

# Oracle® SQLcl

## User's Guide



Release 20.3

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# Preface

This guide provides usage information about Oracle SQLcl (SQL Developer Command Line), a Java-based command-line interface for Oracle Database.

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Below are 4th party dependencies. (Some are optional)

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bouncycastle v1.60 (optional)

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slf4j, v1.7.25,

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tomcat-apr, v5.5.23 (optional)

Apache Tomcat

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# HttpComponents Http Client 4.5.12

Apache httpclient 4.5.10

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## jackson-core 2.10.3

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## Launch4j 3.12

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Logging (commons-logging:commons-logging:1.1 - [http://jakarta.apache.org/commons/\\${pom.artifactId.substring\(8\)}/](http://jakarta.apache.org/commons/${pom.artifactId.substring(8)}/))

ant-antunit (org.apache.ant:ant-antunit:1.3 - no url defined)

AssertJ fluent assertions (org.assertj:assertj-core:1.5.0 - <http://nexus.sonatype.org/oss-repository-hosting.html/assertj-parent-pom/assertj-core>)

Groovy (org.codehaus.groovy:groovy-all:2.3.10 - <http://groovy.codehaus.org/>)

Objenesis (org.objenesis:objenesis:1.2 - <http://objenesis.googlecode.com/svn/docs/index.html>)

osgi.core (org.osgi:org.osgi.core:4.3.1 - <http://www.osgi.org>)

powermock-api-mockito (org.powermock:powermock-api-mockito:1.5.6 - <http://www.powermock.org/powermock-api/powermock-api-mockito>)

powermock-api-support (org.powermock:powermock-api-support:1.5.6 - <http://www.powermock.org/powermock-api/powermock-api-support>)

powermock-core (org.powermock:powermock-core:1.5.6 - <http://www.powermock.org>)

powermock-module-junit4 (org.powermock:powermock-module-junit4:1.5.6 - <http://www.powermock.org>)

powermock-module-junit4-common (org.powermock:powermock-module-junit4-common:1.5.6 - <http://www.powermock.org/powermock-modules/powermock-module-junit4-common>)

powermock-reflect (org.powermock:powermock-reflect:1.5.6 - <http://www.powermock.org/powermock-reflect>)

Spock Framework - Core Module (org.spockframework:spock-core:1.0-groovy-2.3 - <http://spockframework.org>)

Spring Framework (org.springframework:spring:2.0.6 - <http://www.springframework.org>)

SnakeYAML (org.yaml:snakeyaml:1.17 - <http://www.snakeyaml.org>)

avalon-framework (avalon-framework:avalon-framework:4.1.3 - no url defined)

log4j (log4j:log4j:1.2.12 - no url defined)

org.apache.tools.ant (org.apache.ant:ant:1.7.1 - <http://ant.apache.org/ant/>)

ant-launcher (org.apache.ant:ant-launcher:1.7.1 - <http://ant.apache.org/ant-launcher/>)

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=====

javax.servlet:servlet-api:2.4 - no url defined)

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## StringTemplate 4.3

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# 1

## Changes in Release 20.3 for *Oracle SQLcl User's Guide*

This section lists the changes for this release.

### New Features

New features in this release are:

- Access Oracle SQL Developer Data Modeler features using the `MODELER` command.  
See [MODELER](#)
- Call OCI REST APIs using the `OCI` command.  
See [Calling Oracle Cloud Infrastructure REST APIs Using the OCI Command](#)
- Set a default Cloud Storage URL and list contents in object storage using the Cloud Storage (`cs`) command.  
See [Using the Cloud Storage Command](#)

# 2

## Using Oracle SQLcl

Oracle SQLcl (SQL Developer Command Line) is a Java-based command-line interface for Oracle Database. Using SQLcl, you can execute SQL and PL/SQL statements interactively or as a batch file. SQLcl provides inline editing, statement completion, command recall, and also supports existing SQL\*Plus scripts.

Oracle SQLcl is available for download from Oracle Technology Network.

This chapter contains the following topics:

- [Alphabetic List of SQLcl Commands](#)
- [List of Unsupported SQL\\*Plus Commands and Features](#)
- [Starting and Leaving SQLcl](#)
- [Starting Up and Shutting Down a Database](#)
- [Entering and Executing Commands](#)
- [Manipulating SQL, SQLcl, and PL/SQL Commands](#)
- [Formatting Query Results](#)
- [Accessing Databases](#)
- [Miscellaneous Commands](#)

### 2.1 Alphabetic List of SQLcl Commands

```
@{url | file_name[.ext]} [arg ...]
@@ { url | file_name[.ext] } [arg ...]
/ (slash)
ACC[EPT] variable [NUM[BER] | CHAR | DATE | BINARY_FLOAT | BINARY_DOUBLE]
[FOR[MAT] format] [DEF[AULT] default] [PROMPT text | NOPR[OMPT]] [HIDE]
ALIAS [<name>=<SQL statement>; | LOAD [<filename>]|SAVE [<filename>] | LIST
[<NAME>] | DROP <name> | DESC <name> <Description String>]
APEX [export <application_id>]
A[PPEND] text
ARCHIVE LOG LIST
BRE[AK] [ON report_element [action [action]]] ...
BRIDGE
BTI[TLE] [printspectext | variable] ... | [ON | OFF]
CD [<directory>]
```

C[HANGE] *sepchar old [sepchar [new [sepchar]]]*

CL[EAR] *option ...*

COL[UMN] [*{column | expr} [option ...]*]

COMP[UTE] [*function [LAB[EL] text] ... OF {expr | column | alias} ...ON {expr | column | alias | REPORT | ROW} ...*]

CONN[ECT] [*{<logon> | / | proxy} [AS {SYSOPER | SYSDBA | SYSASM}] [edition=value]*]

CTAS *table new\_table*

COPY *{FROM database | TO database | FROM database TO database} {APPEND | CREATE | INSERT | REPLACE | APPEND\_BYTE | CREATE\_BYTE | REPLACE\_BYTE} destination\_table(column, column, column, ...) USING query*

DDL [*object\_name [type] [SAVE filename]*]

DEF[INE] [*variable*] | [*variable = text*]

DEL [*n | n m | n \* | n LAST | \* | \* n | \* LAST | LAST*]

DESC[RIBE] [*{[schema.]object[@connect\_identifler]}*]

DISC[ONNECT]

ED[IT] [*file\_name[.ext]*]

EXEC[UTE] *statement*

{EXIT | QUIT} [SUCCESS | FAILURE | WARNING | *n* | *variable* | *:BindVariable*] [COMMIT | ROLLBACK]

FIND [*<filename>*]

FORMAT [BUFFER | RULES *<filename>* | FILE *<input\_file>* *<output\_file>*]

GET [FILE] *file\_name[.ext]* [LIST | NOLIST]

HELP | ? [*topic*]

HISTORY [*index | FULL | USAGE | SCRIPT | TIME | CLEAR (SESSION)?*]

HO[ST] [*command*]

INFO[RMATION] [*{[schema.]object[@connect\_identifler]}*]

I[NPUT] [*text*]

L[IST] [*n | n m | n \* | n LAST | \* | \* n | \* LAST | LAST*]

LOAD [*schema.]table\_name[@db\_link] file\_name*

OERR *<facility>* *<error>*

PASSW[ORD] [*username*]

PAU[SE] [*text*]

PRINT [*variable ...*]

PRO[MPT] [*text*]

```

{QUIT | EXIT} [SUCCESS | FAILURE | WARNING | n | variable | :BindVariable]
[COMMIT | ROLLBACK]

REM[ARK]

REPEAT <iterations> <sleep>

REST [export [<module_name> | <module_prefix>] | modules | privileges |
schemas]

R[UN]

SAV[E] [FILE] file_name [.ext] [CRE[ATE] | REP[LACE] | APP[END]]

SCRIPT <script file>

SET system_variable value

SHO[W] [option]

SHUTDOWN [ABORT | IMMEDIATE | NORMAL | TRANSACTIONAL [LOCAL]]

SODA

SPO[OL] [filename [.ext] [CRE[ATE] | REP[LACE] | APP[END]] | OFF | OUT]

SSTUNNEL <username>@<hostname> -i <identity_file> [-L
localPort:Remotehost:RemotePort]

STA[RT] { url | file_name [.ext] } [arg ...]

STARTUP db_options | cdb_options | upgrade_options

STORE {SET} file_name [.ext] [CRE[ATE] | REP[LACE] | APP[END]]

TNSPING <address>

TTI[TLE] [printspect [text | variable] ...] | [ON | OFF]

UNDEF[INE] variable ...

WHENEVER OSERROR {EXIT [SUCCESS | FAILURE | WARNING | n | variable | :BindVariable]
[COMMIT | ROLLBACK] | CONTINUE[COMMIT | ROLLBACK | NONE]}

WHENEVER SQLERROR {EXIT [SUCCESS | FAILURE | WARNING | n | variable
| :BindVariable] [COMMIT | ROLLBACK] | CONTINUE [COMMIT | ROLLBACK |
NONE]}

WHICH <filename>

XQUERY xquery_statement

```

 **Note:**

You can use the up and down arrow keys to cycle through the previous 100 statements or scripts.

## 2.2 List of Unsupported SQL\*Plus Commands and Features

### Commands

- REPHEADER
- REPFOOTER
- TIMING

The TIMING command is replaced by the SET TIMING command.

### System Variables and Environment Settings through the SET Command

- describe
- flagger
- fullcolname
- logsource
- loboffset
- markup
- recsep
- shiftinout
- sqlterminator
- underline
- xmloptimizationcheck

## 2.3 Starting and Leaving SQLcl

### Logging In and Logging Out

Use the following commands to log in to and out of SQLcl.

```
SQLCL [[option] [logon | / NOLOG] [start]]
```

where *option* has the following syntax:

```
-H[ELP] | -V[ERSION] | [ [-C[OMPATIBILITY] x.y[.z]] [-L[OGON]] [-  
NOLOGINTIME] [-R[ESTRICT] {1 | 2 | 3}] [-S[ILENT]] [-AC]]
```

where *logon* has the following syntax:

```
{username[/password] [@connect_identifier] | /} [AS {SYSASM | SYSBACKUP |  
SYSDBA | SYSDBG | SYSOPER | SYSRAC | SYSKM}] [edition=value]
```

and where *start* has the following syntax:

```
@{url | file_name[.ext]} [arg ...]  
{EXIT | QUIT} [SUCCESS | FAILURE | WARNING | n | variable | :BindVariable]  
[COMMIT | ROLLBACK]
```

Commits or rolls back all pending changes, logs out of Oracle, terminates SQLcl and returns control to the operating system.

```
{QUIT | EXIT} [SUCCESS | FAILURE | WARNING | n | variable | :BindVariable]
[COMMIT | ROLLBACK]
```

Commits or rolls back all pending changes, logs out of Oracle, terminates SQLcl and returns control to the operating system.

### Setting JVM Options

To set an Oracle Java Virtual Machine (JVM) option in SQLcl, use the following environment variable:

```
JAVA_TOOL_OPTIONS
```

The following example shows in Windows, how to change the user interface language in SQLcl to Spanish (es):

```
c:\SQLDev\sqlcl\20.2\sqlcl\bin>SET JAVA_TOOL_OPTIONS=-Duser.language=es
c:\SQLDev\sqlcl\20.2\sqlcl\bin>sql hr/oracle
Picked up JAVA_TOOL_OPTIONS: -Duser.language=es
SQLcl: Versin 20.2 Production en mar. ago. 25 15:37:58 2020
Copyright (c) 1982, 2020, Oracle. Todos los derechos reservados.
Last Successful login time: Mar Ago 25 2020 15:38:01 -04:00
Conectado a:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit
Production
```

```
Se ha encontrado login.sql en el CWD. El acceso a la DB est 
restringido para login.sql.
Ajuste SQLPATH para incluir la ruta y activar la funcionalidad completa.
SQL>
```

The following example shows how to change the user interface language in SQLcl to French (fr), and also increase the maximum memory available to SQLcl (-Xmx800m):

```
c:\SQLDev\sqlcl\20.2\sqlcl\bin>SET JAVA_TOOL_OPTIONS=-Duser.language=fr
-Xmx800m
c:\SQLDev\sqlcl\20.2\sqlcl\bin>sql hr/oracle
Picked up JAVA_TOOL_OPTIONS: -Duser.language=fr -Xmx800m
SQLcl : version 20.2 Production sur mar. ao t 25 15:57:21 2020
Copyright (c) 1982, 2020, Oracle. Tous droits r serv s....
```

## 2.4 Starting Up and Shutting Down a Database

Starting up and shutting down a database requires DBA privileges.

```
STARTUP db_options | cdb_options | upgrade_options
```

where *db\_options* has the following syntax:

```
[FORCE] [RESTRICT] [PFILE=filename] [QUIET] [ MOUNT [dbname] | [ OPEN
[open_db_options] [dbname] ] | NOMOUNT ]
```

where *open\_db\_options* has the following syntax:

```
READ {ONLY | WRITE [RECOVER]} | RECOVER
```

where *cdb\_options* has the following syntax:

```
root_connection_options | pdb_connection_options
```

where *root\_connection\_options* has the following syntax:

```
PLUGGABLE DATABASE pdbname [FORCE] | [RESTRICT] [ OPEN {open_pdb_options}]
```

where *pdb\_connection\_options* has the following syntax:

```
[FORCE] | [RESTRICT] [ OPEN {open_pdb_options}]
```

where *open\_pdb\_options* has the following syntax:

```
READ WRITE | READ ONLY
```

and where *upgrade\_options* has the following syntax:

```
[PFILE=filename] {UPGRADE | DOWNGRADE} [QUIET]
```

Starts an Oracle Database instance with several options, including mounting and opening a database.

```
SHUTDOWN [ABORT | IMMEDIATE | NORMAL | TRANSACTIONAL [LOCAL]]
```

Shuts down a currently running Oracle instance, optionally closing and dismounting a database.

## 2.5 Entering and Executing Commands

Use the following commands to execute and collect timing statistics on SQL commands and PL/SQL blocks:

```
/ (slash)
```

Executes the most recently executed SQL command or PL/SQL block which is stored in the SQL buffer. Does not list the command. Use slash (/) at the command prompt or line number prompt in SQLcl command line.

```
EXEC[UTE] statement
```

Executes a single PL/SQL statement or runs a stored procedure.

```
R[UN]
```

Lists and executes the most recently executed SQLcl command or PL/SQL block which is stored in the SQL buffer. The buffer has no command history list and does not record SQLcl commands.

```
TIMI[NG]
```

Timing is only available as a switch.

Use the following command to access the help system:

```
HELP | ? [topic]
```

Accesses the command-line help system. Enter `HELP INDEX` or `? INDEX` for a list of topics. You can view the Oracle Database Library at <http://www.oracle.com/technology/documentation>.

Use the following command to execute operating system commands:

```
HO[ST] [command]
```

Executes an operating system command without leaving SQLcl. Enter `HOST` without command to display an operating system prompt. You can then enter multiple operating system commands.

With some operating systems, you can use another character instead of `HOST` such as `!` (UNIX) and `$` (Windows). See the Oracle installation and user's manuals provided for your operating system for details.

Use the following command to recall the history of SQLcl commands:

```
HISTORY [index | FULL | USAGE | SCRIPT | TIME | CLEAR (SESSION)?] | FAILS
```

- Use the Up and Down arrow keys to navigate through history items at the prompt.
- Use the `HISTORY` command to print the history contents.
- History is limited to the last 100 statements.
- `SET HISTORY LIMIT N` allows you to change the default limit, where *N* is the maximum number.
- History is retained between SQLcl sessions.
- By default, the `SHOW`, `HISTORY`, `CONNECT`, and `SET` commands are not saved in history.
- `SET HISTORY BLACKLIST` allows you to set the commands that should not be recorded in history.

## 2.6 Manipulating SQL, SQLcl, and PL/SQL Commands

Use the following commands to edit SQL commands and PL/SQL blocks:

```
A[PPEND] text
```

Adds specified text to the end of the current line in the SQL buffer. To separate *text* from the preceding characters with a space, enter two spaces. To append *text* that ends with a semicolon, end the command with two semicolons (a single semicolon is interpreted as a command terminator).

```
C[HANGE] sepchar old [sepchar [new [sepchar]]]
```

Changes first occurrence of *old* on the current line of the SQL buffer. The buffer has no command history list and does not record SQLcl commands. You can use any non-alphanumeric character such as `/` or `!` as a *sepchar*. You can omit the space between `CHANGE` and the first *sepchar*.

```
DEL [n | n m | n * | n LAST | * | * n | * LAST | LAST]
```

Deletes one or more lines of the SQL buffer ("`*`" indicates the current line). You can omit the space between `DEL` and *n* or `*`, but not between `DEL` and `LAST`. Enter `DEL` with no clauses to delete the current line of the buffer. The buffer has no command history list and does not record SQLcl commands.



`I[NPUT] [text]`

Adds one or more new lines of text after the current line in the SQL buffer. The buffer has no command history list and does not record SQLcl commands.

`L[IST] [n | n m | n * | n LAST | * | * n | * LAST | LAST]`

Lists one or more lines of the most recently executed SQL command or PL/SQL block which is stored in the SQL buffer. Asterisk (\*) indicates the current line. You can omit the space between LIST and n or \*, but not between LIST and LAST. Enter LIST with no clauses to list all lines.

In SQLcl, you can also use ";" to list all the lines in the SQL buffer. The buffer has no command history list and does not record SQLcl commands.

