

# HP Network Automation

Software Version: 9.00 Patch 4 (9.00.04)

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## Administration Guide

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## Documentation Updates

This guide's title page contains the following identifying information:

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# 1 About This Guide

This guide contains a collection of information and best practices for administering HP Network Automation Software (NA). This guide is for an expert system administrator, network engineer, or HP support engineer with experience deploying and managing networks in large installations.

This guide assumes that you have already installed NA and that you are familiar with start-up configuration tasks. To learn more about these tasks, see the *NA Upgrade and Installation Guide* and the NA help.

HP updates this guide between product releases as new information becomes available. For information about retrieving an updated version of this document, see [Documentation Updates](#) on page 2.

## Revision History

[Table 1](#) lists the major changes for each new release of this document.

**Table 1 Document Changes**

Document Release Date	Description of Major Changes
October 2011 (9.00 Patch 3)	First publication.
June 2012 (9.00 Patch 4)	Added: <ul style="list-style-type: none"> <li>• <a href="#">Working with .rcx Files</a></li> <li>• <a href="#">Configuring the Default Setting of the Force Save Check Box for New Tasks</a></li> <li>• <a href="#">Extending the Number of Custom Enhanced Fields</a></li> </ul>





## 2 Working with .rcx Files

The HP Network Automation Software (NA) property files use the .rcx extension. NA reads .rcx files in reverse alphabetical order. If a given setting is in multiple .rcx files, NA uses the last-read value. Thus, the settings in the `adjustable_options.rcx` file take precedence over the settings in the other .rcx files installed with NA.



At startup, NA reads *all* files in the `jre` directory and interprets their contents for NA configuration options. For this reason, save all backup copies of .rcx files outside the root NA directory.

In Horizontal Scalability environments, NA shares the actual values of most settings, not the .rcx files, across the NA cores. When a setting is modified on one NA core, that setting is replicated to the other NA cores. If an NA core is not operational during the change replication, that NA core does not receive the change. In that case, at a later time, use the Admin > Distributed > Renew Configuration Options page to push changes to other NA cores.



The distributed system options section of the `appserver.rcx` file lists the settings that are specific to one NA core and are not shared across the NA cores.

Some configuration changes require .rcx file modifications. The .rcx files are located in the following directory:

- *Windows:* %NA\_HOME%\jre\
- *Unix:* \$NA\_HOME/jre/



Always edit .rcx files with care. These files use XML format. If a .rcx file change results in invalid XML, the NA console might not start correctly.



It is recommended to make all configuration changes in the `adjustable_options.rcx` file. NA patch installations and product upgrades might overwrite any of the other NA-installed .rcx files.

The general procedure for changing .rcx files is as follows:

- 1 Back up the .rcx file to a location outside the \$NA\_HOME (%NA\_HOME% on Windows) directory.  
(NA reads all .rcx files within the NA directory structure.)
- 2 Add new content or update existing content as described in the instructions.
- 3 Save the .rcx file.

- 4 Reload the `.rcx` settings by doing *one* of the following:
  - In the NA console, on the Admin > Administrative Settings > User Interface page, click **Save**.
  - Run the `reload server options` command from the NA proxy.
  - Restart the NA services.



Some changes do not take effect until the NA services have been restarted.

## 3 Configuring the Default Setting of the Force Save Check Box for New Tasks

As of NA 9.00.04, for many NA device tasks, the Enforce Save task option specifies whether NA should overwrite the startup configuration with the current running configuration at the completion of the task. The setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type in the `appserver.rcx` file.

For each device task, the `appserver.rcx` file contains an option in the following format:

```
<option name="DeviceInteraction/EnforceConfigurationSave/task_name">setting</option>
```

Possible values for `task_name` are:

- Take Snapshot
- Discover Driver
- Run ICMP Test
- Deploy Passwords
- Deploy Config
- Configure Syslog
- Run Command Script
- Run Diagnostics
- Synchronize Startup and Running
- Update Device Software
- Backup Device Software
- Reboot Device
- Run Device Script
- Delete ACLs
- VLAN Task

Possible values for `setting` are:

- `true`—The Force Save field is visible for this task type and defaults to selected (overwrite the startup configuration). The user running the task can override the default setting by clearing the Force Save check box.
- `false`—The Force Save field is visible for this task type and defaults to cleared (do not change the startup configuration). The user running the task can override the default setting by selecting the Force Save check box.
- `disabled`—The Force Save field is not visible for this task type. The task will never attempt to overwrite the startup configuration with the running configuration.

