

Oracle® Database

PL/SQL Packages and Types Reference



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Preface

This Preface contains these topics:

- [Audience](#)
- [Related Documents](#)
- [Conventions](#)

Audience

Oracle Database PL/SQL Packages and Types Reference is intended for programmers, systems analysts, project managers, and others interested in developing database applications. This manual assumes a working knowledge of application programming and familiarity with SQL to access information in relational database systems. Some sections also assume a knowledge of basic object-oriented programming.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

Access to Oracle Support

Oracle customer access to and use of Oracle support services will be pursuant to the terms and conditions specified in their Oracle order for the applicable services.

Related Documents

For more information, see the following documents:

- *Oracle Database Development Guide*
- *Oracle Database PL/SQL Language Reference*

Many of the examples in this book use the sample schemas, which are installed by default when you select the Basic Installation option with an Oracle Database installation. Refer to *Oracle Database Sample Schemas* for information on how these schemas were created and how you can use them yourself.

Printed documentation is available for sale in the Oracle Store at

<http://shop.oracle.com/>

To download free release notes, installation documentation, technical briefs, or other collateral, please visit the Oracle Technology Network (OTN).

<http://docs.oracle.com/>

Conventions

This section describes the conventions used in the text and code examples of this documentation set. It describes:

- [Conventions in Text](#)
- [Conventions in Code Examples](#)

Conventions in Text

We use various conventions in text to help you more quickly identify special terms. The following table describes those conventions and provides examples of their use.

Convention	Meaning	Example
Bold	Bold typeface indicates terms that are defined in the text or terms that appear in a glossary, or both.	When you specify this clause, you create an index-organized table .
<i>Italics</i>	Italic typeface indicates book titles or emphasis.	<i>Oracle Database Concepts</i> Ensure that the recovery catalog and target database do <i>not</i> reside on the same disk.
UPPERCASE monospace (fixed-width) font	Uppercase monospace typeface indicates elements supplied by the system. Such elements include parameters, privileges, datatypes, RMAN keywords, SQL keywords, SQL*Plus or utility commands, packages and methods, as well as system-supplied column names, database objects and structures, usernames, and roles.	You can specify this clause only for a NUMBER column. You can back up the database by using the BACKUP command. Query the TABLE_NAME column in the USER_TABLES data dictionary view. Use the DBMS_STATS.GENERATE_STATS procedure.
lowercase monospace (fixed-width) font	Lowercase monospace typeface indicates executable programs, filenames, directory names, and sample user-supplied elements. Such elements include computer and database names, net service names and connect identifiers, user-supplied database objects and structures, column names, packages and classes, usernames and roles, program units, and parameter values. <i>Note:</i> Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown.	Enter sqlplus to start SQL*Plus. The password is specified in the orapwd file. Back up the datafiles and control files in the /disk1/oracle/dbs directory. The department_id, department_name, and location_id columns are in the hr.departments table. Set the QUERY_REWRITE_ENABLED initialization parameter to true. The JRepUtil class implements these methods.
lowercase italic monospace (fixed-width) font	Lowercase italic monospace font represents placeholders or variables.	You can specify the <i>parallel_clause</i> . Run <i>old_release</i> .SQL where <i>old_release</i> refers to the release you installed prior to upgrading.

Conventions in Code Examples

Code examples illustrate SQL, PL/SQL, SQL*Plus, or other command-line statements. They are displayed in a monospace (fixed-width) font and separated from normal text as shown in this example:

```
SELECT username FROM dba_users WHERE username = 'MIGRATE';
```

The following table describes typographic conventions used in code examples and provides examples of their use.