Use the following commands to run scripts:

`@ { url | file_name[.ext] } [arg ...]`

Runs the SQLcl statements in the specified script. The script can be called from the local file system or a web server. You can pass values to script variables in the usual way.

`@@ { url | file_name[.ext] } [arg ...]`

Runs the SQLcl statements in the specified script. This command is almost identical to the @ command. It is useful for running nested scripts because it has the additional functionality of looking for the specified script in the same path or url as the calling script.

`REPEAT <iterations> <sleep>`

Repeats the current SQL in the buffer at the specified times with sleep intervals. The maximum sleep interval is 120 seconds.

`SCRIPT <script file>`

Runs the SQLcl statements in the specified script.

`STA[RT] { url | file_name[.ext] } [arg ...]`

Runs the SQLcl statements in the specified script. The script can be called from the local file system or a web server. You can pass values to script variables in the usual way.

Use the following commands to create and modify scripts:

`ED[IT] [file_name[.ext]]`

Invokes an operating system text editor on the contents of the specified file or on the contents of the SQL buffer. To edit the buffer contents, omit the file name.

The DEFINE variable `_EDITOR` can be used to set the editor to use. In SQLcl, `_EDITOR` can be set to any editor that you prefer. *Inline* will set the editor to be the SQLcl editor. This supports the following shortcuts:

- `^R` - Run the current buffer
- `^W` - Go to top of buffer
- `^S` - Go to bottom of buffer
- `^A` - Go to start of line

- `^E` - Go to end of line

FORMAT

- `FORMAT BUFFER` - formats the script in the SQLcl Buffer
- `FORMAT RULES <filename>` - Loads SQLDeveloper Formatter rules file to formatter
- `FORMAT FILE <input_file> <output_file>`

`GET file_name[.ext] [LIST | NOLIST]`

Loads a SQL statement or PL/SQL block from a file into the SQL buffer. The buffer has no command history list and does not record SQLcl commands.

`REM[ARK]`

Begins a comment in a script. The REMARK command must appear at the beginning of a line, and the comment ends at the end of the line (a line cannot contain both a comment and a command). SQLcl does not interpret the comment as a command.

`SAV[E] [FILE] file_name[.ext] [CRE[ATE] | REP[LACE] | APP[END]]`

Saves the contents of the SQL buffer in a script. The buffer has no command history list and does not record SQLcl commands.

`STORE {SET} file_name[.ext] [CRE[ATE] | REP[LACE] | APP[END]]`

Saves attributes of the current SQLcl environment in a file.

`WHENEVER OSERROR {EXIT [SUCCESS | FAILURE | n | variable | :BindVariable] [COMMIT | ROLLBACK] | CONTINUE [COMMIT | ROLLBACK | NONE]}`

Performs the specified action (exits SQLcl by default) if an operating system error occurs (such as a file writing error).

`WHENEVER SQLERROR {EXIT [SUCCESS | FAILURE | WARNING | n | variable | :BindVariable] [COMMIT | ROLLBACK] | CONTINUE [COMMIT | ROLLBACK | NONE]}`

Performs the specified action (exits SQLcl by default) if a SQL command or PL/SQL block generates an error.

Use the following commands to write interactive commands:

`ACC[EPT] variable [NUM[BER] | CHAR | DATE | BINARY_FLOAT | BINARY_DOUBLE] [FOR[MAT] format] [DEF[AULT] default] [PROMPT text | NOPR[OMPT]] [HIDE]`

Reads a line of input and stores it in a given substitution variable.

`DEF[INE] [variable] | [variable = text]`

Specifies a substitution variable and assigns a CHAR value to it, or lists the value and variable type of a single variable or all variables.

`PAU[SE] [text]`

Displays the specified text then waits for the user to press RETURN.

`PRO[MPT] [text]`

Sends the specified message or a blank line to the user's screen.

```
UNDEF[INE] variable ...
```

Deletes one or more substitution variables that you defined either explicitly (with the DEFINE command) or implicitly (with a START command argument).

Use the following commands to create and display bind variables:

```
PRINT [variable ...]
```

Displays the current values of bind variables, or lists all bind variables.

Use the following symbols to create substitution variables and parameters for use in scripts:

```
&n
```

Specifies a parameter in a script you run using the START command. START substitutes values you list after the script name as follows: the first for &1, the second for &2, and so on.

```
&user_variable, &&user_variable
```

Indicates a substitution variable in a SQL or SQLcl command. SQLcl substitutes the value of the specified substitution variable for each substitution variable it encounters. If the substitution variable is undefined, SQLcl prompts you for a value *each* time an "&" variable is found, and the *first* time an "&&" variable is found.

```
. (period)
```

Terminates a substitution variable followed by a character that would otherwise be part of the variable name.

## 2.7 Formatting Query Results

Use the following commands to format, store and print your query results.

```
BRE[AK] [ON report_element [action [action]]] ...
```

Specifies where changes occur in a report and the formatting action to perform, such as:

- suppressing the display of duplicate values for a given column
- skipping a line each time a given column value changes
- printing computed figures each time a given column value changes or at the end of the report

Enter BREAK with no clauses to list the current BREAK definition.

Where *report\_element* has the following syntax:

```
{column | expression | ROW | REPORT}
```

and where *action* has the following syntax:

```
[SKI[P] n | [SKI[P]] PAGE] [NODUP[LICATES] | DUP[LICATES]]
```

```
BTI[TLE] [printspec [text | variable] ...] | [ON | OFF]
```

Places and formats a title at the bottom of each report page, or lists the current BTITLE definition. Use one of the following clauses in place of *printspec*:

BOLD  
CE[ENTER]  
COL *n*  
FORMAT *text*  
LE[FT]  
R[IGHT]  
S[KIP] [*n*]  
TAB *n*

CL[EAR] *option ...*

Resets or erases the current value or setting for the specified option.

Where *option* represents one of the following clauses:

BRE[AKS]  
BUFF[ER]  
COL[UMNS]  
COMP[UTES]  
CONTEXT  
SCR[EEN]  
SQL  
TIMI[NG]

COL[UMN] [{*column* | *expr*} [*option ...*]]

Specifies display attributes for a given column, such as:

- text for the column heading
- alignment for the column heading
- format for NUMBER data
- wrapping of column data

Also lists the current display attributes for a single column or for all columns.

Where *option* represents one of the following clauses:

ALI[AS] *alias*  
CLE[AR]  
ENTMAP {ON | OFF}  
FOR[MAT] *format*  
HEA[DING] *text*  
JUS[TIFY] {L[EFT] | C[ENTER] | R[IGHT]}  
LIKE {*expr* | *alias*}  
NEWL[INE]  
NEW\_V[ALUE] *variable*  
NOPRI[NT] | PRI[NT]  
NUL[L] *text*  
OLD\_V[ALUE] *variable*  
ON | OFF  
WRA[PPED] | WOR[D\_WRAPPED] | TRU[NCATED]

**Note:**

Currently only `NEW_V[ALUE]` variable syntax is supported.

Enter `COLUMN [{column |expr} FORMAT format]` where the *format* element specifies the display format for the column.

To change the display format of a NUMBER column, use `FORMAT` followed by one of the elements in the following table:

Element	Examples	Description
, (comma)	9,999	Displays a comma in the specified position.
. (period)	99.99	Displays a period (decimal point) to separate the integral and fractional parts of a number.
\$	\$9999	Displays a leading dollar sign.
0	0999 9990	Displays leading or trailing zeros (0).
9	9999	Displays a value with the number of digits specified by the number of 9s. Value has a leading space if positive, a leading minus sign if negative. Blanks are displayed for leading zeros. A zero (0) is displayed for a value of zero.
B	B9999	Displays blanks for the integer part of a fixed-point number when the integer part is zero, regardless of zeros in the format model.
C	C999	Displays the ISO currency symbol in the specified position.
D	99D99	Displays the decimal character to separate the integral and fractional parts of a number.
EEEE	9.999EEEE	Displays a value in scientific notation (format must contain exactly four "E"s).
G	9G999	Displays the group separator in the specified positions in the integral part of a number.
L	L999	Displays the local currency symbol in the specified position.
MI	9999MI	Displays a trailing minus sign after a negative value. Displays a trailing space after a positive value.
PR	9999PR	Displays a negative value in <angle brackets>. Displays a positive value with a leading and trailing space.
RN rn	RN rn	Displays uppercase Roman numerals. Displays lowercase Roman numerals. Value can be an integer between 1 and 3999.
S	S9999 9999S	Displays a leading minus or plus sign. Displays a trailing minus or plus sign.

Element	Examples	Description
TM	TM	Displays the smallest number of decimal characters possible. The default is TM9. Fixed notation is used for output up to 64 characters, scientific notation for more than 64 characters. Cannot precede TM with any other element. TM can only be followed by a single 9 or E.
U	U9999	Displays the dual currency symbol in the specified position.

```
COMP[UTE] [function [LAB[EL] text] ... OF {expr | column | alias} ...ON
{expr | column | alias | REPORT | ROW} ...]
```

In combination with the `BREAK` command, calculates and prints summary lines using various standard computations. It also lists all `COMPUTE` definitions. The following table lists valid functions. All functions except `NUMBER` apply to non-null values only. `COMPUTE` functions are always executed in the following sequence `AVG`, `COUNT`, `MINIMUM`, `MAXIMUM`, `NUMBER`, `SUM`, `STD`, `VARIANCE`.

Function	Computes	Applies to Datatypes
AVG	Average of non-null values	NUMBER
COU[NT]	Count of non-null values	All types
MIN[IMUM]	Minimum value	NUMBER, CHAR, NCHAR, VARCHAR2 (VARCHAR), NVARCHAR2 (NCHAR VARYING)
MAX[IMUM]	Maximum value	NUMBER, CHAR, NCHAR, VARCHAR2 (VARCHAR), NVARCHAR2 (NCHAR VARYING)
NUM[BER]	Count of rows	All types
SUM	Sum of non-null values	NUMBER
STD	Standard deviation of non-null values	NUMBER
VAR[ IANCE]	Variance of non-null values	NUMBER

```
SET SQLFORMAT {csv | html | xml | json | ansiconsole | insert | loader |
fixed | default}
```

Outputs reports in various formats. The `ansiconsole` option formats and resizes data according to the column widths, for easier readability. The `json` option returns a query in JSON format.

```
SET SQLFORMAT DELIMITED <delimiter> <left enclosure> <right enclosure>
```

allows you to set a custom delimited format.

`SET SQLFORMAT JSON-FORMATTED` returns a query in well formatted JSON output.

```
SPO[OL] [filename [.ext]] [CRE[ATE] | REP[LACE] | APP[END]] | OFF | OUT]
```

Stores query results in a file, or optionally sends the file to a printer. `OFF` stops spooling. `OUT` stops spooling and sends the file to your computer's default printer. Enter `SPOOL` with no clauses to list the current spooling status. If no file extension is given, the default extension, `.lst` or `.lis`, is used.

```
TTITLE [printspec [text | variable] ...] | [ON | OFF]
```

Places and formats a specified title at the top of each report page, or lists the current TTITLE definition. The old form of TTITLE is used if only a single word or a string in quotes follows the TTITLE command.

Where *printspec* represents one or more of the following clauses:

```
BOLD
CE[NTER]
COL n
FORMAT text
LE[FT]
R[IGHT]
S[KIP] [n]
TAB n
```

## 2.8 Accessing Databases

Use the following commands to access and copy data between tables on different databases:

```
CONN[ECT] [{<logon>| / |proxy} [AS {SYSOPER | SYSDBA | SYSASM}]
[edition=value]]
```

where *logon* has the following syntax:

```
username[/password] [@connect_identifier]
```

where *proxy* has the following syntax:

```
proxyuser[username] [/password] [@connect_identifier]
```



### Note:

The brackets around *username* in *proxy* are required syntax.

Connects a given username to the Oracle Database. If you omit *connect\_identifier*, SQLcl connects you to the default database. If you omit *username* and/or *password*, SQLcl prompts you for them. CONNECT followed by a slash (/) connects you using a default (OPS\$) logon.

When you run a CONNECT command, the site profile, *glogin.sql*, and the user profile, *login.sql*, are processed in that order. CONNECT does not reprompt for username or password if the initial connection does not succeed.

```
DISC[ONNECT]
```

Commits pending changes to the database and logs the current user out of Oracle, but does not exit SQLcl. In SQLcl command line, use EXIT or QUIT to log out of Oracle and return control to your computer's operating system.

```
COPY {FROM database | TO database | FROM database TO database} {APPEND
| CREATE | INSERT | REPLACE | APPEND_BYTE | CREATE_BYTE | REPLACE_BYTE}
destination_table[(column, column, column, ...)] USING query
```

where *database* has the following syntax:

```
username[/password]@connect_identifier
```

Copies data from a query to a table in the same or another database. APPEND, CREATE, INSERT or REPLACE specifies how COPY treats the existing copy of the destination table (if it exists). USING *query* identifies the source table and determines which rows and columns COPY copies from it. COPY supports CHAR, DATE, LONG, NUMBER and VARCHAR2 datatypes.

```
PASSW[ORD] [username]
```

Allows you to change a password without displaying it on an input device.

```
XQUERY xquery_statement
```

Allows you to run an XQuery from SQLcl.

## 2.9 Miscellaneous Commands

```
ALIAS [<name>=<SQL statement>; | LOAD [<filename>] | SAVE [<filename>] | LIST
[<NAME>] | DROP <name> | DESC <name> <Description String>]
```

Alias is a command which allows you to save a SQL, PL/SQL or SQL\*Plus script and assign it a shortcut command.

- ALIAS — Print a list of aliases
- ALIAS LIST <alias\_name> — List the contents of the alias

The following example shows how to create a simple alias:

```
SQL> ALIAS action1=select :one from dual;
```

### Note:

Define an alias simply by using the alias keyword followed by a single identifier name followed by an '='. Anything after the '=' will be used as the alias contents. If it is SQL, it will be terminated by ';'. If it is PL/SQL, it will be terminated by '/'.

```
APEX
```

Lists Application Express Applications. Use APEX EXPORT <app id> to export the application which could be combined with spool for writing to a file.

```
ARCHIVE LOG LIST
```

Displays information about redo log files.

```
BRIDGE <targetTableName> as "<jdbcURL>"(<sqlQuery>);
```



Used mainly to script data move between two connections/schemas. It also includes functionality to dynamically create Oracle tables which "fit" the data being received through JDBC. The following functionality is available:

1. Query tables in other connections
2. Query tables in multiple connections in the same statement
3. Insert data from one connection into another
4. Create a table and insert data into it from another connection

```
CTAS table new_table
```

Uses DBMS\_METADATA to extract the DDL for the existing table, then modifies that into a create table as select \* from.

```
DDL [object_name [type] [SAVE filename]]
```

Generates the code to reconstruct the object listed. Use the *type* option for materialized views. Use the SAVE option to save the DDL to a file.

```
DESC[RIBE] {[schema.]object[@connect_identifier]}
```

Lists the column definitions for a table, view or synonym, or the specifications for a function or procedure.

```
FIND [<filename>]
```

Searches the SQLPATH and its directories for the specified file name. FIND where <filename> lists all the SQLPATH locations where it finds files matching the specified file name.

```
INFO[RMIATION] {[schema.]object[@connect_identifier]}
```

Lists more detailed information about the column definitions for a table, view or synonym, or the specifications for a function or procedure.



#### Note:

INFORMATION+ will show column statistics.

```
OERR <facility> <error>
```

Displays information about errors. Facility is identified by the prefix string in the error message. For example, if you get ORA-7300, "ora" is the facility and "7300" is the error. So you should type "oerr ora 7300".

```
SSHTUNNEL <username>@<hostname> -i <identity_file> [-L  
localPort:Remotehost:RemotePort]
```

Creates a tunnel using standard ssh options such as port forwarding like option -L of the given port on the local host will be forwarded to the given remote host and port on the remote side. It also supports identity files, using the ssh -i option. If passwords are required, they will be prompted for.

```
TNSPING <address>
```

The TNSPING utility determines whether the listener for a service on an Oracle Net network can be reached successfully.

WHICH

Searches the SQLPATH and its directories for the specified file name and prints the name of the first file matching the specified file name in the SQLPATH.

## 2.9.1 REST

REST enables you to export Oracle REST Data Services 3.x services. This is applicable for Oracle REST Data Services release 3.0.5 or later. If you have an earlier version of Oracle REST Data Services, you will need to upgrade. See the Installing Oracle REST Data Services section in *Oracle REST Data Services Installation, Configuration, and Development Guide* for details.

The options are:

- `REST export` — Export all Oracle REST Data Services 3.x service modules
- `REST export <module_name>` — Export a specific module
- `REST export <module_uri_prefix>` — Export a specific module related to the given prefix
- `REST modules` — List the available modules
- `REST privileges` — List the existing privileges
- `REST schemas` — List the available schemas

## 2.9.2 SODA

SODA allows schemaless application development using the JSON data model. The options are:

- `SODA create <collection_name>` — Create a new collection
- `SODA list` — List all the collections
- `SODA get <collection_name> [-all | -f | -k | -klist] [{<key> | <k1> <k2> ... | <qbe>}]` — List documents the collection. Optional arguments:
  - `all`: list the keys of all docs in the collection
  - `k`: list docs matching the specific `<key>`
  - `klist`: list docs matching the list of keys
  - `f`: list docs matching the `<qbe>`
- `SODA insert <collection_name> <json_str | filename>` — Insert a new document within a collection
- `SODA drop <collection_name>` — Delete existing collection
- `SODA count <collection_name> [<qbe>]` — Count number of documents inside collection. Optional parameter `<qbe>` returns number of matching documents
- `SODA replace <collection_name> <oldkey> <new_{str | doc}>` — Replace one document with another
- `SODA remove <collection_name> [-k | -klist | -f] {<key> | <k1> <k2> ... | <qbe>}` — Remove documents from collection. Optional arguments:

- `k` : Remove document in collection matching the specific `<key>`
- `klist` : Remove document in collection matching the list `<key1> <key2> ...`
- `f` : Remove document in collection matching `<qbe>`

## 2.9.3 MODELER

The `MODELER` command provides a command-line interface for Oracle SQL Developer Data Modeler features.