To change the default setting of the Force Save check box for a specific device task type, follow these steps:

- 1 Back up the `adjustable_options.rcx` file to a location outside the `$NA_HOME` (`%NA_HOME%` on Windows) directory.
- 2 In the `appserver.rcx` file, locate the following line for the task that you want to change:

```
<option name="DeviceInteraction/EnforceConfigurationSave/task_name">setting</option>
```

- 3 Copy the line to change from the `appserver.rcx` file to the `adjustable_options.rcx` file.
- 4 In the `adjustable_options.rcx` file, edit the *setting* value.
- 5 Save the `adjustable_options.rcx` file.
- 6 Restart the NA management engine.



The change take effect for new tasks only.

## 4 Extending the Number of Custom Enhanced Fields

In the NA console, you can configure up to 31 custom data fields each for the Device Details page and the Device Interfaces page. These fields are available as follows:

- Six fields can be configured on the Admin > Custom Data Setup page.
- 25 fields can be configured on the Admin > Enhanced Custom Fields Setup page (when the Enable Enhanced Custom Fields check box is selected on the Admin > Administrative Settings > User Interface page).

To extend the available number of enhanced custom fields for the Device Details page, the Device Interfaces page, or both pages, follow these steps:

- 1 Back up the `adjustable_options.rcx` file to a location outside the `<NA_HOME>` directory.
- 2 In a text editor, such as Word or vi, edit the `adjustable_options.rcx` file as follows:
  - To extend the number of enhanced custom fields for the Device Details page, add the following line:

```
<option name=" metadata/field_limit/RN_DEVICE">100</option>
```

- To extend the number of enhanced custom fields for the Device Interfaces page, add the following line:

```
<option name=" metadata/field_limit/RN_DEVICE_PORT">100</option>
```



To restrict the number of available enhanced custom fields, replace 100 with a smaller value. (Specifying a larger value has the same effect as the leaving the value at 100.)

- 3 Save the `adjustable_options.rcx` file.
- 4 Reload the `.rcx` settings by doing one of the following:
  - Run the `reload server options` command from the NA proxy.
  - Restart the NA management engine.



## 5 Full Text Search of Configuration Text (Oracle and SQL Server)

As of version 9.00.02, HP Network Automation Software (NA) supports a “contains (full text)” search of Configuration Text. After full text search is enabled, faster configuration text search is available for the following report options:

- Reports > Search For > Devices > Configuration Text > contains (full text)
- Reports > Search For > Configurations > Configuration Text > contains (full text)
- Reports > Search For > Device Templates > Configuration Text > contains (full text)
- Reports > Advanced Search > Search Criteria > Configuration Text > contains (full text)

Additionally, you can create a dynamic group based on the results of a Search Criteria > Configuration Text > contains (full text) search.

Similarly, these searches also support searching for configuration text that “does not contain (full text).” The search is case insensitive for the “contains (full text)” and “does not contain (full text)” operators.

The “contains (full text)” search is an indexed search and requires that the database is enabled for full text search.

Because the “contains (full text)” search is indexed, it returns results faster than does the “contains” search. However, the “contains (full text)” search supports fewer options than does the “contains” search.

➤ This feature is not supported on MySQL.

This topic contains the following sections:

- [Enabling Full Text Search of Configuration Text](#) on page 16
- [Using the Contains \(Full Text\) Search Operator](#) on page 20
- [Disabling the Contains \(Full Text\) Search Operator](#) on page 21
- [Disabling Full Text Search](#) on page 22
- [Command Line Reference](#) on page 23

➤ The commands in this documentation are available as of NA 9.00.03.

# Enabling Full Text Search of Configuration Text

The procedure for enabling full text search of NA configuration text depends on the NA environment.

## Standalone NA Core Environment

In a standalone NA Core environment, do the following:

- 1 On the NA server, enable full text search of the database. Follow the steps appropriate to the database type:
  - [Enabling Full Text Search on Oracle](#) on page 17
  - [Enabling Full Text Search on Microsoft SQL Server](#) on page 19
- 2 On the NA server, enable the “contains (full text)” search operator as described in [Enabling the Contains \(Full Text\) Search Operator](#) on page 20.