Convention	Meaning	Example
[]	Anything enclosed in brackets is optional.	DECIMAL (<i>digits</i> [, <i>precision</i>])
{ }	Braces are used for grouping items.	{ENABLE DISABLE}
	A vertical bar represents a choice of two options.	{ENABLE DISABLE} [COMPRESS NOCOMPRESS]
...	Ellipsis points mean repetition in syntax descriptions. In addition, ellipsis points can mean an omission in code examples or text.	CREATE TABLE ... AS <i>subquery</i> ; SELECT <i>col1</i> , <i>col2</i> , ... , <i>coln</i> FROM employees;
Other symbols	You must use symbols other than brackets ([]), braces ({ }), vertical bars (), and ellipsis points (...) exactly as shown.	<i>acctbal</i> NUMBER(11,2); <i>acct</i> CONSTANT NUMBER(4) := 3;
<i>Italics</i>	Italicized text indicates placeholders or variables for which you must supply particular values.	<i>enter password</i> DB_NAME = <i>database_name</i>
UPPERCASE	Uppercase typeface indicates elements supplied by the system. We show these terms in uppercase in order to distinguish them from terms you define. Unless terms appear in brackets, enter them in the order and with the spelling shown. Because these terms are not case sensitive, you can use them in either UPPERCASE or lowercase.	SELECT last_name, employee_id FROM employees; SELECT * FROM USER_TABLES; DROP TABLE hr.employees;
lowercase	Lowercase typeface indicates user-defined programmatic elements, such as names of tables, columns, or files. Note: Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown.	SELECT last_name, employee_id FROM employees; sqlplus <i>user_id/password</i> CREATE USER mjones IDENTIFIED BY ty3MU9;

Changes in This Release for Oracle Database PL/SQL Packages and Types Reference

This preface contains:

- [Changes in this Release](#)

Changes in this Release

Review changes in this release of *Oracle Database PL/SQL Packages and Types Reference*.

- [New Features](#)
- [Deprecated Features](#)
- [Desupported Features](#)

New Features

This section lists the major new features in Oracle Database release 23ai *PL/SQL Packages and Types Reference*.

The following features are new in this release:

- [DBMS_AUTOIM](#) provides functions to manage the execution of the Automatic In-Memory feature.
- [DBMS_SPM](#) supports the SQL plan management feature by providing an interface for the DBA or other users to perform controlled manipulation of plan history and SQL plan baselines maintained for various SQL statements.
- [DBMS_INMEMORY_ADVISE](#) enables you to determine if a workload can benefit from Oracle's Database In-Memory feature.
- The [DBMS_VECTOR](#) package is a lightweight package that simplifies common operations with Oracle AI Vector Search, such as chunking and embedding data, generating text for prompts and images, or managing vector indexes.

[DBMS_VECTOR](#)

- The [DBMS_VECTOR_CHAIN](#) package enables advanced operations with Oracle AI Vector Search, such as chunking and embedding data, generating text for prompts and images along with text processing and end-to-end similarity search.

[DBMS_VECTOR_CHAIN](#)

- The [DBMS_HYBRID_VECTOR](#) package enables you to search by both vectors and keywords against hybrid vector indexes.

[DBMS_HYBRID_VECTOR](#)

- [DBMS_DICTIONARY_CHECK](#) is a read-only and lightweight PL/SQL package procedure that helps you identify database dictionary inconsistencies.

DBMS_DICTIONARY_CHECK

- The UTL_HTTP package supports digest SHA-256.

UTL_HTTP

- The UTL_I18N package supports three new procedures that detect the most likely Oracle character sets and Oracle languages for a given data sample: DETECT_CHARSET, DETECT_LANGUAGE, and DETECT_LANGUAGE_CHARSET.

UTL_I18N

- The DBMS_SAGA_ADM package provides a collection of saga administration functions and procedures to define and manage saga participants, coordinators, and brokers.

DBMS_SAGA_ADM

- The DBMS_SAGA package provides a collection of saga functions and procedures to initiate and finalize sagas.

DBMS_SAGA

- The DBMS_FLASHBACK_ARCHIVE package includes the [GET_CURRENT_LIFESPAN_DIGEST Function](#) that generates the current lifespan digest for the specified row in a user table, and the [VERIFY_BLOCKCHAIN_LIFESPAN Procedure](#) that verifies the contents of the current lifespans, historical lifespans, or all lifespans of the user table rows that are protected using blockchain Flashback Archive.
- The DBMS_KAFKA package provides a PL/SQL interface for enabling Oracle SQL access to topics in Kafka clusters.
- The DBMS_SEARCH package enables you to create, maintain, and query ubiquitous search indexes.

DBMS_SEARCH

- The DBMS_SQL_FIREWALL package enables users to administer SQL Firewall.

DBMS_SQL_FIREWALL

- The DBMS_CRYPTO package has the following new features.