The options available are:

- `modeler help <command>` — Displays help information about the specified modeler command.
- `modeler ddl <parameters>` — Generates the Data Definition Language statements from the selected Data Modeler design.
- `modeler report <parameters>` — Generates the report from the selected Data Modeler design.

### MODELER DDL

Generates the Data Definition Language statements from the selected Data Modeler design.

#### Syntax

```
MODELER DDL -design <file> -relmodel <name> [-outputfile <name>]
```

#### Parameters

Parameter	Description
<code>-design (d) &lt;file&gt;</code>	Full path to the design's file name.
<code>-relmodel (rm) &lt;name&gt;</code>	Name of the relational model.
<code>-dbsite (ds) &lt;name&gt;</code>	(Optional) Name of the physical model database site. If this is not specified, then the default relational database management system site for the provided relational model is used.
<code>-outputfile (o) &lt;file&gt;</code>	Full path to the output file for the generated DDL content.
<code>-systemTypesDir (td) &lt;path&gt;</code>	Full path to the system types directory.
<code>-settingsFile (s) &lt;file&gt;</code>	Full path to the exported Data Modeler settings file.
<code>-ddlConfigFile (c) &lt;file&gt;</code>	Full path to the exported DDL configuration file.

#### Example

```
modeler ddl -design "C:/Designs/SH.dmd" -relmodel "SH" -outputfile "C://DDL.sql"
```

## MODELER REPORT

Generates the report from the selected Data Modeler design.

### Syntax

```
MODELER REPORT -design <file> -type <type> [-title <name>] -filename
<name> -outputpath <path>
```

### Parameters

Parameter	Description
-design (d) <file>	Full path to the design's file name.
-type (tp)	Specify the type of report. Available types are: Tables, TableViews, TablesAndViews, Entities, EntityViews, EntitiesAndViews, Domains.
-filename (f) <name>	Name of the generated HTML file.
-outputpath (o) <path>	Full path to the folder for the generated HTML content. The report file is put in that folder and a "css" sub-directory with the CSS files used is created.
-relmodel (rm) <name>	Name of the relational model (for Tables and Table Views only).
-title (tt) <name>	(Optional) Title of the report.
-standardTemplate (st) <name>	Name of the template for a standard report, defining the set of report sections to include (optional). If this is not specified, all report sections are included.
-customTemplate (ct) <name>	(Optional) Name of the template for a custom report.
-reportConfTemplate (c) <name>	(Optional) Name of the template that defines the set of objects and subviews to include in the report.
-companyname (cn) <name>	(Optional) Name of the company.
-systemTypesDir (td) <path>	Full path to the system types directory.
-settingsFile (s) <file>	Full path to the exported Data Modeler settings file.

### Example

```
modeller report -design "C:/Designs/SH.dmd" -type "Tables" -filename
"SHTablesReport" -outputpath "C:/Reports"
```

## 2.9.4 SET *system\_variable value*

Sets a system variable to alter the SQLcl environment settings for your current session.

For example, to:

- Set the display width for data
- Customize HTML formatting

- Enable or disable printing of column headings
- Set the number of lines per page

Enter a system variable followed by a value as shown below:

```

SET APPI[NFO] {ON | OFF | text}
SET ARRAY[SIZE] {15 | n}
SET AUTO[COMMIT] {ON | OFF | IMM[EDIATE] | n}
SET AUTOP[RINT] {ON | OFF}
SET AUTORECOVERY {ON | OFF}
SET AUTOT[RACE] {ON | OFF | TRACE[ONLY]}
SET BLO[CKTERMINATOR] {. | c | ON | OFF}
SET CLASSIC [ ON | OFF ]
SET CLEAR [ TOP | BOTTOM | SAME ]
SET CLOUDCONFIG [ -proxy=<proxyhost>:<port> ] <wallet.zip location>
SET CMDS[EP] {; | c | ON | OFF}
SET CODESCAN ALL | NONE | SQLINJECTION [ON | OFF]
SET COLSEP {_ | text}
SET CON[CAT] {. | c | ON | OFF}
SET COPYC[OMMIT] {0 | n}
SET COPYTYPECHECK {ON | OFF}
SET DDL [[ PRETTY | SQLTERMINATOR | CONSTRAINTS | REF_CONSTRAINTS
| CONSTRAINTS_AS_ALTER|OID | SIZE_BYTE_KEYWORD | PARTITIONING |
SEGMENT_ATTRIBUTES | STORAGE | TABLESPACE | SPECIFICATION | BODY |
FORCE | INSERT | INHERIT | RESET] {on|off} ] | OFF ]
SET DEF[INE] {& | c | ON | OFF}
SET ECHO {ON | OFF}
SET EDITF[ILE] file_name[.ext]
SET EMB[EDDED] {ON | OFF}
SET ENCODING
SET ERRORL[OGGING] {ON | OFF} [TABLE [schema.]tablename] [TRUNCATE]
[IDENTIFIER identifier]
SET ESC[APE] {\ | c | ON | OFF}
SET ESCCHAR {@ | ? | % | $ | OFF}
SET EXITC[OMMIT] {ON | OFF}
SET FEED[BACK] {6 | n | ON | OFF}
SET FLU[SH] {ON | OFF}
SET HEA[DING] {ON | OFF}
SET HEADS[EP] {_ | c | ON | OFF}
SET HISTORY [FAILS [LIMIT [ n | DEFAULT ] ] | NOFAILS |BLACKLIST
[DEFAULT <command list>?|<command list>?] |LIMIT [n|DEFAULT]]
SET LDAPCON
SET LIN[ESIZE] {80 | n}
SET LOAD [options...]
SET LOADFORMAT [ DEFAULT | CSV | DELIMITED | HTML | INSERT | JSON |
JSON-FORMATTED | LOADER | T2 | XML ] [options...]
SET LONG {80 | n}
SET LONGC[HUNKSIZE] {80 | n}
SET MAXROWS {n>1 | DEFAULT}

```

```

SET MAXSPOOLROWSTRUNCATE [ON | OFF | DEFAULT]
SET NET {ON | OFF | READONLY}
SET NEWP[AGE] {1 | n | NONE}
SET NOVERWRITE {ON | OFF | WARN}
SET NULL text
SET NUMF[ORMAT] format
SET NUM[WIDTH] {10 | n}
SET PAGES[IZE] {14 | n}
SET PAU[SE] {ON | OFF | text}
SET RECSEPCHAR {_ | c}
SET SERVEROUT[PUT] {ON | OFF} [SIZE {n | UNL[IMITED]}] [FOR[MAT]
{WRA[PPED] | WOR[D_W]RAPPED | TRU[NCATED]}]
SET SHOW[MODE] {ON | OFF}
SET SQLBL[ANKLINES] {ON | OFF}
SET SQLC[ASE] {MIX[ED] | LO[WER] | UP[PER]}
SET SQLCO[N]TINUE {≥ | text}
SET SQLFORMAT {csv | html | xml | json | ansiconsole | insert | loader
| fixed | default}
SET SQLPLUSCOMPAT[IBILITY] {x.y[.z]}
SET SQLPRE[FIX] {# | c}
SET SQLP[ROMPT] {SQL> | text}
SET SUF[FIX] {SQL | text}
SET T2 METRICDATA NAMESPACE {text}
SET T2 METRICDATA COMPARTMENTID {text}
SET T2 METRICDATA NAME {text}
SET T2 DIMENSIONS RESOURCEID {text}
SET T2 DIMENSIONS REGION {text}
SET T2 METADATA UNIT {text}
SET TAB {ON | OFF}
SET TERM[OUT] {ON | OFF}
SET TI[ME] {ON | OFF}
SET TIMI[NG] {ON | OFF}
SET TRIM[OUT] {ON | OFF}
SET TRIMS[POOL] {ON | OFF}
SET VER[IFY] {ON | OFF}
SET WRA[P] {ON | OFF}

SET DDL [[ PRETTY | SQLTERMINATOR | CONSTRAINTS | REF_CONSTRAINTS
| CONSTRAINTS_AS_ALTER|OID | SIZE_BYTE_KEYWORD | PARTITIONING |
SEGMENT_ATTRIBUTES | STORAGE | TABLESPACE | SPECIFICATION | BODY | FORCE |
INSERT | |INHERIT | RESET] {on|off} ] | OFF ]

```

Allows you to set the DDL transform option on DBMS\_METADATA.

```
SET ENCODING <encoding>
```

Allows you to set the encoding for the current session. Use SHOW ENCODING to view the encoding set for the current session. Use SHOW ENCODINGS to list the encodings available on your platform.

## 2.9.5 SHOW *option*

Shows the value of a SQLcl system variable, or the current SQLcl environment. Enter any system variable set by the SET command in place of *system\_variable*. SHOW SGA can only be used by a DBA user. Use one of the following terms or clauses in place of *option*:

```
system_variable  
ALL  
BTI[TLE]  
CON_ID  
CON_NAME  
CONNECTION  
DDL  
EDITION  
ENCODING  
ENCODINGS  
ERR[ORS] [ {FUNCTION | PROCEDURE | PACKAGE | PACKAGE BODY | TRIGGER |  
VIEW | TYPE | TYPE BODY | DIMENSION | JAVA CLASS} [schema.]name]  
INSTANCE  
JAVA  
JDBC  
LNO  
NLS  
PARAMETER[S] [parameter_name]  
PDBS  
PNO  
RECYC[LEBIN] [original_name]  
REL[EASE]  
REPF[OOTER]  
REPH[EADER]  
SGA  
SPOOL[L]  
SPPARAMETER[S] [parameter_name]  
SQLCODE  
SQLPATH  
TNS  
TTI[TLE]  
USER  
VERSION
```

```
SHOW ENCODING
```

Shows the encoding which is set for the client.

```
SHOW ENCODINGS
```

Shows the available encodings for the client.

## 2.10 Loading a File and Unloading Table Data

Use the `LOAD` command in SQLcl to load a comma-separated value file from a local directory or cloud storage location into a table. The `UNLOAD` command unloads table data into a local directory or cloud storage location.

### 2.10.1 LOAD

Loads a comma-separated value (csv) file from a local directory or cloud storage location into a table.

#### Syntax

```
LOAD [TABLE] [schema.]table_name { <file-specification> | <cloud-  
storage-specification> }
```

where

`[schema.]table_name` identifies the table to load. If the schema is omitted, the table for the connected user schema is loaded.

`file-specification` has the following syntax:

```
{ <fully-qualified-file-name> | <file-name> }
```

- `fully-qualified-file-name`: Identifies the full path to the file to load.
- `file-name`: Identifies the file to load. The file must be located in the default path.

`cloud-storage-specification` has the following syntax:

```
{ CLOUDSTORAGE | CS | CLOUD_STORAGE } [ <url> | <qualified-name> ]
```

- `url`: Complete URL for the cloud storage file if a default cloud storage URL is not set using the Cloud Storage command.
- `qualified-name`: Name of the object, optionally qualified by the namespace and bucket. The qualified name combined with the URL specified by the Cloud Storage command must fully identify the object URL. If `url` and `qualified-name` are omitted, the default Cloud Storage URL must be set to the object.

For more information about the Cloud Storage command, see [Using the Cloud Storage Command](#).

The defaults for the file format are:

- The columns are delimited by a comma and may optionally be enclosed in double quotes.
- Lines are terminated with standard line terminators for Windows, UNIX or Mac.
- File is encoded UTF8.

The default load:

- Processes with 50 rows per batch.



- If AUTOCOMMIT is set in SQLCL, a commit is done every 10 batches.
- The load is terminated if more than 50 errors are found.

Use `SET LOADFORMAT` options for reading the file (delimiter, enclosures).

Use `SET LOAD` options for loading the data (rows per batch, date formats).

### Example

The following example shows how to load a file from local storage into a table.

```
--Create Table "countries"
create table countries(countries_id NUMBER(5),countries_name
VARCHAR2(40));
Table COUNTRIES created

--Load file COUNTRIES_DATA_TABLE.csv in local storage to "countries"
table
load countries C:\Users\JDOE\SQLcl\COUNTRIES_DATA_TABLE.csv

format csv

column_names on
delimiter ,
enclosure_left "
enclosure_right "
encoding UTF8
row_limit off
row_terminator default
skip_rows 0
skip_after_names

--Number of rows processed: 30
--Number of rows in error:
0 - SUCCESS: Load processed without errors

--Check the number of rows in countries table
select count(*) from countries;

COUNT(*)
-----
30
```

## 2.10.2 UNLOAD

Unloads table data into a locally accessible directory or cloud storage location.

Using `SET LOADFORMAT`, you can specify the file format when unloading data into local or cloud storage. By default, the format is `DELIMITED`. The other file format options are `HTML`, `JSON`, `JSON-FORMATTED`, `SQL LOADER`, `T2` and `XML`.

 **Note:**

The SQL LOADER format is not supported for cloud storage.

**Syntax**

```
UNLOAD [TABLE] [schema.]table_name [ <directory-specification> | <cloud-
storage-specification> ]
```

where

[*schema.*]*table\_name* identifies the table to load. If the schema is omitted, the table for the connected user schema is loaded.

*file-specification* has the following syntax:

```
{ <fully-qualified-file-name> | <file-name> }
```

- *fully-qualified-file-name*: Identifies the full path to the file to load.
- *file-name*: Identifies the file to load. The file must be located in the default path.

*cloud-storage-specification* has the following syntax:

```
{ CLOUDSTORAGE | CS | CLOUD_STORAGE } [ <url> | <qualified-name> ]
```

- *url*: Complete URL for the cloud storage file if a default Cloud Storage URL is not set using the Cloud Storage command.
- *qualified-name*: Name of the object, optionally qualified by the namespace and bucket. The qualified name combined with the URL specified by the Cloud Storage command must fully identify the object URL. If *url* and *qualified-name* are omitted, the default Cloud Storage URL must be set to the object.

**Example**

The following example shows how to unload table data from "countries" into a directory in local storage.

```
--Set default directory for file access
cd C:\Users\JDOE\

--Specify JSON as the file format
set loadformat json

--Unload table data from countries
unload countries

format json

** UNLOAD Start ** at 2020.09.10-16.43.24
Export Separate Files to C:\Users\JDOE
DATA TABLE COUNTRIES
File Name: C:\Users\JDOE\COUNTRIES_DATA_TABLE_1.json
```

```
Number of Rows Exported: 30  
** UNLOAD End ** at 2020.09.10-16.43.25
```

## 2.11 Calling Oracle Cloud Infrastructure REST APIs Using the OCI Command

Starting from SQLcl release 20.2, you can call Oracle Cloud Infrastructure (OCI) REST APIs using the `oci` command.



### See Also:

[Oracle Cloud Infrastructure API Documentation](#)

### Prerequisites

To use the `oci` command, you need to first set the OCI profile for authentication and access.

For more information about how to set up the required SSH keys and configure your Oracle Cloud Infrastructure Software Development Kits, see [Setup and Prerequisites](#) in the *Oracle Cloud Infrastructure Documentation*.

To list profiles contained in the OCI configuration file at `~/.oci/config`, enter:

```
oci profile
```

To set the profile name as "demo", enter:

```
oci profile demo
```

### Two Syntax Formats

There are two syntax formats available for using the `oci` command.

#### Specify Target

In the first syntax format, the target is specified completely in the `oci` command:

```
oci <host> <method> [file-to-send-as-body] <request-target>
```

where

*method* is GET, PUT or DELETE.

*request-target* is the path to the namespace, bucket or object on *host*.

### Examples

To delete the emp.csv file from testing-bucket:

```
oci objectstorage.us-ashburn-1.oraclecloud.com delete /n/abc123/b/testing-bucket/o/emp.csv
```

To list the contents of testing-bucket:

```
oci objectstorage.us-ashburn-1.oraclecloud.com get /n/abc123/b/testing-bucket/o/
```

To put the emp.csv file into testing-bucket:

```
oci objectstorage.us-ashburn-1.oraclecloud.com put ./emp.csv /n/abc123/b/testing-bucket/o/emp.csv
```

To get the emp.csv file from testing-bucket:

```
oci objectstorage.us-ashburn-1.oraclecloud.com get /n/abc123/b/testing-bucket/o/emp.csv
```

### Specify Target using Cloud Storage Command

In the second syntax format, the target is a complete or partial URL to the location, which is set using the Cloud Storage command (cs):

```
oci <method> [file-to-send-as-body] <qualifier>
```

where

*method* is GET, PUT or DELETE.

*qualifier* is the cloud storage namespace or bucket. *qualifier* is appended to the location specified on the set Cloud Storage command and must form the complete URL to the namespace, bucket, or object used by the *method*.

For more information about the Cloud Storage command, see [Using the Cloud Storage Command](#).