## Horizontal Scalability Environment

In a Horizontal Scalability environment, do the following:

- 1 On *one* NA server, enable full text search of the database. Follow the steps appropriate to the database type:
  - [Enabling Full Text Search on Oracle](#) on page 17
  - [Enabling Full Text Search on Microsoft SQL Server](#) on page 19
- 2 On *one* NA server, enable the “contains (full text)” search operator as described in [Enabling the Contains \(Full Text\) Search Operator](#) on page 20.

Use the `reload server options` command to reload the `.rcx` settings. This command pushes the change to the other NA servers in the Horizontal Scalability environment.

- ▶ Restarting the NA services does *not* push the change to the other NA servers in the Horizontal Scalability environment. If you use this approach to reload the `.rcx` settings, also modify the `.rcx` file on each of the other NA servers.



Use a similar approach for disabling full text search of NA configuration text.



## Multimaster Distributed System Environment

In a Multimaster Distributed System environment, do the following:

- 1 On *each* NA server, enable full text search of the database.

Run the enablement procedures in parallel. That is, complete step 1 on each NA server before initiating step 2 on any NA server, and so forth.

Follow the steps appropriate to the database type:

- [Enabling Full Text Search on Oracle](#) on page 17
- [Enabling Full Text Search on Microsoft SQL Server](#) on page 19

- 2 On *one* NA server, enable the “contains (full text)” search operator as described in [Enabling the Contains \(Full Text\) Search Operator](#) on page 20.

Use the `reload server options` command to reload the `.rcx` settings. This command pushes the change to the other NA servers in the Multimaster Distributed System environment.

- ▶ Restarting the NA services does *not* push the change to the other NA servers in the Multimaster Distributed System environment. If you use this approach to reload the `.rcx` settings, also modify the `.rcx` file on each of the other NA servers.

- ▶ Use a similar approach for disabling full text search of NA configuration text.

## Enabling Full Text Search on Oracle

Full-text search accesses an index of the text records in the database. The initial index generation requires available time and disk space.

- ▶ If Oracle Text is not yet enabled, also plan for database downtime.

NA maintains the full text index by incrementally indexing new configurations added during snapshot tasks and by removing the index entries of deleted configurations.

- ▶ Note the following:

- Because index generation is CPU-intensive, NA tasks might run slower than normal during the process of enabling full text search.
- Do not restart the NA services while index generation is in progress.

To enable full text search on an Oracle database, follow these steps:

- 1 Verify that Oracle Text is enabled and has the required privileges and space:
  - a Log on to the NA proxy with the credentials used to install NA.
  - b Run the following command:

```
run checkdb -resolver analyzesearchindex -verbose
```

- c Examine the output of the `analyzesearchindex` command.
  - If Oracle Text is not enabled, see [Analyze the NA Database in Preparation for Index Generation](#) on page 23 for suggested Oracle resources.
  - If Oracle Text is enabled, verify that the approximate additional space required for the index generation process is available on the database server.
- 2 *Optional* (available for 9.00.04 or later). Consider the approximate time required for the index generation process. The `analyze` command calculates time based on the use of a single thread. You can reduce this time by using multiple threads while generating the index. To configure NA to use multiple parallel threads while generating the full text index, make the following edit:
  - a Back up the `adjustable_options.rcx` file to a location outside the `<NA_HOME>` directory.
  - b In the `adjustable_options.rcx` file, add the following line:
 

```
<option name="fulltextsearch/parallel">T</option>
```


*T* is the number of parallel threads. Possible values range from 1 to one less than the number of database server cores.
  - c Save the `adjustable_options.rcx` file.
  - d Reload the `.rcx` settings by doing one of the following:
    - Run the `reload server options` command from the NA proxy.
    - Restart the NA services.
- 3 In the NA console, delay any Take Snapshot tasks that are scheduled to start before the end of the approximate time required for index generation to complete.
- 4 Generate the full text index:
  - a From the NA proxy, run the following command:
 

```
run checkdb -resolver addsearchindex -verbose
```
  - b Examine the output of the `addsearchindex` command.
    - The expected status is COMPLETE & VALID.
    - If the status is IN PROGRESS, wait for index generation to complete.
    - If the status is INVALID, remove the index with the `run checkdb -resolver removesearchindex -verbose` command, and then repeat [step a](#).



