of records to be processed is not counted. The value in the NUMBER_OF field of the PROCESS_LOG table will be equal to "0".
- "TRACE" – generate a trace file (Oracle Trace) for the corresponding Way4 process. Parameter values:
 - "N" – do not generate; this is the default value.
 - "Y" – generate (collect traces with wait events).
 - "BIND" – generate (collect traces with wait events and binds).
- "TRACEFILE_IDENTIFIER" – postfix added to a trace file's name when debugging is enabled (TRACE="Y"). This parameter simplifies identification of trace files. For example, for the "myproc" parameter value, the name of the trace file will appear as orcl_j001_8148_myproc.trc.



In case of uneven distribution of records between parallel threads in a long-running process, a warning is generated in the process log ("Process Log" form): "Distribution of work between parallel threads is not even, consider changing number of threads to some prime number."

The message is generated if a process has a parallel degree greater than 2, is executed for more than 600 seconds (the value can be changed using the global parameter `PRC_MIN_TIME_FOR_CHECK_DISTRIB`) and has more than a five times difference between the number of processed records for a session (the smallest and largest value of the Current Number field for a session, the value can be changed using the global parameter `PRC_DISTRIB_DIFF_THRESHOLD`).

3 Advanced Parallel Run

Advanced mode is used for processes where a query to select records for processing requires a significant amount of time and creates a large load on the system. Unlike standard mode, this mode makes it possible to execute such a query once only, instead of as many times as there are processes.

In advanced mode, data from a table being processed are preliminarily filtered to the DM_RECORD_LF table, from which records are distributed between threads based on a hash expression (by default, records in one physical block of objects being processed will go into one thread) and the number of buckets (number of subpartitions in DM_RECORD_LF). After the process has been run successfully, data from the DM_RECORD_LF table are deleted.



Advanced mode to run a process in parallel for the WAY4™ Housekeeping R2 module is described in the document "WAY4™ Housekeeping".

3.1 Configuring process parameters



All parameters from standard mode are used in advanced mode, except TO_COUNT and HINT_COUNT, since the number of records is always counted when inserting records into the DM_RECORD_LF table.

Advanced mode is enabled by setting the USE_DM_FS process parameter to "Y".

Parameters specific to advanced parallel mode are shown below.

Table Process parameters specific to advanced parallel mode

Name	Description	Values	Default value
USE_DM_FS	If the value is "Y" the cycle works through DM_RECORD_LF collection	Y/N	N
USE_DM_FS_BUCKETS	Number of buckets (number of subpartitions in DM_RECORD_LF). It is recommended to set 5-10 threads for one bucket	Number	1

Name	Description	Values	Default value
SELECT_HINT	Added as a hint to the main select operator or to the select part of insert select when selecting records from a table being processed.	*+ any sql hints */	null
INSERT_HINT	Added as a hint to the insert operator when inserting records to DM_RECORD_LF	/*+ any sql hints */	/*+ append */



To use distribution of records between threads based on the number of buckets (number of subpartitions in DM_RECORD_LF), the DM_RECORD_LF table must be repartitioned.

3.2 Repartitioning the DM_RECORD_LF Table

To use distribution of records between threads based on the number of buckets (number of subpartitions in DM_RECORD_LF), the DM_RECORD_LF table must be repartitioned. To do so:

- Run the command:

```
TRUNCATE TABLE DM_RECORD_LF;
```

This command deletes Housekeeping module selection data. No actions will be performed for steps that are not completed. Completed steps will reselect records the next time they are run.

- Run the RedefineWiz.bat utility (<OWS Home>\install\RedefineWiz.bat):
 - On the "Migration Candidates" tab, select the DM_RECORD_LF table and check the "(Re)partit." checkbox.
 - Click the [Start Migration] button to start the table partitioning process.

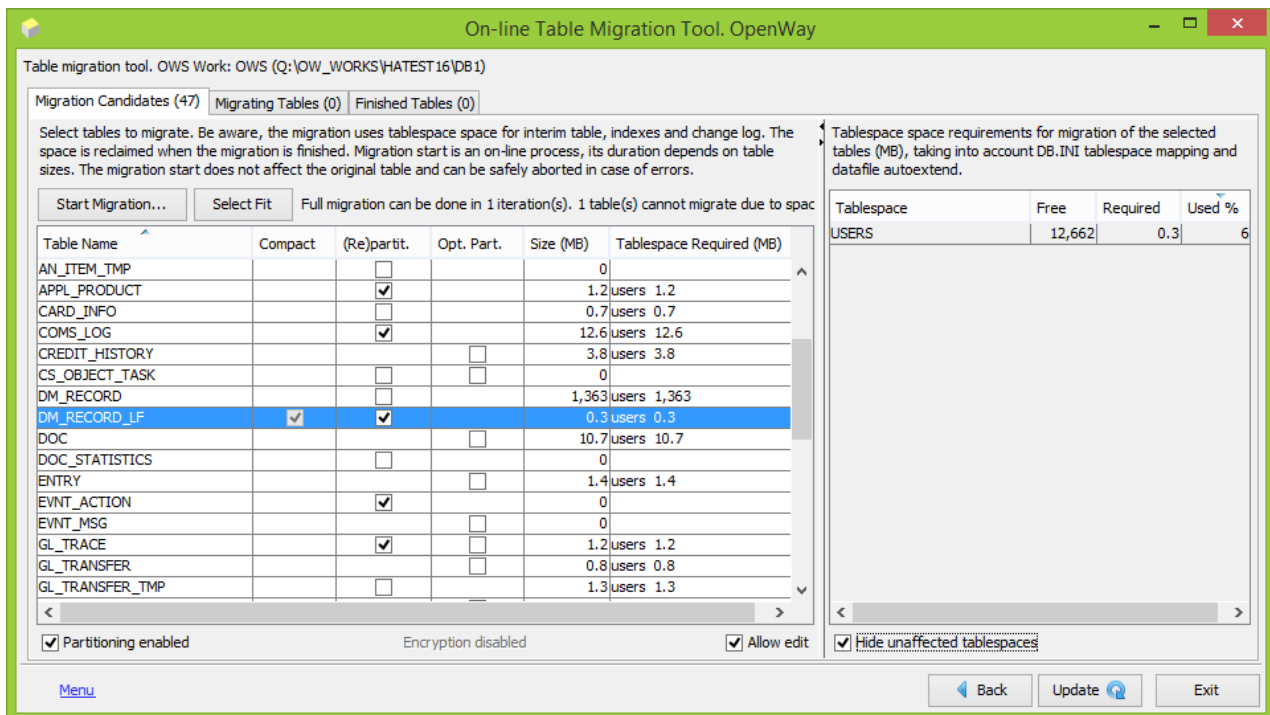


Fig. Repartitioning the DM_RECORD_LF table