### Examples

To delete emp.csv from testing-bucket:

```
cs objectstorage.us-ashburn-1.oraclecloud.com  
oci delete /n/abc123/b/testing-bucket/o/emp.csv
```

To list contents of testing-bucket:

--Using the OCI Command (oci get)

```
cs objectstorage.us-ashburn-1.oraclecloud.com/n/abc123/b/testing-bucket/o/  
oci get
```

--Using the Cloud Storage Command (cs listo)

```
cs objectstorage.us-ashburn-1.oraclecloud.com/n/abc123/b/testing-  
bucket/o/  
cs listo
```

To put emp.csv into testing-bucket:

```
cs objectstorage.us-ashburn-1.oraclecloud.com/n/abc123/b/testing-bucket  
oci put ./emp.csv /o/emp.csv
```

To get emp.csv from testing-bucket:

```
cs objectstorage.us-ashburn-1.oraclecloud.com/n/abc123/b/testing-bucket  
oci get /o/emp.csv
```

# 3

## Liquibase Support in SQLcl

This chapter covers the Liquibase feature in SQLcl. It has the following topics:

- [About Liquibase in SQLcl](#)
- [Requirements for Using Liquibase](#)
- [Supported Types](#)
- [Supported Liquibase Commands in SQLcl](#)
- [DATABASECHANGELOG\\_DETAILS VIEW](#)
- [ChangeSets in Liquibase](#)
- [Examples Using Liquibase](#)

### 3.1 About Liquibase in SQLcl

Liquibase is an open-source database-independent library for tracking, managing and applying database schema changes.

For an understanding of the major concepts in Liquibase, see Major Concepts.

 **Note:**

Liquibase is not available in SQLcl that is part of the SQL Developer installation. To use this feature, you need to download the standalone SQLcl offering.

The Liquibase feature in SQLcl enables you to execute commands to generate a changelog for a single object or for a full schema (changeset and changelogs). You can process these objects manually using SQLcl or through any of the traditional Liquibase interfaces.

With the Liquibase feature in SQLcl, you can:

- Generate and execute single object changelogs
- Generate and execute schema changesets with object dependencies
- Automatically sort a changeset during creation based on object dependencies
- Record all SQL statements for changeset or changelog execution, as it is generated
- Provide full rollback support for changesets and changelogs automatically

## 3.2 Requirements for Using Liquibase

The two important aspects for using the Liquibase functionality are capturing and deploying objects in an Oracle database.

### Capture Objects

To capture an object or a schema, you must have SQLcl 19.2 or later installed.

In this release, you can only capture objects from the schema you are connected to in SQLcl. You also need write permission on the directory in which you save the files.

If you are capturing an entire schema, the user you are connected to must have the privilege to create a table. The DATABASECHANGELOG\_EXPORT table is created internally to gather object details and sort them correctly. The created object is automatically excluded from the capture process and destroyed upon capture completion.

### Deploy Objects

Liquibase uses the DATABASECHANGELOG table to track the changesets that have been run. The DATABASECHANGELOGLOCK table ensures that only one instance of Liquibase is running at a time. The DATABASECHANGELOG\_ACTIONS table tracks the object state and the SQL statements executed during deployment.

- **SQLcl**

Deploying changes to any database through SQLcl requires the 19.2 release or later and the privilege to create a table. You must have necessary permissions to create any object type through the change that you are deploying.

- **Liquibase**

If you use Liquibase directly to deploy changesets, you need to have:

- the extension installed in your Liquibase environment. Add the `dbtools-liquibase.jar` file in `liquibase/lib/ext`.
- the privileges to create a table and a package.

## 3.3 Supported Types

DDL types use create or replace syntax. A snapshot of the object is taken before applying the change so automatic rollback to the last known state is supported.

SXML types support automatic alter generation with automatic rollback support.

DDL types have their own change type.

- CONSTRAINT
- DIMENSION
- DIRECTORY
- FUNCTION
- JOB
- OBJECT\_GRANT

- PACKAGE\_BODY
- PACKAGE\_SPEC
- PROCEDURE
- PUBLIC\_SYNONYM
- REF\_CONSTRAINT
- SYNONYM
- TRIGGER
- TYPE BODY
- TYPE SPEC

SXML types share the SXML change type.

- AQ\_QUEUE
- AQ\_QUEUE\_TABLE
- AQ\_TRANSFORM
- ASSOCIATION
- AUDIT
- AUDIT\_OBJ
- CLUSTER
- CONTEXT
- DB\_LINK
- DEFAULT\_ROLE
- FGA\_POLICY
- JOB
- LIBRARY
- MATERIALIZED\_VIEW
- MATERIALIZED\_VIEW\_LOG
- OPERATOR
- PROFILE
- PROXY
- REFRESH\_GROUP
- RESOURCE\_COST
- RLS\_CONTEXT
- RLS\_GROUP
- RMGR\_CONSUMER\_GROUP
- RMGR\_INITIAL\_CONSUMER\_GROUP
- RMGR\_PLAN
- RMGR\_PLAN\_DIRECTIVE
- ROLE



- ROLLBACK\_SEGMENT
- SEQUENCE
- TABLE
- TABLESPACE
- TRIGGER XS\_ACL
- TRUSTED\_DB\_LINK
- USER
- VIEW
- XMLSCHEMA
- XS\_ACL\_PARAM INDEX
- XS\_DATA\_SECURITY
- XS\_ROLE
- XS\_ROLESET
- XS\_ROLE\_GRANT
- XS\_SECURITY\_CLASS
- XS\_USER

## 3.4 Supported Liquibase Commands in SQLcl

You can invoke the Liquibase commands in SQLcl with `liquibase` or `lb`.

To display a list of all available commands, execute `liquibase` or `lb` with no arguments.

- `LB GENOBJECT`
- `LB GENSCHEMA`
- `LB GENCONTROLFILE`
- `LB UPDATE`
- `LB UPDATESQL`
- `LB ROLLBACK`
- `LB ROLLBACKSQL`
- `LB DIFF`
- `LB DBDOC`
- `LB CHANGELOGSYNC`
- `LB CLEARCHECKSUMS`
- `LB LISTLOCKS`
- `LB RELEASELOCKS`
- `LB STATUS`
- `LB VALIDATE`
- `LB VERSION`

## 3.4.1 LB GENOBJECT

Generates change logs for APEX, ORDS RESTful Service Modules, or database objects.

### APEX

#### Syntax

```
lb genobject -type {APEX} -applicationid APPLICATIONID -workspaceid
WORKSPACEID
[-instance] [-expWorkspace][-expMinimal] [-expFiles] [-skipExportDate]
[-expPubReports] [-expSavedReports]
[-expIRNotif] [-expTranslations] [-expFeedback] [-expTeamdevdata] [-
deploymentSystem DEPLOYMENTSYSTEM]
[-expFeedbackSince EXPFEEDBACKSINCE] [-expOriginalIds] [-
expNoSubscriptions] [-expComments]
[-expSupportingObjects {Y,N,I}] [-expACLAssignments] [-dir DIR] [-list
LIST]
[-changesSince CHANGESINCE] [-changesBy CHANGESBY] [-nochecksum] [-
split]
[-expComponents EXPCOMPONENTS] [-context CONTEXT] [-label LABEL]
[-emit_schema] [-fail] [-replace] [-runonchange] [-runalways] [-debug]
```

Generates a change log for APEX objects.

#### Named Parameters

Parameter	Description	Default
-type {APEX}	Generate output for APEX objects.	-
-applicationid APPLICATIONID	Specify ID for application to be exported.	-
-workspaceid WORKSPACEID	Specify workspace ID for all applications to be exported or the workspace to be exported.	-
-instance	Export all applications.	False
-expWorkspace	Export workspace identified by -workspaceid or all workspaces if -workspaceid not specified.	False
-expMinimal	Export only workspace definition, users, and groups.	False
-expFiles	Export all workspace files identified by -workspaceid.	False
-skipExportDate	Exclude export date from application export files	False
-expPubReports	Export all user-saved public interactive reports.	False
-expSavedReports	Export all user-saved interactive reports.	False
-expIRNotif	Export all interactive report notifications.	False
-expTranslations	Export the translation mappings and all text from the translation repository.	False

Parameter	Description	Default
-expFeedback	Export team development feedback for all workspaces or identified by -workspaceid.	False
-expTeamdevdata	Export team development data for all workspaces or identified by -workspaceid.	False
-deploymentSystem <i>DEPLOYMENTSYSTEM</i>	Specify deployment system for exported feedback.	-
-expFeedbackSince <i>EXPFEEBACKSINCE</i>	Export team development feedback since date in the format YYYYMMDD.	-
-expOriginalIds	Export emits ids as they were when the application was imported.	False
-expNoSubscriptions	Does not export references to subscribed components.	False
-expComments	Export developer comments.	False
-expSupportingObjects {Y,N,I}	Export supporting objects. Pass (Y)es, (N)o or (I)nstall to override the default (default: N).	N
-expACLAssignments	Export ACL User Role Assignments.	False
-dir <i>DIR</i>	Save all files in the given directory. For example, -dir some/sub/directory.	-
-list <i>LIST</i>	List all changed applications in the workspace or components in the application.	-
-changesSince <i>CHANGESINCE</i>	Expect date parameter (yyyy-mm-dd). Limit -list values to changes since the given date.	-
-changesBy <i>CHANGESBY</i>	Expect string parameter. Limit -list values to changes by the given user.	-
-nochecksum	Overwrite existing files even if the contents have not changed.	False
-split	Split applications into multiple files.	False
-expComponents <i>EXPCOMPONENTS</i>	Export application components. All remaining parameters must be of form TYPE:ID.	-

### Common Generator Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False

Parameter	Description	Default
-runalways	Set runAlways value in changeset	False
-debug	Generate and display additional debug output	False

### Example

```
SQL> lb genobject -type apex -applicationid 4900
Exporting Application 4900
Action successfully completed please review created file f4900.xml
```

## ORDS RESTful Service Modules

### Syntax

```
lb genobject -type {ORDS} -name NAME [-noenable] [-noprivs]
[-context CONTEXT] [-label LABEL] [-emit_schema] [-fail]
[-replace] [-runonchange] [-runalways] [-debug]
```

Generates a change log for an ORDS (Oracle REST Data Services) RESTful service module.

### Named Parameters

Parameter	Description	Default
-type {ORDS}	Generate output for ORDS module	-
-name <i>NAME</i>	Module name	-
-noenable	Dictates whether the enable_schema call is included in the export	True
-noprivs	Dictates whether Privs is included in the export	True

### Common Generator Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False

Parameter	Description	Default
-runalways	Set runAlways value in changeset	False
-debug	Generate and display additional debug output	False

## Database Object

### Syntax

```
lb genobject -type TYPE -name NAME
[-context CONTEXT] [-label LABEL] [-emit_schema]
[-fail] [-replace] [-runonchange] [-runalways] [-debug]
```

Generates a change log for a specified database object.

### Named Parameters

Parameter	Description
-type <i>TYPE</i>	Type of object in the database
-name <i>NAME</i>	Object name

### Common Generator Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False
-runalways	Set runAlways value in changeset	False
-debug	Generate and display additional debug output	False

### Database Object Types Supported

Type	Type	Type
AQ_QUEUE	AQ_QUEUE_TABLE	AQ_TRANSFORM
ASSOCIATION	AUDIT	AUDIT_OBJ
CLUSTER	CONSTRAINT	CONTEXT
DB_LINK	DEFAULT_ROLE	DIMENSION

Type	Type	Type
FGA_POLICY	FUNCTION	INDEX
JOB	LIBRARY	MATERIALIZED_VIEW
MATERIALIZED_VIEW_LOG	OBJECT_GRANT	OPERATOR
PACKAGE_SPEC	PACKAGE_BODY	PROCEDURE
PROFILE	PROXY	PUBLIC_SYNONYM
REF_CONSTRAINT	REFRESH_GROUP	RESOURCE_COST
RLS_CONTEXT	RLS_GROUP	RLS_POLICY
RMGR_CONSUMER_GROUP	RMGR_PLAN	RMGR_PLAN_DIRECTIVE
ROLE	ROLLBACK_SEGMENT	SEQUENCE
SYNONYM	TABLE	TABLESPACE
TRIGGER	TRUSTED_DB_LINK	TYPE
TYPE_SPEC	TYPE_BODY	USER
VIEW	XMLSCHEMA XS_USER	XS_ROLE
XS_ROLESET	XS_ROLE_GRANT	XS_SECURITY_CLASS
XS_DATA_SECURITY	XS_ACL	XS_ACL_PARAM
XS_NAMESPACE	RMGR_INITIAL_CONSUME R_GROUP	

### Example

```
SQL> lb genobject -type table -name zipcodes
Action successfully completed please review created file
zipcodes_table.xml
```

## 3.4.2 LB GENSCHEMA

Generates changelogs and controller file for the connected schema.

### Syntax

```
liquibase(lb) genschema [-noreport] [-synonyms] [-grants]
[-context CONTEXT] [-label LABEL] [-emit_schema]
[-fail] [-replace] [-runonchange] [-runalways] [-debug]
```

Captures the entire schema that the user is connected to in SQLcl. An XML file is created in the current working directory for each object in the schema, and a controller.xml file is created. The controller file is a change log that includes all files in the proper order to enable the schema to be deployed correctly.

### Named Parameters

Parameter	Description	Default
-noreport	Suppress screen output	True
-synonyms	Include public synonyms	False
-grants	Include grants	False

## Common Generator Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False
-runalways	Set runAlways value in changeset	False
-debug	Generate and display additional debug output	False

### Example

```
SQL> lb genschema
lb genschema
[Type - TYPE_SPEC]: 153 ms
[Type - TYPE_BODY]: 29 ms
[Type - SEQUENCE]: 48 ms
[Type - CLUSTER]: 27 ms
[Type - TABLE]: 36 ms
[Type - MATERIALIZED_VIEW_LOG]: 19 ms
[Type - MATERIALIZED_VIEW]: 6 ms
[Type - VIEW]: 148 ms
[Type - REF_CONSTRAINT]: 272 ms
[Type - DIMENSION]: 23 ms
[Type - FUNCTION]: 27 ms
[Type - PROCEDURE]: 64 ms
[Type - PACKAGE_SPEC]: 171 ms
[Type - DB_LINK]: 14 ms
[Type - SYNONYM]: 22 ms
[Type - INDEX]: 202 ms
[Type - TRIGGER]: 51 ms
[Type - PACKAGE_BODY]: 252 ms
[Method loadCaptureTable]: 1864 ms
[Method parseCaptureTableRecords]: 7342 ms
[Method sortCaptureTable]: 30 ms
[Method createExportChangeLogs]: 3 ms

Export Flags Used:
Export Grants false
Export Synonyms false
```

### 3.4.3 LB GENCONTROLFILE

Generates a blank controller.xml as a sample.

#### Syntax

```
liquibase(lb) gencontrolfile
```

Creates an empty changelog, `master.xml`, with a placeholder to include files in the current working directory. You can use this command when you are creating your own changelog with custom changeset inclusions.

#### Example

```
SQL> lb gencontrolfile
Action successfully completed please review created file controller.xml
```

### 3.4.4 LB UPDATE

Applies the specified change log using the current connection.

#### Syntax

```
liquibase(lb) update -changelog CHANGELOG [-context CONTEXT]
[-label LABEL] [-emit_schema] [-fail] [-replace] [-runonchange] [-
runalways] [-debug]
```

Enables you to apply database changes that you and other developers have added to the change log file.

#### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

#### Common Update Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-log	Generate a log of work performed	False
-debug	Generate and display additional debug output	False



### Example

```
SQL> lb update -changelog zipcodes_table.xml
ScriptRunner
Executed:zipcodes_table.xml::3b128595dbfbc34086c0a18ff38e090529999::Generated
```

## 3.4.5 LB UPDATESQL

Generates SQL to update the database to the current version.

### Syntax

```
liquibase(lb) updatesql -changelog CHANGELOG [-context CONTEXT]
[-label LABEL] [-emit_schema] [-fail] [-replace] [-runonchange] [-runalways] [-debug]
```

Generates and renders to the screen the SQL statements that would be applied for a specific change log.

### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

### Common Generator Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False
-runalways	Set runAlways value in changeset	False
-debug	Generate and display additional debug output	False

### Example

```
SQL> lb updatesql -changelog zipcodes_tablev2.xml
-- *****
-- Update Database Script
```

```
-- *****
-- Change Log: zipcodes_tablev2.xml
-- Ran at: 6/3/20 12:49 PM
-- Against: JDOE@jdbc:oracle:thin:@localhost:1521/ORCLPDB1
-- Liquibase version: 3.8.9
-- *****

-- Lock Database
UPDATE JDOE.DATABASECHANGELOGLOCK SET LOCKED = 1, LOCKEDBY =
'192.168.1.175 (192.168.1.175)',
LOCKGRANTED = TO_TIMESTAMP('2020-06-03 12:49:05.779', 'YYYY-MM-DD
HH24:MI:SS.FF') WHERE ID = 1 AND LOCKED = 0;

-- Changeset
zipcodes_tablev2.xml::3595dbfbc34086449c0a18ff38e090529999::Generated
ALTER TABLE "ZIPCODES" ADD ("LON" NUMBER)
/

-- Logging Oracle Extension actions to the Database.
DECLARE
id varchar2(200) := '3595dbfbc34086449c0a18ff38e090529999';
rawAction clob;
rawSxml clob;
myrow varchar2(2000);
action clob := '';
sxml clob := '';
dep varchar2(200) := '1202945773';
author varchar2(200) := 'Generated';
filename varchar2(200) := 'zipcodes_tablev2.xml';
insertlog varchar2(200) := 'insert into DATABASECHANGELOG_ACTIONS
(id,author,filename,sql,sxml,deployment_id)
values (:id,:author,:filename,:action,:sxml,:dep) returning rowid
into :out';
updateaction varchar2(200) := 'update DATABASECHANGELOG_ACTIONS set sql
= sql ||:action where rowid = :myrow ';
updatesxml varchar2(200) := 'update DATABASECHANGELOG_ACTIONS set sxml
= sxml ||:sxml where rowid = :myrow ';
begin
action :=
utl_raw.cast_to_varchar2(utl_encode.base64_decode(utl_raw.cast_to_raw(q'
{QUxURVlgVEFCTEUgIlpJUENPREVTIiBBREQgKCJMT04iIE5VTUJFUikKLWogIC0tIE9SQS0
zOTM0MTogQ
2Fubm90IGNvbnZlcnQgYW4gZXhpc3RpbmcgY29sdWluIGludG8gYW4gaWRlbnRpdHkgY29sd
WluLgov}')));
sxml :=
utl_raw.cast_to_varchar2(utl_encode.base64_decode(utl_raw.cast_to_raw(q'
{PD94bWwgdmVyc2lvbjoIMS4wIiBlbmNvZGluz0iVVRGLTgiIHN0YW5kYWxvbmU9Im5vIj8
+PFRBQkxFIHhtbG5zPSJodHRwOi8veG1sbnMub3Jh
Y2xlLmNvbS9rdSIgdmVyc2lvbjoIMS4wIj4KICAgPFNDSEVNQT5TS1VUWjwU0NIRU1BPgog
ICA8TkFNRT5aSVBBDT0RFUzwwTkFNRT4KICAgPFJFT
EFUSU90QUxfVEFCTEU+CiAgICAgIDxDT0xfTElTVD4KICAgICAgICAgPENPTF9MSVNUX01UR
U0+CiAgICAgICAgICAgIDx0QU1FPk1EPC90QU1FPg
ogICAgICAgICAgICA8REFUQVRZUEU+TlVNQkVSPC9EQVRBVF1QRT4KICAgICAgICAgICAgPE
5PVF90VUxMLz4KICAgICAgICAgPC9DT0xfTElTVF9
JVEVNPgogICAgICAgICA8Q09MX0xJU1RfSVRFTT4KICAgICAgICAgICAgPE5BTUU+Q09ERTw
```

```
vTkFNRT4KICAgICAgICAgICAgPERBVEFUWVBFP1ZBU
kNIQVIyPC9EQVRBVF1QRT4KICAgICAgICAgICAgPExFTkdUSD42PC9MRU5HVEg+CiAgICAgI
CAgICAgIDxDt0xMQVRFX05BTUU+VVNJTKdfTkxTX0N
PTVA8L0NPTExBVEVfTkFNRT4KICAgICAgICAgPC9DT0xfTE1TVF9JVEVNPgogICAgICAgICA
8Q09MX0xJU1RfSVRFTT4KICAgICAgICAgICAgPE5BT
UU+Q01UWTwvTkFNRT4KICAgICAgICAgICAgPERBVEFUWVBFP1ZBUkNIQVIyPC9EQVRBVF1QR
T4KICAgICAgICAgICAgPExFTkdUSD41MDwvTEVOR1R
IPgogICAgICAgICAgICA8Q09MTEFURV9OQU1FP1VTSU5HX05MU19DT01QPC9DT0xMQVRFX05
BTUU+CiAgICAgICAgICAgIDwvQ09MX0xJU1RfSVRFTT4KI
CAgICAgICAgPENPTF9MSVNUX01URU0+CiAgICAgICAgICAgIDxOQU1FP1NUQVRFPC9OQU1FP
gogICAgICAgICAgICA8REFUQVRZUEU+VkFSQ0hBUjI
8L0RBVEFUWVBFPgogICAgICAgICAgICA8TEVOR1RIPjUwPC9MRU5HVEg+CiAgICAgICAgICA
gIDxDt0xMQVRFX05BTUU+VVNJTKdfTkxTX0NPTVA8L
0NPTExBVEVfTkFNRT4KICAgICAgICAgPC9DT0xfTE1TVF9JVEVNPgogICAgICAgICA8Q09MX
0xJU1RfSVRFTT4KICAgICAgICAgICAgPE5BTUU+Q09
VT1RZPC9OQU1FPgogICAgICAgICAgICA8REFUQVRZUEU+VkFSQ0hBUjI8L0RBVEFUWVBFPgog
gICAgICAgICAgICA8TEVOR1RIPjUwPC9MRU5HVEg+C
iAgICAgICAgICAgIDxDt0xMQVRFX05BTUU+VVNJTKdfTkxTX0NPTVA8L0NPTExBVEVfTkFNR
T4KICAgICAgICAgPC9DT0xfTE1TVF9JVEVNPgogICA
gICAgICA8Q09MX0xJU1RfSVRFTT4KICAgICAgICAgICAgPE5BTUU+QVJFQV9DT0RFPC9OQU1
FPgogICAgICAgICAgICA8REFUQVRZUEU+TlVNQkVSP
C9EQVRBVF1QRT4KICAgICAgICAgICAgPFBSRUNJU01PTj4zPC9QUkVDSVNJT04+CiAgICAgI
CAgICAgIDxTQ0FMRT4wPC9TQ0FMRT4KICAgICAgICA
gPC9DT0xfTE1TVF9JVEVNPgogICAgICAgICA8Q09MX0xJU1RfSVRFTT4KICAgICAgICAgICA
gPE5BTUU+TEFUPC9OQU1FPgogICAgICAgICAgICA8R
EFUQVRZUEU+TlVNQkVSPC9EQVRBVF1QRT4KICAgICAgICAgPC9DT0xfTE1TVF9JVEVNPgogI
CAgICA8L0NPTE9MSVNUUpgogICAgICA8UFJJTUF5SWV9
LRV1fQ09OU1RSQU1OVF9MSVNUUpgogICAgICAgICA8UFJJTUF5SWV9LRV1fQ09OU1RSQU1OVF9
MSVNUX01URU0+CiAgICAgICAgICAgIDxDt0xfTE1TV
D4KICAgICAgICAgICAgICAgPENPTF9MSVNUX01URU0+CiAgICAgICAgICAgICAgICAgIDxOQ
U1FPK1EPC9OQU1FPgogICAgICAgICAgICAgICA8L0N
PTF9MSVNUX01URU0+CiAgICAgICAgICAgIDwvQ09MX0xJU1Q+CiAgICAgICAgICAgIDxVU01
OR19JTkrFWD4KICAgICAgICAgICAgICAgPELOREVVX
0FUVFJjQ1VURVM+CiAgICAgICAgICAgICAgICAgIDxQq1RGUkVFPjEwPC9Qq1RGUkVFPgogI
CAgICAgICAgICAgICA8SU5JVfJBT1M+MjwvSU5
JVfJBT1M+CiAgICAgICAgICAgICAgICAgIDxNQvHUUkFOUz4yNTU8L01BWF5R5SU5TPgogICA
gICAgICAgICAgICA8VEFC7EVTUEFDRT5VU0VSVU
zwwVEFC7EVTUEFDRT4KICAgICAgICAgICAgICAgICAgPExPR0dJTkc+WTwvTE9HR01ORz4KI
CAgICAgICAgICAgICAgPC9JTkrFWF9BVF5R5SU5JVVEV
TPgogICAgICAgICAgICA8L1VTSU5HX010REVPgogICAgICAgICA8L1BSSU1BUllfS0VZX0N
PTlNUUkFJTLRfTE1TVF9JVEVNPgogICAgICA8L1BSS
U1BUllfS0VZX0NPTlNUUkFJTLRfTE1TVD4KICAgICAgPERFRkFVTFRfQ09MTEFUSU90P1VTS
U5HX05MU19DT01QPC9ERUZBVUxUX0NPTExBVE1PTj4
KICAgICAgPFBIWV5NQ0FMX1BST1BFU1RJRVM+CiAgICAgICAgIDxIRUFQX1RBQkxP5PpogICA
gICAgICAgICA8U0VHTUVOVF9BVFR5SU5JVVEVTPgogI
CAgICAgICAgICAgICA8U0VHTUVOVF9DUKVBVE1PT19ERUZFU1JFR5C+CiAgICAgICAgICAgI
CAgIDxQQ1RGUkVFPjEwPC9Qq1RGUkVFPgogICAgICA
gICAgICAgICA8UENUV5FRD40MDwvUENUV5FRD4KICAgICAgICAgICAgICAgICAgPELO5VRSQU5
TPjE8L010SVRSQU5TPgogICAgICAgICAgICAgICA8T
UFYVfJBT1M+MjU1PC9NQvHUUkFOUz4KICAgICAgICAgICAgICAgICAgPF5R5BQkxFU1BBQ0U+VVNFU
lM8L1RBQkxFU1BBQ0U+CiAgICAgICAgICAgICAgIDx
MT0dHSU5HP1k8L0xPR0dJTkc+CiAgICAgICAgICAgIDwvU0VHTUVOVF9BVFR5SU5JVVEVTPgo
gICAgICAgICAgICA8Q09NUFJFU1M+TjwvQ09NUFJFU
1M+CiAgICAgICAgIDwvSEVBUF9QUJMRT4KICAgICAgPC9QSF1TSUNBTf9QUk9QRVJUSUVTP
gogICA8L1JFTeFUSU9OQUxfVEFC7E7E+}')));
```

```

execute immediate insertlog using id,author,filename,action,sxml,dep
returning into myrow;
end;
/
--;

INSERT INTO JDOE.DATABASECHANGELOG (ID, AUTHOR, FILENAME, DATEEXECUTED,
ORDEREXECUTED, MD5SUM, DESCRIPTION,
COMMENTS, EXECTYPE, CONTEXTS, LABELS, LIQUIBASE, DEPLOYMENT_ID) VALUES
('3595dbfbc34086449c0a18ff38e090529999',
'Generated', 'zipcodes_tablev2.xml', SYSTIMESTAMP, 2,
'8:5262bd1c3989655295b5641b82868158',
'createSxmlObject objectName=ZIPCODES, ownerName=JDOE, '', 'EXECUTED',
NULL, NULL, '3.8.9', '1202945773');

-- Release Database Lock
UPDATE JDOE.DATABASECHANGELOGLOCK SET LOCKED = 0, LOCKEDBY = NULL,
LOCKGRANTED = NULL WHERE ID = 1;

```

## 3.4.6 LB ROLLBACK

Rolls back the state requested.

### Syntax

```

liquibase(lb) rollback -changelog CHANGELOG [-context CONTEXT]
[-label LABEL] [-emit_schema] [-fail] [-replace] [-runonchange] [-
runalways] [-log]
[-debug] (-count COUNT | -date DATE)

```

Rolls back changes starting from the last change applied using the input change log. The count can be higher than the changes in the change log. 999, which is the maximum size, rolls back all the changes.

### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

### Rollback Style Options

Select one of the following options:

Option	Description
-count <i>COUNT</i>	Number of changes to apply
-date <i>DATE</i>	Date to roll back to

## Common Update Parameters

Parameter	Description	Default
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-label <i>LABEL</i>	Filter the changelog using labels	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False
-runalways	Set runAlways value in changeset	False
-log	Generate a log of work performed	False
-debug	Generate and display additional debug output	False

### Example

```
lb rollback -changelog zipcodes_tablev2.xml -count 100
ScriptRunner
Executed:zipcodes_tablev2.xml::3595dbfbc34086449c0a18ff38e090529999::Generated
```

## 3.4.7 LB ROLLBACKSQL

Writes SQL to roll back the database to the state requested.

### Syntax

```
liquibase(lb) rollbacksql -changelog CHANGELOG [-context CONTEXT]
[-label LABEL] [-emit_schema] [-fail] [-replace] [-runonchange] [-runalways] [-debug]
(-count COUNT | -date DATE)
```

### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

### Rollback Style Options

Select one of the following options:

Option	Description
-count <i>COUNT</i>	Number of changes to apply
-date <i>DATE</i>	Date to roll back to

### Common Update Parameters

Parameter	Description	Default
-label <i>LABEL</i>	Filter the changelog using labels	-
-context <i>CONTEXT</i>	Specify changeset contexts to execute	-
-emit_schema	Include the schema when generating DDL	False
-fail	Set failOnError value in changeset	False
-replace	Set replaceIfExists value in changeset	False
-runonchange	Set runOnChange value in changeset	False
-runalways	Set runAlways value in changeset	False
-debug	Generate and display additional debug output	-

### Example

```
lb rollbacksql -changelog zipcodes_tablev2.xml -count 100

-- *****
-- Rollback 100 Change(s) Script
-- *****
-- Change Log: zipcodes_tablev2.xml
-- Ran at: 6/3/20 12:55 PM
-- Against: JDOE@jdbc:oracle:thin:@localhost:1521/ORCLPDB1
-- Liquibase version: 3.8.9
-- *****

-- Lock Database
UPDATE JDOE.DATABASECHANGELOGLOCK SET LOCKED = 1, LOCKEDBY =
'192.168.1.175 (192.168.1.175)',
LOCKGRANTED = TO_TIMESTAMP('2020-06-03 12:55:19.175', 'YYYY-MM-DD
HH24:MI:SS.FF')
WHERE ID = 1 AND LOCKED = 0;

-- Rolling Back ChangeSet:
zipcodes_tablev2.xml::3595dbfbc34086449c0a18ff38e090529999::Generated

ALTER TABLE "JDOE"."ZIPCODES" DROP ("LON");

delete from DATABASECHANGELOG_actions where id =
'3595dbfbc34086449c0a18ff38e090529999' and
```

```

filename = 'zipcodes_tablev2.xml' and author = 'Generated' and sequence
= (select Max(sequence)
from DATABASECHANGELOG_actions where id =
'3595dbfbc34086449c0a18ff38e090529999' and
filename = 'zipcodes_tablev2.xml' and author = 'Generated');

DELETE FROM JDOE.DATABASECHANGELOG WHERE ID =
'3595dbfbc34086449c0a18ff38e090529999' AND
AUTHOR = 'Generated' AND FILENAME = 'zipcodes_tablev2.xml';

-- Release Database Lock
UPDATE JDOE.DATABASECHANGELOGLOCK SET LOCKED = 0, LOCKEDBY = NULL,
LOCKGRANTED = NULL WHERE ID = 1;

```

## 3.4.8 LB DIFF

Writes a description of differences between two databases to standard output.

### Syntax

```
liquibase(lb) diff -url URL -user USER -pass PASS [-noreport]
```

Displays differences between the current connection and the specified database. When the report is true, the output will be in the form of a text report. When the report is false, which is the default, the output will be in the form of a change log.

The destination URL format is HOST:PORT:SID or HOST:PORT/SERVICE.

### Named Parameters

Parameter	Description	Default
-url <i>URL</i>	JDBC URL for destination database	-
-user <i>USER</i>	Destination user	-
-pass <i>PASS</i>	Destination password	-
-noreport	Results output as a changelog, not a text report	True

### Example

```
lb diff -url localhost:1521/ORCLPDB1 -user hr -password hr
```

```
Action successfully completed please review created file diffResult.txt
```

```

!more diffResult.txt
Reference Database: JDOE @ jdbc:oracle:thin:@localhost:1521/ORCLPDB1
(Default Schema: JDOE)
Comparison Database: HR @ jdbc:oracle:thin:@localhost:1521/ORCLPDB1
(Default Schema: HR)
Compared Schemas: JDOE -> HR
Product Name: EQUAL
Product Version: EQUAL