You can close the command prompt window during index generation. In this case, run the following command to determine the status of the index generation:

```
run checkdb -resolver statusindex -verbose
```

- 5 Edit the `adjustable_options.rcx` file as described in [Enabling the Contains \(Full Text\) Search Operator](#) on page 20.
  - 6 In the NA console, examine the status of recent Take Snapshot tasks. Rerun any that failed.
-  On an Oracle database, the log file contains the following error for any Take Snapshot tasks that were running during the generation of the full text index. You can ignore this error:

```
java.sql.SQLException: ORA-29861: domain index is marked LOADING/  
FAILED/UNUSABLE
```

## Enabling Full Text Search on Microsoft SQL Server

Full-text search accesses an index of the text records in the database. The initial index generation requires available time and disk space.



If the SQL Server Full Text Search service is not installed and enabled, also plan for database downtime.

NA maintains the full text index by incrementally indexing new configurations added during snapshot tasks and by removing the index entries of deleted configurations.



Note the following:

- Because index generation is CPU-intensive, NA tasks might run slower than normal during the process of enabling full text search.
- Do not restart the NA services while index generation is in progress.

To enable full text search on a Microsoft SQL Server database, follow these steps:

- 1 Verify that the SQL Server Full Text Search service is installed and enabled by using one of the following approaches:
  - Using the SQL Server configuration manager, determine whether the SQL Server Full Text Search service is installed and started.
  - Using SQL Management Studio, run the following select statement:

```
SELECT fulltextserviceproperty('IsFulltextInstalled');
```

This statement returns 1 if the database is full-text enabled and 0 if not.

- 2 On SQL Server 2005, remove the SQL Server noise words as follows:
  - a Change to the `$SQL_Server_Install_Path\Microsoft SQL Server\MSSQL.1\MSSQL\FTDATA\` directory.
  - b Back up the `noiseENU.txt` file.
  - c Delete all entries in the `noiseENU.txt` file to leave an empty file.

For more information about editing noise words, see the “Noise Words” topic in the MSDN library:

**<http://msdn.microsoft.com/en-us/library/ms142551%28SQL.90%29.aspx>**



On SQL Server 2008, by default no noise words are enabled.

- 3 Generate the full text index:
  - a Log on to the NA proxy with the credentials used to install NA.
  - b Run the following command:

```
run checkdb -resolver addsearchindex -verbose
```



On SQL Server, this command returns immediately and starts full-text indexing. Wait some time before you start using the new search. In the verbose output, verify that this run did not generate any SQL exceptions.

- 4 Determine the status of the index generation by running the following command:
 

```
run checkdb -resolver statusindex -verbose
```

  - The expected status is COMPLETE & VALID.
  - If the status is IN PROGRESS, wait for index generation to complete.
  - If the status is INVALID, remove the index with the `run checkdb -resolver removesearchindex -verbose` command, and then repeat [step 3](#).
- 5 Edit the `adjustable_options.rcx` file as described in [Enabling the Contains \(Full Text\) Search Operator](#) on page 20.

## Enabling the Contains (Full Text) Search Operator

After the NA database is enabled for full text search, enable the “contains (full text)” search operator in the NA console as follows:

- 1 Back up the `adjustable_options.rcx` file to a location outside the `<NA_HOME>` directory.
- 2 In the `adjustable_options.rcx` file, add the following line:
 

```
<option name="fulltextsearch/enabled">true</option>
```
- 3 Save the `adjustable_options.rcx` file.
- 4 Reload the `.rcx` settings by doing one of the following:
  - Run the `reload server options` command from the NA proxy.
  - Restart the NA services.

## Using the Contains (Full Text) Search Operator

The “contains (full text)” operator supports the following search types:

- Search for a single word (a sequence of characters containing no spaces).
 

Valid examples:

  - interface
  - telnet
  - snmp
- Search for a single word using the wildcard.
  - The asterisk character (\*) is the only supported wildcard; this wildcard must be at the end of the search phrase.
  - Valid examples:
    - interf\*
    - tel\*
- Search for an IP address (same as searching for a single word).
 

The asterisk character (\*) is the only supported wildcard; this wildcard must be at the end of the search phrase.

- Search for an IPv4 address is supported and treated as single word.  
Valid examples:
  - 10.11.12.13 results in exact match
  - 10.11.12.\* results in all addresses that start with 10.11.12
  - 10.11.\* results in all addresses that start with 10.11
- Search for a phrase (a sequence of characters containing one or more white spaces):  
Valid examples:
  - set vlan
  - set vpn name
- Search for a phrase using the wildcard.
  - The asterisk character (\*) is the only supported wildcard; this wildcard must represent one or more complete words within of the search phrase.
  - The \* must NOT be at the end of the search phrase.
  - Use white space on either side of the \*. If white space is absent, NA treats the search as a word using the wildcard.
  - Valid examples:
    - set \* name
    - telnet \* table \* settings



Logical operators (AND, OR, NOT, ACCUM, EQUIV) are not supported nor considered as part of search string.

## Disabling the Contains (Full Text) Search Operator

To temporarily disable the “contains (full text)” search operator in the NA console, follow these steps:

- 1 If any dynamic groups are configured to use the “contains (full text)” or “does not contain (full text)” operator, edit or delete these dynamic group configurations.
- 2 Back up the `adjustable_options.rcx` file to a location outside the `<NA_HOME>` directory.
- 3 In the `adjustable_options.rcx` file, locate the following line:
 

```
<option name="fulltextsearch/enabled">true</option>
```
- 4 Edit the located line to set the `fulltextsearch/enabled` option to false:
 

```
<option name="fulltextsearch/enabled">>false</option>
```

Alternatively, delete this option from the file.
- 5 Save the `adjustable_options.rcx` file.
- 6 Reload the `.rcx` settings by doing one of the following:
  - Run the `reload server options` command from the NA proxy.
  - Restart the NA services.

## Disabling Full Text Search

To permanently disable the “contains (full text)” search operator in the NA console and to remove the full text index from the database, follow these steps:

- 1 If any dynamic groups are configured to use the “contains (full text)” or “does not contain (full text)” operator, edit or delete these dynamic group configurations.
- 2 Disable the feature in NA:
  - a Back up the `adjustable_options.rcx` file to a location outside of the `<NA_HOME>` directory.
  - b In the `adjustable_options.rcx` file, locate the following line:

```
<option name="fulltextsearch/enabled">true</option>
```
  - c Edit the located line to set the `fulltextsearch/enabled` option to false:

```
<option name="fulltextsearch/enabled">false</option>
```

Alternatively, delete this option from the file.
  - d Save the `adjustable_options.rcx` file.
  - e Reload the `.rcx` settings by doing one of the following:
    - Run the `reload server options` command from the NA proxy.
    - Restart the NA services.
- 3 Remove the full text index:
  - a Log on to the NA proxy with the credentials used to install NA.
  - b Run the following command:

```
run checkdb -resolver removesearchindex -verbose
```

## Command Line Reference

This section describes the NA-provided commands available for working with a full text search index on an Oracle database. Run these commands from the NA proxy.

This content is the complete documentation for these commands. No command-line help is available for them.

### Analyze the NA Database in Preparation for Index Generation

To analyze the NA database in preparation for full-text index generation, run the following command:

```
run checkdb -resolver analyzesearchindex -verbose
```

If Oracle Text is enabled and no full-text index is present, this command determines the total configuration text present in the NA database. It then outputs the following estimates related to full-text index generation:

- Approximate additional space required for the index generation process
- Approximate time required for index generation to complete

Ensure that the database enough space for index as estimated by this CLI command.

If Oracle Text is not enabled, engage the Oracle database administrator to change the configuration. For information about enabling Oracle Text, see “Administering Oracle Text” in the *Oracle Text Application Developer’s Guide*.



Another information source is the Oracle MetaLink document collection, for which you must have a MetaLink account with Oracle. Documents of interest include the following:

- 280713.1: Manual installation, deinstallation of Oracle Text 10gR1
- 979705.1: Manual installation, deinstallation of Oracle Text 10gR2
- 579601.1: Manual installation, deinstallation and verification of Oracle Text 11gR1
- 970473.1: Manual installation, deinstallation and verification of Oracle Text 11gR2

The index configuration process requires available disk space of 50% to 200% of the configuration text size. Actual space requirements depend on the database contents.

The index configuration process is resource-intensive. Actual time depends on database hardware and configuration as well as the volume of text to be indexed.

For more information, see “Frequently Asked Questions About Indexing Performance” in the *Oracle Text Application Developer’s Guide*.