```

```
Missing Catalog(s): NONE
Unexpected Catalog(s): NONE
Changed Catalog(s): NONE
Missing Column(s):
    JDOE.ZIPCODES.AREA_CODE
    JDOE.DATABASECHANGELOG.AUTHOR
    JDOE.DATABASECHANGELOG_ACTIONS.AUTHOR
    JDOE.DATABASECHANGELOG_DETAILS.AUTHOR
    JDOE.ZIPCODES.CITY
    JDOE.ZIPCODES.CODE
    JDOE.DATABASECHANGELOG.COMMENTS
    JDOE.DATABASECHANGELOG_DETAILS.COMMENTS
    JDOE.DATABASECHANGELOG.CONTEXTS
    JDOE.DATABASECHANGELOG_DETAILS.CONTEXTS
    JDOE.ZIPCODES.COUNTY
    JDOE.DATABASECHANGELOG.DATEEXECUTED
    JDOE.DATABASECHANGELOG_DETAILS.DATEEXECUTED
    JDOE.DATABASECHANGELOG.DEPLOYMENT_ID
    JDOE.DATABASECHANGELOG_ACTIONS.DEPLOYMENT_ID
    JDOE.DATABASECHANGELOG_DETAILS.DEPLOYMENT_ID
    JDOE.DATABASECHANGELOG.DESCRPTION
    JDOE.DATABASECHANGELOG_DETAILS.DESCRPTION
    JDOE.DATABASECHANGELOG.EXECTYPE
    JDOE.DATABASECHANGELOG_DETAILS.EXECTYPE
    JDOE.DATABASECHANGELOG.FILENAME
    JDOE.DATABASECHANGELOG_ACTIONS.FILENAME
    JDOE.DATABASECHANGELOG_DETAILS.FILENAME
    JDOE.DATABASECHANGELOG.ID
    JDOE.DATABASECHANGELOGLOCK.ID
    JDOE.DATABASECHANGELOG_ACTIONS.ID
    JDOE.DATABASECHANGELOG_DETAILS.ID
    JDOE.ZIPCODES.ID
    JDOE.DATABASECHANGELOG.LABELS
    JDOE.DATABASECHANGELOG_DETAILS.LABELS
    JDOE.ZIPCODES.LAT
    JDOE.DATABASECHANGELOG.LIQUIBASE
    JDOE.DATABASECHANGELOG_DETAILS.LIQUIBASE
    JDOE.DATABASECHANGELOGLOCK.LOCKED
    JDOE.DATABASECHANGELOGLOCK.LOCKEDBY
    JDOE.DATABASECHANGELOGLOCK.LOCKGRANTED
    JDOE.ZIPCODES.LON
    JDOE.DATABASECHANGELOG.MD5SUM
    JDOE.DATABASECHANGELOG_DETAILS.MD5SUM
    JDOE.DATABASECHANGELOG.ORDEREXECUTED
    JDOE.DATABASECHANGELOG_ACTIONS.SEQUENCE
    JDOE.DATABASECHANGELOG_ACTIONS.SQL
    JDOE.DATABASECHANGELOG_DETAILS.SQL
    JDOE.ZIPCODES.STATE
    JDOE.DATABASECHANGELOG_ACTIONS.SXML
    JDOE.DATABASECHANGELOG_DETAILS.SXML
    JDOE.DATABASECHANGELOG.TAG
Unexpected Column(s): NONE
Changed Column(s): NONE
Missing Foreign Key(s): NONE
Unexpected Foreign Key(s): NONE
```



```

Changed Foreign Key(s): NONE
Missing Index(s):
    PK_DATABASECHANGELOGLOCK UNIQUE ON JOE.DATABASECHANGELOGLOCK(ID)
    SYS_C00122620 UNIQUE ON JOE.DATABASECHANGELOG_ACTIONS(ID,
AUTHOR, FILENAME, SEQUENCE)
    SYS_C00122637 UNIQUE ON JOE.ZIPCODES(ID)
Unexpected Index(s): NONE
Changed Index(s): NONE
Missing Primary Key(s):
    PK_DATABASECHANGELOGLOCK on JOE.DATABASECHANGELOGLOCK(ID)
    SYS_C00122620 on JOE.DATABASECHANGELOG_ACTIONS(ID, AUTHOR,
FILENAME, SEQUENCE)
    SYS_C00122637 on JOE.ZIPCODES(ID)
Unexpected Primary Key(s): NONE
Changed Primary Key(s): NONE
Missing Sequence(s): NONE
Unexpected Sequence(s): NONE
Changed Sequence(s): NONE
Missing Table(s):
    DATABASECHANGELOG
    DATABASECHANGELOGLOCK
    DATABASECHANGELOG_ACTIONS
    ZIPCODES
Unexpected Table(s): NONE
Changed Table(s): NONE
Missing Unique Constraint(s): NONE
Unexpected Unique Constraint(s): NONE
Changed Unique Constraint(s): NONE
Missing View(s):
    DATABASECHANGELOG_DETAILS
Unexpected View(s): NONE
Changed View(s): NONE

```

```
SQL> lb diff -url localhost:1521/ORCLPDB1 -user hr -password hr -
noreport
```

Action successfully completed please review created file diffResult.xml

```

diffResult.xml
!more diffResult.xml
<?xml version="1.1" encoding="UTF-8" standalone="no"?>
<databaseChangeLog xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
xmlns:ext="http://www.liquibase.org/xml/ns/dbchangelog-ext"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog-ext
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-ext.xsd
http://www.liquibase.org/xml/ns/dbchangelog
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-3.8.xsd">
  <changeSet author="jdoe (generated)" id="1591203948991-1">
    <createTable tableName="DATABASECHANGELOG_ACTIONS">
      <column name="ID" type="VARCHAR2(255 BYTE)">
        <constraints nullable="false"/>
      </column>
      <column name="SEQUENCE" type="NUMBER">

```

```
        <constraints nullable="false"/>
    </column>
    <column name="SQL" type="CLOB"/>
    <column name="SXML" type="CLOB"/>
    <column name="AUTHOR" type="VARCHAR2(255 BYTE)">
        <constraints nullable="false"/>
    </column>
    <column name="FILENAME" type="VARCHAR2(255 BYTE)">
        <constraints nullable="false"/>
    </column>
    <column name="DEPLOYMENT_ID" type="VARCHAR2(10 BYTE)"/>
</createTable>
</changeSet>
<changeSet author="jdoe (generated)" id="1591203948991-2">
    <createView fullDefinition="true"
viewName="DATABASECHANGELOG_DETAILS">
CREATE OR REPLACE FORCE VIEW DATABASECHANGELOG_DETAILS (DEPLOYMENT_ID,
ID, AUTHOR,
FILENAME, SQL, SXML, DATEEXECUTED, EXECTYPE, MD5SUM, DESCRIPTION,
COMMENTS, LIQUIBASE,
CONTEXTS, LABELS) AS SELECT da.deployment_id, da.id,
da.author,
da.filename, da.sql, da.sxml, d.dateexecuted, d.exectype,
d.md5sum,
d.description, d.comments, d.liquibase, d.contexts, d.labels
FROM databasechangelog d LEFT JOIN databasechangelog_actions da ON
d.id = da.id
AND d.author = da.author AND
d.filename = da.filename ORDER BY 1,7</createView>
</changeSet>
<changeSet author="jdoe (generated)" id="1591203948991-3">
    <createTable tableName="ZIPCODES">
        <column name="ID" type="NUMBER">
            <constraints nullable="false" primaryKey="true"
primaryKeyName="SYS_C00122637"/>
        </column>
        <column name="CODE" type="VARCHAR2(6 BYTE)"/>
        <column name="CITY" type="VARCHAR2(50 BYTE)"/>
        <column name="STATE" type="VARCHAR2(50 BYTE)"/>
        <column name="COUNTY" type="VARCHAR2(50 BYTE)"/>
        <column name="AREA_CODE" type="NUMBER(3, 0)"/>
        <column name="LAT" type="NUMBER"/>
        <column name="LON" type="NUMBER"/>
    </createTable>
</changeSet>
<changeSet author="jdoe (generated)" id="1591203948991-4">
    <createIndex indexName="SYS_C00122620"
tableName="DATABASECHANGELOG_ACTIONS" unique="true">
        <column name="ID"/>
        <column name="AUTHOR"/>
        <column name="FILENAME"/>
        <column name="SEQUENCE"/>
    </createIndex>
</changeSet>
<changeSet author="skutz (generated)" id="1591203948991-5">
```

```

        <addPrimaryKey columnNames="ID, AUTHOR, FILENAME, SEQUENCE"
constraintName="SYS_C00122620"
forIndexName="SYS_C00122620" tableName="DATABASECHANGELOG_ACTIONS"/>
    </changeSet>
</databaseChangeLog>

```

## 3.4.9 LB DBDOC

Generates Javadoc-like documentation based on the current database and change log.

### Syntax

```
liquibase(lb) dbdoc -changelog CHANGELOG -dir DIR [-context CONTEXT]
[-label LABEL]
```

### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use
-dir <i>DIR</i>	Saves all files in the given directory, example, -dir some/sub/directory

### Common Update Parameters

Parameter	Description
-context <i>CONTEXT</i>	Specify the changeset contexts to execute
-label <i>LABEL</i>	Filter the changelog using labels

### Example

```

SQL> lb dbdoc -changelog states_table.xml -dir ./doc
SQL> !ls -l ./doc
total 56
drwxr-xr-x  3 jdoe  staff   96 Jun  3 13:25 authors
-rw-r--r--  1 jdoe  staff  449 Jun  3 13:25 authors.html
drwxr-xr-x  3 jdoe  staff   96 Jun  3 13:25 changelogs
-rw-r--r--  1 jdoe  staff  474 Jun  3 13:25 changelogs.html
drwxr-xr-x 31 jdoe  staff  992 Jun  3 13:25 columns
-rw-r--r--  1 jdoe  staff  555 Jun  3 13:25 currenttables.html
-rw-r--r--  1 jdoe  staff  899 Jun  3 13:25 globalnav.html
-rw-r--r--  1 jdoe  staff  769 Jun  3 13:25 index.html
-rw-r--r--  1 jdoe  staff  445 Jun  3 13:25 overview-summary.html
drwxr-xr-x  4 jdoe  staff  128 Jun  3 13:25 pending
drwxr-xr-x  3 jdoe  staff   96 Jun  3 13:25 recent
-rw-r--r--  1 jdoe  staff 1202 Jun  3 13:25 stylesheet.css
drwxr-xr-x  4 jdoe  staff  128 Jun  3 13:25 tables

```

**Figure 3-1** shows the index page that is created by the DBDOC command. It enables you to navigate the various details of the changelog used to produce the document.

Figure 3-1 Index Page

<p>Current Tables</p> <p>Authors</p> <p>Change Logs</p> <p>Pending Changes</p> <p>Pending SQL</p> <p>Most Recent Changes</p> <hr/> <p>Current Tables</p> <p>DATABASECHANGELOG_ACTIONS</p> <p>ETHNICITIES</p> <p>EXPOSURE_DURATIONS</p> <p>EXPOSURE_LOCATIONS</p> <p>EXPOSURE_VICINITIES</p> <p>FACILITIES</p> <p>FACILITY_LOGS</p> <p>FACILITY_PEOPLE</p> <p>FACILITY_PEOPLE_LOGS</p> <p>HEALTH_SYSTEM_LOGS</p> <p>HEALTH_SYSTEM_PEOPLE</p> <p>HEALTH_SYSTEM_PEOPLE_LOGS</p> <p>HEALTH_SYSTEMS</p> <p>HTMLDB_PLAN_TABLE</p> <p>LANGUAGES</p> <p>LOAD_FACILITIES</p> <p>LOAD_FACILITY_ERRORS</p> <p>LOAD_PARTICIPANT_ERRORS</p> <p>LOAD_PARTICIPANTS</p> <p>MEDICAL_TEST_LOGS</p> <p>MEDICAL_TESTS</p> <p>NOTIFICATION_LOG</p> <p>PEOPLE</p> <p>PEOPLE_LOGS</p> <p>PREFERENCES</p> <p>STATES</p> <p>STATUS_UPDATE_LOGS</p> <p>STATUS_UPDATES</p> <p>SYMPTOMS</p> <p>TEST_TYPES</p> <p>TEST_VENDORS</p> <p>TRANSLATIONS</p> <p>ZIPCODES</p>	<p><b>Changes affecting table "LOAD_FACILITY_ERRORS"</b></p> <table border="1"> <thead> <tr> <th colspan="3">Current Columns</th> </tr> </thead> <tbody> <tr><td>NUMBER</td><td>NOT NULL</td><td>ID</td></tr> <tr><td>NUMBER</td><td>NULL</td><td>LINE_NUMBER</td></tr> <tr><td>NUMBER</td><td>NULL</td><td>HEALTH_SYSTEM_ID</td></tr> <tr><td>VARCHAR(4000 BYTE)</td><td>NULL</td><td>REASON</td></tr> <tr><td>VARCHAR(4000 BYTE)</td><td>NULL</td><td>SOL_ERROR</td></tr> <tr><td>VARCHAR(255 BYTE)</td><td>NULL</td><td>HEALTH_SYSTEM</td></tr> <tr><td>VARCHAR(255 BYTE)</td><td>NULL</td><td>NAME</td></tr> <tr><td>VARCHAR(255 BYTE)</td><td>NULL</td><td>ADDRESS</td></tr> <tr><td>VARCHAR(255 BYTE)</td><td>NULL</td><td>ADDRESS2</td></tr> <tr><td>VARCHAR(100 BYTE)</td><td>NULL</td><td>CITY</td></tr> <tr><td>VARCHAR(2 BYTE)</td><td>NULL</td><td>STATE</td></tr> <tr><td>VARCHAR(50 BYTE)</td><td>NULL</td><td>COUNTY</td></tr> <tr><td>VARCHAR(10 BYTE)</td><td>NULL</td><td>ZIP</td></tr> <tr><td>NUMBER</td><td>NULL</td><td>MAIN_COORDINATOR_ID</td></tr> <tr><td>VARCHAR(255 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<tr><td>Non-Unique</td><td>LOAD_FACILITY_ERRORS_I1</td><td>HMS MAIN_COORDINATOR_ID</td></tr> <tr><td>Non-Unique</td><td>LOAD_FACILITY_ERRORS_I2</td><td>HMS HEALTH_SYSTEM_ID</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Current Table Foreign Keys</th> </tr> </thead> <tbody> <tr><td>LOAD_FAC_ERR_MAIN_COORD_FK</td><td>HMS.MAIN_COORDINATOR_ID</td><td>PEOPLE</td><td>HMS.ID</td></tr> <tr><td>LOAD_FACILT_ERR_HS_FK</td><td>HMS.HEALTH_SYSTEM_ID</td><td>HEALTH_SYSTEMS</td><td>HMS.ID</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="1">Pending Changes</th> </tr> </thead> <tbody> <tr><td>None Found</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="1">Past Changes</th> </tr> </thead> <tbody> <tr><td>None Found</td></tr> </tbody> </table>	Current Columns			NUMBER	NOT NULL	ID	NUMBER	NULL	LINE_NUMBER	NUMBER	NULL	HEALTH_SYSTEM_ID	VARCHAR(4000 BYTE)	NULL	REASON	VARCHAR(4000 BYTE)	NULL	SOL_ERROR	VARCHAR(255 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### 3.4.10 LB CHANGELOGSYNC

Writes the SQL statements to mark all changes in the change log as executed in the database to a file.

#### Syntax

```
liquibase(lb) changelogsync -changelog CHANGELOG
```

#### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

#### Example

```
SQL> lb changelogsync -changelog zipcodes_table.xml
-- *****
-- SQL to add all changesets to database history table
-- *****
```

```
-- Change Log: zipcodes_table.xml
-- Ran at: 6/3/20 1:28 PM
-- Against: JDOE@jdbc:oracle:thin:@localhost:1521/ORCLPDB1
-- Liquibase version: 3.8.9
-- *****

-- Lock Database
UPDATE JDOE.DATABASECHANGELOGLOCK SET LOCKED = 1, LOCKEDBY =
'192.168.1.175 (192.168.1.175)',
LOCKGRANTED = TO_TIMESTAMP('2020-06-03 13:28:24.686', 'YYYY-MM-DD
HH24:MI:SS.FF')
WHERE ID = 1 AND LOCKED = 0;

INSERT INTO JDOE.DATABASECHANGELOG (ID, AUTHOR, FILENAME, DATEEXECUTED,
ORDEREXECUTED,
MD5SUM, DESCRIPTION, COMMENTS, EXECTYPE, CONTEXTS, LABELS, LIQUIBASE,
DEPLOYMENT_ID)
VALUES ('e6568d24910039bf3d4241e7edff5ec82612c60f', 'Generated',
'zipcodes_table.xml',
SYSTIMESTAMP, 3, '8:e4fe731b3a40f479dec11e234e4a69ac',
'createXmlObject objectName=ZIPCODES,
ownerName=JDOE', '', 'EXECUTED', NULL, NULL, '3.8.9', '1205304697');

-- Release Database Lock
UPDATE JDOE.DATABASECHANGELOGLOCK SET LOCKED = 0, LOCKEDBY = NULL,
LOCKGRANTED = NULL WHERE ID = 1;
```

### 3.4.11 LB CLEARCHECKSUMS

Removes current checksums from the database. For the next update, changesets that have already been deployed will have their checksums recomputed, and changesets that have not been deployed will be deployed.

#### Syntax

```
liquibase(lb) clearchecksums -changelog CHANGELOG
```

#### Named Parameters

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

#### Example

```
SQL> lb clearchecksums -changelog zipcodes_table.xml
```

### 3.4.12 LB LISTLOCKS

Lists who currently has locks on the database change log.

**Syntax**

```
liquibase(lb) listlocks -changelog CHANGELOG
```

**Named Parameters**

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

**Example**

```
SQL> lb listlocks -changelog zipcodes_table.xml
No locks currently in use
```

### 3.4.13 LB RELEASELOCKS

Releases all locks on the database change log.

**Syntax**

```
liquibase(lb) releaselocks -changelog CHANGELOG
```

**Named Parameters**

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

**Example**

```
SQL> lb releaselocks -changelog zipcodes_table.xml
```

### 3.4.14 LB STATUS

Outputs a list of change sets that have not been applied.

**Syntax**

```
liquibase(lb) status -changelog CHANGELOG
```

Checks the status of the change log using the current connection. This shows if the change log has been applied and the result of the change log.

**Named Parameters**

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

**Example**

```
SQL> lb status -changelog zipcodes_table.xml

1 change sets have not been applied to
JDOE@jdbc:oracle:thin:@localhost:1521/ORCLPDB1
zipcodes_table.xml::e6568d24910039bf3d4241e7edff5ec82612c60f::Generated
```

## 3.4.15 LB VALIDATE

Checks the changelog for errors.

**Syntax**

```
liquibase(lb) validate -changelog CHANGELOG
```

**Named Parameters**

Parameter	Description
-changelog <i>CHANGELOG</i>	Specify the changelog file to use

**Example**

```
lb validate -changelog zipcodes_table.xml
No issues were found in file zipcodes _table.xml, validation passed
```

## 3.4.16 LB VERSION

Display product version information.

**Syntax**

```
liquibase(lb) version
```

**Example**

```
SQL> lb version

Liquibase version: 3.8.9
Extension Version: 2.0.0.0.0
```

## 3.4.17 LB HELP

Lists the available Liquibase commands.

**Syntax**

```
liquibase(lb) help command
```

Type a command with no options for help on a specific command.