## Check the Status of the NA Database Index

To determine the status of the NA database full-text index, run the following command:

```
run checkdb -resolver statusindex -verbose
```

This command returns the current status of the full-text index for the NA database. Possible values are:

- **COMPLETE & VALID:** Indexing has completed. The index is valid.
- **IN PROGRESS:** Indexing is in progress.
- **NOT PRESENT:** No full-text index is present. Searches based on the “contains (full text)” or “does not contain (full text)” search operator will fail.
- **INVALID:** The full-text index is corrupted. Remove the index, and the add it again.

## Generate an Index of the NA Database

To generate a full-text index (if no index exists) for the NA database, run the following command:

```
run checkdb -resolver addsearchindex -verbose
```

Follow the recommendations from the `run checkdb -resolver analyzesearchindex -verbose` command to understand the disk space and time required for this index generation process.

To track the status of the index generation, do one of the following:

- Run the `run checkdb -resolver statusindex -verbose` command.
- Watch the NA logs with the troubleshooting option `feature/proxy` set to debug.

## Remove the NA Database Index

To remove the full-text index (if present) from the NA database, run the following command:

```
run checkdb -resolver removesearchindex -verbose
```

Searches based on the “contains (full text)” or “does not contain (full text)” search operator will fail.

## Reindex the NA Database

If search queries are very slow, the full-text index might be fragmented. To regenerate the full-text index of the NA database, run the following command:

```
run checkdb -resolver reindex -verbose
```



## 6 Reclaiming Unused Space (Oracle Database)

Database maintenance often involves deleting data chunks within a database table, which results in free space inside the table. New records added after this maintenance populates the free space inside the table first, so the new records can be spread across several physical locations within the table. This fragmentation degrades database performance by extending data access times.

HP Network Automation Software (NA) pruning tasks can cause database table fragmentation. This section identifies one way to defragment an Oracle database tablespace. This procedure can be performed while the database is online.



This documentation describes one approach to this database administration task. Read the prerequisites to determine whether this approach applies to your situation. For other approaches and more detailed information, see the documentation for your database type and version.

Tablespace defragmentation can be run against all tables in the NA schema. [Table 2](#) lists the NA database tables and the associated LOB columns that are most frequently affected by fragmentation.

**Table 2 NA Database Tables Frequently Affected by Fragmentation**

Table Name	Target LOB Columns
RN_DEVICE_ACCESS_LOG	<ul style="list-style-type: none"> <li>ChangeEventData</li> <li>Comments</li> </ul>
RN_DEVICE_DATA	<ul style="list-style-type: none"> <li>DataBlock</li> <li>Comments</li> </ul>
RN_DEVICE_TOPOLOGY_DATA	
RN_DIAGNOSTIC_DATA	<ul style="list-style-type: none"> <li>DataBlock</li> <li>Comments</li> </ul>
RN_EVENT	<ul style="list-style-type: none"> <li>EventText</li> <li>EventData</li> </ul>
RN_EVENT_MESSAGE	<ul style="list-style-type: none"> <li>MessageBody</li> </ul>
RN_SCHEDULE_TASK	<ul style="list-style-type: none"> <li>Comments</li> <li>Result</li> <li>TaskData</li> </ul>

To defragment an Oracle database tablespace, follow these steps:

- 1 Verify that the tablespace meets the following prerequisites:
  - The tablespace must be set with automatic segment space management (ASSM).
  - The disk space available to the redo log must be sufficiently large relative to the size of the tablespace.
- 2 Enter the SQL\*Plus command-line interface as the SYSDBA user.
- 3 Use the Oracle Segment Advisor to determine whether defragmentation is needed. Either check the results of the Automatic Segment Advisor or run the Segment Advisor manually.

For more information, see “Using the Segment Advisor” in the *Oracle Database Administrator’s Guide*.

- 4 For each table that requires defragmentation, do the following:
  - a Enable row movement by running the following command:

```
ALTER TABLE <table_name> ROW MOVEMENT;
```
  - b Reclaim unused rows by running the following command:

```
ALTER TABLE <table_name> SHRINK SPACE;
```
  - c Reclaim unused LOB columns by running the following command:

```
ALTER TABLE <table_name> MODIFY LOB (<lob_column_name>) (SHRINK SPACE);
```



Alternatively, reclaim unused rows and columns with one command as follows:

```
ALTER TABLE <table_name> SHRINK SPACE CASCADE;
```

This CASCADE command replaces [step b](#) and [step c](#).

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