**Example**

```
SQL> lb help
usage: lb COMMAND ...
```

Commands:  
 The following commands are available within the liquibase feature.  
 lb help COMMAND for command specific help

```
COMMAND
genobject          Generate change log for a specific database object
genschema         Generate changelogs and controller for connected
schema
gencontrolfile    Remove locks held by changelog
update            Updates database to current version
updatesql         Generates SQL to update database to current version
rollback          Rolls back the state requested
rollbacksql       Writes SQL to roll back the database to the state
requested
diff              Writes description of differences between two
databases to standard out.
dbdoc             Generates Javadoc-like documentation based on
current database and change log.
changelogsync     Mark all changes as executed in the database.
clearchecksums    Removes current checksums from database.
listlocks         Lists who currently has locks on the database
changelog.
releaselocks      Releases all locks on the database changelog.
status           Outputs list of unrun change sets.
validate          Checks the changelog for errors.
version           Display product version information
```

## 3.5 DATABASECHANGELOG\_DETAILS VIEW

DATABASECHANGELOG\_DETAILS is a view that consolidates information from the DATABASECHANGELOG and DATABASECHANGELOG\_ACTIONS tables for easier reporting and troubleshooting.

This view enables a better understanding of the status and work performed by each change applied to the database. The SQL column shows the actual SQL that was run in the database. The SXML column shows the state of the object prior to the change being applied.

**Example**

```
SQL> desc DATABASECHANGELOG_DETAILS
```

Name	Null?	Type
DEPLOYMENT_ID		VARCHAR2(10)



ID		VARCHAR2 ( 255 )
AUTHOR		VARCHAR2 ( 255 )
FILENAME		VARCHAR2 ( 255 )
SQL		CLOB
SXML		CLOB
DATEEXECUTED	NOT NULL	TIMESTAMP ( 6 )
EXECTYPE	NOT NULL	VARCHAR2 ( 10 )
MD5SUM		VARCHAR2 ( 35 )
DESCRIPTION		VARCHAR2 ( 255 )
COMMENTS		VARCHAR2 ( 255 )
LIQUIBASE		VARCHAR2 ( 20 )
CONTEXTS		VARCHAR2 ( 255 )
LABELS		VARCHAR2 ( 255 )

## 3.6 ChangeSets in Liquibase

The following table lists the changeSets and provides a description for each of them. To learn more about changeSets, see <changeSet> tag.

ChangeSet	Description
CreateOracleConstraint	Creates a constraint from SQL.
CreateOracleDirectory	Creates a directory from SQL.
CreateOracleFunction	Creates a function from SQL.
CreateOracleGrant	Creates a grant from SQL.
CreateOraclePackageBody	Creates a package body from SQL.
CreateOracleJob	Creates a DBMS_Scheduler job from SQL.
CreateOraclePackageSpec	Creates a package specification from SQL.
CreateOracleProcedure	Creates a procedure from SQL.
CreateOraclePublicSynonym	Creates a public synonym from SQL.
CreateOracleRefConstraint	Creates a referential constraint from SQL.
CreateOracleSynonym	Creates a synonym from SQL.
CreateOracleTrigger	Creates a trigger from SQL.
CreateOracleTypeBody	Creates a type body from SQL.
CreateOracleTypeSpec	Creates a type spec from SQL.
CreateSxmlObject	Creates a function from SQL.
DropOracleConstraint	Drops a constraint.
DropOracleFunction	Drops a function.
DropOracleGrant	Drops a grant.
DropOraclePackageBody	Drops a package body.
DropOraclePackageSpec	Drops a package specification.
DropOracleProcedure	Drops a procedure.
DropOracleRefConstraint	Drops a referential constraint.
DropOracleTrigger	Drops a trigger.
DropOracleTypeBody	Drops a type body.
DropOracleTypeSpec	Drops a type specification.
DropOracleSynonym	Drops a synonym.

ChangeSet	Description
DropSxmlObject	Drops an SXML object. If the object was created through createSxmlObject, this rolls back the object to the last state. If not created, the object is just dropped. This is primarily used internally for SXML object handling.
RunOracleScript	Executes a SQL script using the SQLcl engine and therefore supports all SQLcl commands. Supports script, file, and URL sources. See <a href="#">Execute Custom SQL with RunOracleScript</a>


## 3.7 Examples Using Liquibase

Some examples of using the Liquibase functionality for database change management tasks:

- [Capture and Deploy an Object](#)
- [Capture and Deploy a Schema](#)
- [Generate the Master Control File](#)
- [Capture and Deploy a Schema and then Upgrade it and Redeploy](#)
- [Execute Custom SQL with RunOracleScript](#)

### 3.7.1 Capture and Deploy an Object

To deploy the EMPLOYEES table from HR to HR2:

 **Note:**

The syntax for the GENOBJECT command has changed. See [LB GENOBJECT](#)

1. Connect to HR.

```
SQL> connect hr/hr  
Connected.
```

2. Capture the object.

```
SQL> lb genobject -type table -name employees  
Action successfully completed please review created file  
employees_table1.xml
```

3. Connect to the other user.

```
SQL> connect hr2/hr2  
Connected.
```

4. Ensure the object does not already exist.

```
SQL> drop table employees
Table EMPLOYEES dropped.
```

5. Create the object in the current schema.

 **Note:**

As the schema name has changed, you must set *include schema* to *false* or it will try and create the object in the hr schema.

```
SQL> lb update -changelog employees_table.xml
ScriptRunner Executed:/Users/jdoe/Documents/lbtest/v2/
employees_table.xml::6486f968-93fe-4e1c-ac59-17ef392e1423::Generated
```

6. Verify the object was created.

```
SQL> desc employees
-----
EMPLOYEE_ID      NOT NULL      NUMBER(6)
FIRST_NAME
LAST_NAME        NOT NULL      VARCHAR2(25)
EMAIL            NOT NULL      VARCHAR2(25)
PHONE_NUMBER
HIRE_DATE        NOT NULL      DATE
JOB_ID           NOT NULL      VARCHAR2(10)
SALARY
COMMISSION_PCT   NUMBER(2,2)
MANAGER_ID       NUMBER(6)
DEPARTMENT_ID    NUMBER(4)
```

## 3.7.2 Capture and Deploy a Schema

To capture the HR schema and reproduce it in the HR2 schema:

```
sql.exe hr/hr@pdb1
```

```
SQL> lb genschema
[Type - TYPE_SPEC]:                107 ms
[Type - TYPE_BODY]:                80 ms
[Type - SEQUENCE]:                 26 ms
[Type - CLUSTER]:                  25 ms
[Type - TABLE]:                   721 ms
[Type - MATERIALIZED_VIEW_LOG]:     18 ms
[Type - MATERIALIZED_VIEW]:         9 ms
[Type - VIEW]:                      81 ms
[Type - REF_CONSTRAINT]:           128 ms
[Type - DIMENSION]:                14 ms
[Type - FUNCTION]:                  43 ms
```

```

[Type - PROCEDURE]:                47 ms
[Type - PACKAGE_SPEC]:              24 ms
[Type - DB_LINK]:                   14 ms
[Type - SYNONYM]:                   23 ms
[Type - INDEX]:                     102 ms
[Type - TRIGGER]:                   25 ms
[Type - PACKAGE_BODY]:              33 ms
[Type - JOB]:                        14 ms
[Method loadCaptureTable]:          1534 ms
[Method parseCaptureTableRecords]: 5479 ms
[Method sortCaptureTable]:          37 ms
[Method createExportChangeLogs]:    0 ms

```

Export Flags Used:

```

Export Grants           false
Export Synonyms        false
SQL>

```

setup the hr2 user --

```

drop user hr2 cascade;
create user hr2 identified by hr2;
grant connect,resource, create view to hr2;
alter user hr2 quota unlimited on users;
alter user hr2 quota unlimited on sysaux;

```

```

SQL> drop user hr2 cascade;
User HR2 dropped.

```

```

SQL> create user hr2 identified by hr2;
User HR2 created.

```

```

SQL> grant connect,resource, create view to hr2;
Grant succeeded.

```

```

SQL> alter user hr2 quota unlimited on users;
User HR2 altered.

```

```

SQL> alter user hr2 quota unlimited on sysaux;
User HR2 altered.

```

```

SQL> connect hr2/hr2
Connected.

```

```

SQL> lb update -changelog controller.xml
ScriptRunner
Executed:person_typ_type_spec.xml::32492b89db4b0e2a115caa3e7e6c3d29c11fa
ldb::Generated
ScriptRunner
Executed:emp_person_typ_type_spec.xml::cb314e652bc79126fa0a2b5261720d157
28c7e04::Generated
ScriptRunner
Executed:people_typ_type_spec.xml::cc5c2298290e3ce2dc1563da82ddd9ea33a76
8c8::Generated

```

```
SQL> tables
```

```
TABLES
```

```
-----  
DATABASECHANGELOG  
DATABASECHANGELOGLOCK  
DATABASECHANGELOG_ACTIONS  
COUNTRIES  
REGIONS  
LOCATIONS  
DEPARTMENTS  
JOBS  
EMPLOYEES  
JOB_HISTORY
```

```
10 rows selected.
```

### 3.7.3 Generate the Master Control File

```
SQL> lb gencontrolfile
```

```
Action successfully completed please review created file controller.xml
```

```
SQL> !more controller.xml
```

```
<?xml version="1.0" encoding="UTF-8"?>  
<databaseChangeLog  
  xmlns="http://www.liquibase.org/xml/ns/dbchangelog"  
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
  xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog  
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-3.1.xsd">  
  <include file="{filename.xml}"/>  
</databaseChangeLog>
```

### 3.7.4 Capture and Deploy a Schema and then Upgrade it and Redeploy

The steps are:

1. Migrate the HR schema to the HR2 schema, then modify the HR schema and update HR2.

```
setup the hr2 user --  
drop user hr2 cascade;  
create user hr2 identified by hr2;  
grant connect,resource, create view to hr2;  
alter user hr2 quota unlimited on users;  
alter user hr2 quota unlimited on sysaux;
```

```
SQL> drop user hr2 cascade;  
User HR2 dropped.
```

```
SQL> create user hr2 identified by hr2;
User HR2 created.

SQL> grant connect,resource, create view to hr2;
Grant succeeded.

SQL> alter user hr2 quota unlimited on users;
User HR2 altered.

SQL> alter user hr2 quota unlimited on sysaux;
User HR2 altered.

SQL> connect hr2/hr2
Connected.

SQL> !mkdir v1

SQL> cd v1
SQL> connect hr/hr
Connected.
SQL> lb genschema
[Type - TYPE_SPEC]:                185 ms
[Type - TYPE_BODY]:                84 ms
[Type - SEQUENCE]:                 41 ms
[Type - CLUSTER]:                  38 ms
[Type - TABLE]:                   702 ms
[Type - MATERIALIZED_VIEW_LOG]:    20 ms
[Type - MATERIALIZED_VIEW]:        10 ms
[Type - VIEW]:                     85 ms
[Type - REF_CONSTRAINT]:           142 ms
[Type - DIMENSION]:                21 ms
[Type - FUNCTION]:                 45 ms
[Type - PROCEDURE]:                 52 ms
[Type - PACKAGE_SPEC]:             30 ms
[Type - DB_LINK]:                  18 ms
[Type - SYNONYM]:                  30 ms
[Type - INDEX]:                    125 ms
[Type - TRIGGER]:                  31 ms
[Type - PACKAGE_BODY]:             39 ms
[Type - JOB]:                       19 ms
[Method loadCaptureTable]:          1717 ms
[Method parseCaptureTableRecords]: 6243 ms
[Method sortCaptureTable]:          42 ms
[Method createExportChangeLogs]:    1 ms

Export Flags Used:
Export Grants           false
Export Synonyms         false
```

## 2. Modify the HR schema.

```
SQL> ALTER TABLE DEPARTMENTS ADD (COLUMN1 VARCHAR2(20) );
Table DEPARTMENTS altered.
```

```
SQL> ALTER TABLE COUNTRIES ADD (COLUMN1 VARCHAR2(20) );
```

Table COUNTRIES altered.

```
SQL> ALTER TABLE LOCATIONS ADD (COLUMN1 VARCHAR2(20) );  
Table LOCATIONS altered.
```

```
SQL> CREATE OR REPLACE PROCEDURE PROCEDURE2 (PARAM1 IN  
VARCHAR2,PARAM2 IN VARCHAR2,PARAM3 IN VARCHAR2, PARAM4 IN VARCHAR  
2) AS BEGIN NULL; END PROCEDURE2;  
Procedure PROCEDURE2 compiled
```

### 3. Make a change to the v2 directory.

```
SQL> cd ..  
SQL> !mkdir v2  
SQL> cd v2
```

### 4. Export v2 of the HR schema.

```
SQL> lb genschema  
[Type - TYPE_SPEC]: 102 ms  
[Type - TYPE_BODY]: 74 ms  
[Type - SEQUENCE]: 26 ms  
[Type - CLUSTER]: 25 ms  
[Type - TABLE]: 534 ms  
[Type - MATERIALIZED_VIEW_LOG]: 13 ms  
[Type - MATERIALIZED_VIEW]: 10 ms  
[Type - VIEW]: 78 ms  
[Type - REF_CONSTRAINT]: 119 ms  
[Type - DIMENSION]: 15 ms  
[Type - FUNCTION]: 44 ms  
[Type - PROCEDURE]: 46 ms  
[Type - PACKAGE_SPEC]: 25 ms  
[Type - DB_LINK]: 14 ms  
[Type - SYNONYM]: 24 ms  
[Type - INDEX]: 100 ms  
[Type - TRIGGER]: 25 ms  
[Type - PACKAGE_BODY]: 34 ms  
[Type - JOB]: 14 ms  
[Method loadCaptureTable]: 1322 ms  
[Method parseCaptureTableRecords]: 5452 ms  
[Method sortCaptureTable]: 37 ms  
[Method createExportChangeLogs]: 0 ms  
Export Flags Used:  
Export Grants false  
Export Synonyms false
```

To import v1, change back to the v1 directory and connect as HR2.

```
SQL> cd ..  
SQL> connect hr2/hr2  
Connected.
```

**5. Now import the capture into the HR2 schema.**

```

SQL> lb update -changelog controller.xml
ScriptRunner
Executed:person_typ_type_spec.xml::f9d8cb37f8030674b1d0060b054254a28
f96dd51::Generated
ScriptRunner
Executed:emp_person_typ_type_spec.xml::cabf96af49def8fc164a6c0aa7be6
9c1a78d46c4::Generated
ScriptRunner
Executed:people_typ_type_spec.xml::6a98e2a2ec56a7ca6b716a114804081f8
760ec78::Generated
ScriptRunner
Executed:dept_persons_typ_type_spec.xml::e250a6757e4e023a30c1b9f4581
49e4dfa0ad6bc::Generated
ScriptRunner
Executed:employee_type_type_spec.xml::aa2ef7c172e6df08e4082a4f139f4c
6edf6e14bc::Generated
ScriptRunner
Executed:person_typ_type_body.xml::bd29fd1d0827b70ae4b644781eeb9a69f
7caf956::Generated
ScriptRunner
Executed:departments_seq_sequence.xml::ea03838db9dc0613a5128090c9388
ff1b8dc8a1a::Generated
ScriptRunner
Executed:locations_seq_sequence.xml::2aba6107a95a977632161be9ca920bd
b836f18fc::Generated
ScriptRunner
Executed:employees_seq_sequence.xml::2379ab3cbd7f84f52f6596fa16479bb
6ccf721ca::Generated
ScriptRunner
Executed:countries_table.xml::8e87e94fd74b172dc76d950216e057827e2e3f
83::Generated
ScriptRunner
Executed:countries_comments.xml::8797a740e38cf3ef7da36b6ba4aa5497cfd
6b457::Generated

```

**6. Check a table to verify.**

```

SQL> show user
USER is "HR2"

```

```

SQL> desc departments

```

Name	Null?	Type
DEPARTMENT_ID	NOT NULL	NUMBER(4)
DEPARTMENT_NAME	NOT NULL	VARCHAR2(30)
MANAGER_ID		NUMBER(6)
LOCATION_ID		NUMBER(4)

**7. Switch to v2 and import the capture.**

```

SQL> cd v2
SQL> lb update -changelog controller.xml

```



```
ScriptRunner
Executed:countries_table.xml::31a15fa402822ae67ae588a74e2b0d9506f1dc
26::Generated
ScriptRunner
Executed:locations_table.xml::9548f26f7f8b53bc3639869e23b118b4fe0936
3b::Generated
ScriptRunner
Executed:departments_table.xml::560727e73ed902cd0ad3e25793987d323580
b823::Generated
ScriptRunner
Executed:emp_email_uk_index.xml::99a0278c50a75912985023c6a075514ec93
9d233::Generated
ScriptRunner
Executed:secure_employees_trigger.xml::cfe2f3f3443973ee9d43f4cc77701
d211c6023ba::Generated
ScriptRunner
Executed:update_job_history_trigger.xml::aa8e35e3de04b9bb0ef3c47885f
175e20be6c59e::Generated
```

## 8. Verify that you are on v2.

```
SQL> desc departments
```

Name	Null?	Type
DEPARTMENT_ID	NOT NULL	NUMBER(4)
DEPARTMENT_NAME	NOT NULL	VARCHAR2(30)
MANAGER_ID		NUMBER(6)
LOCATION_ID		NUMBER(4)
COLUMN1		NUMBER

## 3.7.5 Execute Custom SQL with RunOracleScript

Create a RunOracleScript changeset where the source can be a script, a link to a file, or a URL. The changeset in this example shows how to create a table and use PL/SQL variables in the script.

```
#### SCRIPT - STRING EXAMPLE ####

<?xml version="1.0" encoding="UTF-8"?>
<databaseChangeLog
  xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:n0="http://www.oracle.com/xml/ns/dbchangelog-ext"
  xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-3.6.xsd">
  <changeSet id="runScriptString" author="jdoe">
    <n0:runOracleScript objectName="myScript" ownerName="JDOE"
sourceType="STRING">
      <n0:source><![CDATA[DEFINE table_name = RUNNERSTRING;create
table &&table_name (id number);]]></n0:source>
    </n0:runOracleScript>
  </changeSet>
```

```
</databaseChangeLog>
-----
-----
----

SQL> tables
no rows selected

SQL> lb update -changelog stringscript.xml
ScriptRunner Executed:stringscript.xml::runScriptString::jdoe

SQL> tables
TABLES
-----
DATABASECHANGELOGLOCK
DATABASECHANGELOG
DATABASECHANGELOG_ACTIONS
RUNNERSTRING

#### SCRIPT - FILE EXAMPLE ####

filescript.xml
-----
-----
----
<?xml version="1.0" encoding="UTF-8"?>
<databaseChangeLog
  xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:n0="http://www.oracle.com/xml/ns/dbchangelog-ext"
  xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-3.6.xsd">
  <changeSet id="RunScriptFile" author="jdoe">
    <n0:runOracleScript objectName="myScript" ownerName="JDOE"
sourceType="FILE">
      <n0:source><![CDATA[/Volumes/SSD/work/sqlcl/scriptFILE.sql]]></
n0:source>
    </n0:runOracleScript>
  </changeSet>
</databaseChangeLog>
-----
-----
----

scriptFILE.sql
-----
-----
CREATE TABLE RUNNERFILE (id number)
-----
-----
SQL> tables
TABLES
-----
```

```
DATABASECHANGELOGLOCK
DATABASECHANGELOG
DATABASECHANGELOG_ACTIONS
RUNNERSTRING
```

```
SQL> lb update -changelog filescript.xml
ScriptRunner Executed:/Volumes/SSD/work/sqlcl/
filescript.xml::RunScriptFile::jdoe
```

```
SQL> tables
TABLES
```

---

```
DATABASECHANGELOGLOCK
DATABASECHANGELOG
DATABASECHANGELOG_ACTIONS
RUNNERSTRING
RUNNERFILE
```

```
#### SCRIPT - URL EXAMPLE ####
```

```
urlscript.xml
```

```
-----
-----
<?xml version="1.0" encoding="UTF-8"?>
<databaseChangeLog
  xmlns="http://www.liquibase.org/xml/ns/dbchangelog"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:n0="http://www.oracle.com/xml/ns/dbchangelog-ext"
  xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog
http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-3.6.xsd">
  <changeSet id="RunScriptUrl" author="jdoe">
    <n0:runOracleScript objectName="myScript" ownerName="JDOE"
sourceType="URL">
      <n0:source><![CDATA[file:///Volumes/SSD/work/sqlcl/
scriptURL.sql]]></n0:source>
    </n0:runOracleScript>
  </changeSet>
</databaseChangeLog>
```

```
-----
-----
scriptURL.sql
```

```
-----
-----
CREATE TABLE RUNNERURL (id number)
```

```
SQL> tables
TABLES
```

---

```
DATABASECHANGELOGLOCK
```

```
DATABASECHANGELOG  
DATABASECHANGELOG_ACTIONS  
RUNNERSTRING  
RUNNERFILE
```

```
SQL> lb update -changelog urlscript.xml  
ScriptRunner Executed:/Volumes/SSD/work/sqlcl/  
urlscript.xml::RunScriptUrl::jdoe
```

```
SQL> tables  
TABLES
```

---

```
DATABASECHANGELOGLOCK  
DATABASECHANGELOG  
DATABASECHANGELOG_ACTIONS  
RUNNERSTRING  
RUNNERFILE  
RUNNERURL
```

# 4

## Using the Cloud Storage Command

Starting from SQLcl release 20.3, use the Cloud Storage (`cs`) command to set a default Cloud Storage URL, list compartments, buckets and objects, and view some of the contents of an object in cloud storage.

You can access objects in cloud storage using Oracle Cloud Infrastructure Object Storage or Oracle SWIFT Object Storage.

The `OCI`, `LOAD` and `UNLOAD` commands support the default URL specified.

### Topics

- [Prerequisites](#)
- [Cloud Storage Command Options](#)
- [Examples](#)

#### See Also:

- [Loading a File and Unloading Table Data](#)
- [Calling Oracle Cloud Infrastructure REST APIs Using the OCI Command](#)

### 4.1 Prerequisites

For using the Cloud Storage command, you must first set the OCI profile for authentication and access.

For more information about how to set up the required SSH keys and configure your Oracle Cloud Infrastructure Software Development Kits, see [Setup and Prerequisites](#) in the *Oracle Cloud Infrastructure Documentation*.

Note the following points:

- Generate a RSA key pair in PEM format (minimum 2048 bits required) **without a passphrase**. Use this `key_file` in the profile.
- Do not use relative paths inside the configuration file because relative paths resolve based on the SQLcl launch directory. Therefore, the `key_file` may not be found.
- Use double backslashes (`\\`) instead of a single backslash (`\`) for specifying the path of the `key_file` in Windows.

To display the list of profiles contained in the OCI configuration file at `~/.oci/config`, enter:

```
oci profile
```

To set the profile as "demo", enter:

```
oci profile demo
```

## 4.2 Cloud Storage Command Options

You can invoke the Cloud Storage command in SQLcl with `cloudstorage` or `cloud_storage` or `cs`.

For a list of the cloud storage command options in SQLcl, enter:

```
help cs
```

The command options are:

- `cs [ url ] <url>`: Sets the default Cloud Storage URL. The URL must contain the host and optionally the namespace, bucket and object.

Example:

```
--host
cs https://objectstorage.us-ashburn-1.oraclecloud.com
--namespace
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test
--bucket
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/
example
--object
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/
example/o/employees.csv
```

- `cs clear`: Clears the Cloud Storage URL.
- `cs show`: Shows the current default Cloud Storage URL and profile settings.
- `cs listc [ <compartment> ]`: Lists the compartments in the specified *compartment*. If *compartment* is not specified, lists the compartments in the namespace as identified by the profile.
- `cs listb <compartment>`: Lists the buckets in a compartment.
- `cs listo [ <bucket> ]`: Lists the objects in a bucket. You must include the bucket in the set cloud storage `cs` command or the `listo` command.
- `cs peek [ <qualified-name> ] [ { pos | position } <position> ] [ size <size> ]`: Displays the contents of the object where:

*qualified-name* is the name of the object, optionally qualified by the namespace and the bucket. The qualified name combined with the default URL specified must fully identify the object URL.

*position* is the start location for display

*size* is the number of characters to display. If omitted, 2000 characters are displayed.

## 4.3 Examples

This section provides some examples:

- [Load a Cloud Storage File into a Table](#)
- [Unload Table Data into Cloud Storage](#)
- [List Compartments, Buckets and Objects](#)
- [Load a Local File into Cloud Storage using the OCI PUT command](#)
- [Get a File from Cloud Storage using the OCI GET Command](#)

### Load a Cloud Storage File into a Table

The following example shows how to load a cloud storage file into a database table.

```
--Set Cloud Storage URL to the bucket
cs https://objectstorage.us-ashburn-1.example.com/n/test/b/example

--Create Table "locations"
create table locations(location_id NUMBER(5),location_name
VARCHAR2(40));
Table LOCATIONS created

--Load data from LOCATIONS_DATA_TABLE.csv in cloud storage into
"locations" table of the schema for the current user
load locations cs /o/LOCATIONS_DATA_TABLE.csv
Cloud Storage Set: https://objectstorage.us-ashburn-1.oraclecloud.com/n/
test/b/example
Qualifier: LOCATIONS_DATA_TABLE.csv
TargetURL: https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/
example/o/LOCATIONS_DATA_TABLE.csv
Profile:freedb

format csv

column_names on
delimiter ,
enclosure_left "
enclosure_right "
encoding UTF8
row_limit off
row_terminator default
skip_rows 0
skip_after_names

--Number of rows processed: 23
--Number of rows in error: 0
0 - SUCCESS: Load processed without errors

select count(*) from locations;

COUNT(*)
```

```
-----  
50
```

### Unload Table Data into Cloud Storage

This example shows how to unload data from the "locations" table into cloud storage. The data is unloaded to the cloud storage location and is named LOCATIONS\_DATA\_TABLE.csv.

```
--Set Cloud Storage URL to the bucket  
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/example  
  
--Specify delimiter as | and terminator as <eof>  
set loadformat delimiter | term <eof>  
  
--Unload locations table into cloud storage  
unload locations cs  
Cloud Storage Set: https://objectstorage.us-ashburn-1.oraclecloud.com/n/  
test/b/example  
TargetURL: https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/  
example  
Profile: DEFAULT  
  
format csv  
  
column_names on  
delimiter |  
enclosure_left "  
enclosure_right "  
encoding UTF8  
row_terminator <eof>  
  
** UNLOAD Start ** at 2020.09.10-17.08.34  
Export Separate Files to https://objectstorage.us-  
ashburn-1.oraclecloud.com/n/test/b/example  
DATA TABLE LOCATIONS  
File Name: LOCATIONS_DATA_TABLE.csv  
Number of Rows Exported: 23  
** UNLOAD End ** at 2020.09.10-17.08.39  
  
-- Show file contents  
cs peek /o/LOCATIONS_DATA_TABLE.csv  
  
"LOCATION_ID"|"LOCATION_NAME"<eof>01|"California"<eof>02|"Alaska<eof>03|  
"Florida"<eof>04|"Texas"<eof>05|"Virginia"<eof>  
06|"Louisiana"<eof>07|"Massachusetts"<eof>08|"Arkansas"<eof>09|"Oregon"<  
eof>10|"Hawaii"<eof>11|"Maryland"<eof>  
12|"Pennsylvania"<eof>13|"Colorado<eof>14|"Michigan"<eof>15|"Minnesota"<  
eof>16|"Ohio"<eof>17|"Maine"<eof>18|"Arizona"<eof>  
19|"Missouri"<eof>20|"Vermont"<eof>21|"Kansas"<eof>22|"Nevada"<eof>23|"I  
llinois"
```



## List Compartments, Buckets and Objects

This example shows how to list compartments, buckets and objects in cloud storage.

```
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test

--Lists the compartments in the namespace
cs listc

COMP_APEX
dbtst
old
ords
pdf-fn-compartment
sandbox
sqldev

--Lists the compartments in the compartment sqldev
cs listc sqldev

sqldev1

--Lists the buckets in the compartment sqldev
cs listb sqldev

example
test

--Lists the objects in the bucket transfer
cs listo /b/example

COUNTRIES_DATA_TABLE.csv
DEPARTMENTS_DATA_TABLE.csv
REGIONS_DATA_TABLE.csv
LOCATIONS_DATA_TABLE.csv

--Displays the first 2000 characters of LOCATIONS_DATA_TABLE file
cs peek /o/LOCATIONS_DATA_TABLE.csv
```

## Load a Local File into Cloud Storage using the OCI PUT command

This example shows how to load a local file into cloud storage using the OCI PUT command and the Cloud Storage command.

```
--Set Cloud Storage URL to the bucket
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/example

--Put an object from local directory into cloud storage
oci put C:\\Users\\JDOE\\EMPLOYEES_DATA_TABLE.csv /o/myemployees.csv

Status:200 OK

--List the objects in the bucket
```

```
cs listo
```

```
COUNTRIES_DATA_TABLE.csv  
DEPARTMENTS_DATA_TABLE.csv  
REGIONS_DATA_TABLE.csv  
LOCATIONS_DATA_TABLE.csv  
myemployees.csv
```

### Get a File from Cloud Storage using the OCI GET Command

The following example shows how to get a file from cloud storage using the OCI GET command and the Cloud Storage command.

```
--Set Cloud Storage URL to the bucket  
cs https://objectstorage.us-ashburn-1.oraclecloud.com/n/test/b/  
example/o/  
  
--Set the local directory  
cd C:\\Users\\JDOE\\TempCS  
  
--Get the myemployees.csv file from cloud storage  
oci get /o/myemployees.csv  
  
Status:200 OK  
Response Saved to C:\\Users\\JDOE\\TempCs\\myemployees.csv
```

# 5

## PGQL Plug-in for SQLcl

Property Graph Query Language (PGQL) is a graph pattern-matching query language for the property graph data model. The PGQL plug-in enables execution and translation of PGQL statements from the command line in SQLcl.

The PGQL plug-in for SQLcl is available with Oracle Graph Server and Client Release 20.3 and later releases.



### See Also:

[Property Graph Query Language](#) for more information about PGQL.

This chapter covers the following topics:

- [Downloading and Installing](#)
- [About PGQL Commands](#)
- [Examples](#)

### 5.1 Downloading and Installing

You can download the plug-in either from [Oracle Software Delivery Cloud](#) (search for "Oracle Graph Server and Client") or from [Oracle Graph Server and Client Downloads](#).

To install the PGQL plug-in for SQLcl, you need to unzip the downloaded plug-in into the `lib/ext` directory of your local SQLcl installation.

### 5.2 About PGQL Commands

To run PGQL statements against a database, start SQLcl and then turn on PGQL mode by using the following command:

```
pgql auto on;
```

After PGQL mode is turned on, all subsequent SELECT, INSERT, UPDATE, DELETE, CREATE, and DROP statements are considered as PGQL statements.

You can also provide different arguments when turning on PGQL mode:

```
pgql auto on [args]
```

The possible arguments are:

- `graph <graph_name>`: Make queries run against the specified graph.
- `execute`: Turn on PGQL execution.
- `executeonly`: Turn on PGQL execution and do not show PGQL-to-SQL translation.
- `translate`: Show PGQL-to-SQL translation.
- `translateonly`: Show PGQL-to-SQL translation and turn off PGQL execution.
- `parallel <parallel>`: Run (or translate) PGQL queries using the specified parallel value.
- `dynamic_sampling <dynamic_sampling>`: Run (or translate) PGQL queries using the specified dynamic sampling value.

By default, the `graph` value is not set, PGQL execution is turned on, and PGQL to SQL translation is turned off. The default value for `parallel` is 0, and the default value for `dynamic_sampling` is 6.

To run SQL statements again, turn PGQL mode off:

```
pgql auto off;
```

To reset all parameters to their default values, turn PGQL mode off and then turn on again.

## 5.3 Examples

This section provides some examples:

- [Turn On PGQL Mode](#)
- [Create a Property Graph and Execute a Query](#)
- [Define a Graph Parameter](#)
- [Show SQL Translation Using Parallel Value 2](#)
- [Turn Off PGQL Mode](#)

### Turn On PGQL Mode

This example turns PGQL mode on. The PGQL prompt appears when PGQL is enabled.

```
SQL> pgql auto on;
```

```
PGQL Auto enabled for graph=[null], execute=[true], translate=[false]  
PGQL>
```

### Create a Property Graph and Execute a Query

This example creates a property graph and executes a query against the newly created "scott\_hr" graph.

```
PGQL> CREATE PROPERTY GRAPH scott_hr  
2     VERTEX TABLES (  
3         emp KEY(empno) LABEL Employee
```

```

4      PROPERTIES ARE ALL COLUMNS EXCEPT ( deptno ),
5      dept KEY(deptno) LABEL Department
6      PROPERTIES ( deptno, dname )
7  )
8  EDGE TABLES (
9      emp AS works_for
10     SOURCE KEY ( empno ) REFERENCES emp
11     DESTINATION KEY ( deptno ) REFERENCES dept
12     NO PROPERTIES
13 );

```

Graph created

```

PGQL> column name format a15;
PGQL> SELECT e.ename AS name
2  FROM MATCH (e:Employee) ON scott_hr
3  ORDER by e.ename
4  LIMIT 4;

```

```

NAME
-----
ADAMS
ALLEN
BLAKE
CLARK

```

### Define a Graph Parameter

You can define a `graph` parameter to run all PGQL queries against a particular graph. This example sets `graph` to `scott_hr`. Note that the query does not need an `ON` clause.

```
PGQL> pgql auto on graph scott_hr;
```

```
PGQL Auto enabled for graph=[SCOTT_HR], execute=[true],
translate=[false]
```

```

PGQL> column department format a20;
PGQL> column employees format a10;
PGQL> SELECT d.dname AS department, COUNT(e) AS employees
2  FROM MATCH (e:Employee) -[:works_for]-> (d:Department)
3  GROUP BY d
4  ORDER BY employees
5* LIMIT 3;

```

```

DEPARTMENT          EMPLOYEES
-----
ACCOUNTING          3
RESEARCH            5
SALES                6

```

## Show SQL Translation Using Parallel Value 2

This example shows the SQL translation of a PGQL query using a parallel value of 2. Note that the SQL translation has a hint using the defined parallel value.

```
SQL> pgql auto on translateonly parallel 2;
```

```
PGQL Auto enabled for graph=[null], execute=[false], translate=[true]
PGQL> SELECT id(n) FROM MATCH (n) ON scott_hr;
SELECT /*+ parallel(2) */ * FROM(SELECT 7 AS "id(n)$T",
to_nchar(T0$0.VID,'TM9','NLS_Numeric_Characters='.', '') AS "id(n)$V",
T0$0.VID AS "id(n)$VN",
to_timestamp_tz(null) AS "id(n)$VT"
FROM "SCOTT".SCOTT_HRVD$ T0$0);
```

## Turn Off PGQL Mode

This example shows how to turn PGQL mode off.

```
PGQL> pgql auto off;
```

```
PGQL Auto disabled
SQL>
```