DBMS_CRYPTO

- New APIs for elliptic-curve Diffie–Hellman (ECDH) operations
 - * ECDH_GENKEYPAIR: This function generates an EC public/private key pair
 - * ECDHDERIVE_SHAREDSECRET: This function derives shared secret using private key of local application and public key from the remote application.
- New PKENCRYPT/PKDECRYPT algorithm: PKENCRYPT_RSA_PKCS1_OAEP_SHA2
- New chain modes GCM CCM
- New DBMS_CRYPTO block cipher suites AES_CCM_NONE and AES_GCM_NONE
- New signature and verification algorithms:
 - * SIGN_SHA224_ECDSA
 - * SIGN_SHA256_ECDSA
 - * SIGN_SHA384_ECDSA
 - * SIGN_SHA512_ECDSA
 - * SIGN_ECDSA

- The `DBMS_SCHEDULER` package has a new `DUMP_IN_MEMORY_TRACE` procedure that dumps the scheduler in-memory trace buffer of the specified process state object address into the current trace file of the requester process.

[DBMS_SCHEDULER](#)

- The `DBMS_SQL` and `DBMS_TF` packages are updated to support the ISO SQL standard-compliant `BOOLEAN` data type.

[DBMS_SQL](#)

[DBMS_TF](#)

- The `DBMS_COMPRESSION` package is updated to support the Advanced Low Index Compression for IOTs.

[DBMS_COMPRESSION](#)

- The `DBMS_SHARDING_DIRECTORY` package is added to support the Oracle Globally Distributed Database directory-based data distribution method.

[DBMS_SHARDING_DIRECTORY](#)

- The `DBMS_AUTO_CLUSTERING` package is added to support the automatic clustering and zone mapping.

[DBMS_AUTO_CLUSTERING](#)

- The `DBMS_AUTO_INDEX` package has a new parameter `AUTO_INDEX_INCLUDE_DML_COST` for the `DBMS_AUTO_INDEX.CONFIGURE` procedure.

[DBMS_AUTO_INDEX](#)

- The `DBMS_BLOCKCHAIN_TABLE` package has enhancements related to Blockchain Table User Chains, Blockchain Table Delegate Signer, and Blockchain Table Countersignature.

[DBMS_BLOCKCHAIN_TABLE](#)

- The `DBMS_DATA_MINING` package is enhanced to support the following settings:
 - `IMPORT_ONNX_MODEL` procedure. To learn more, see [IMPORT_ONNX_MODEL Procedure](#).

Generalized Linear Model setting:

- `GLMS_LINK_FUNCTION`. See [DBMS_DATA_MINING — Algorithm Settings: Generalized Linear Model](#).

XGBoost settings:

- `xgboost_interaction_constraints`
- `xgboost_decrease_constraints`
- `xgboost_increase_constraints`
- `objective: survival:aft`
- `xgboost_aft_loss_distribution`
- `xgboost_aft_loss_distribution_scale`
- `xgboost_aft_right_bound_column_name`
See [DBMS_DATA_MINING — Algorithm Settings: XGBoost](#).

Explicit Semantic Analysis settings:

- `ESAS_EMBEDDINGS`

- `ESAS_EMBEDDING_SIZE`
See [DBMS_DATA_MINING — Algorithm Settings: Explicit Semantic Analysis](#).

Expectation Maximization setting:

- `EMCS_OUTLIER_RATE`
See [DBMS_DATA_MINING — Algorithm Settings: Expectation Maximization](#).

Exponential Smoothing settings:

- `EXSM_SERIES_LIST`
- `EXSM_INITVL_OPTIMIZE`
See [DBMS_DATA_MINING — Algorithm Settings: Exponential Smoothing](#).

k-Means setting:

- `KMNS_WINSORIZE`
See [DBMS_DATA_MINING — Algorithm Settings: *k*-Means](#).

Global settings:

- `ODMS_BOXCOX`
- `ODMS_EXPLOSION_MIN_SUPP`
See [DBMS_DATA_MINING — Global Settings](#).

- The `DBMS_USERDIAG` package is a new package that allows you to perform a limited set of diagnosis operations on the PDB, such as establish trace operations. Most of the regular diagnostic mechanisms available in a CDB have been restricted out of security concerns.

See [DBMS_USERDIAG](#).

- The `DBMS_PIPE` package has been enhanced to support singleton pipes as well as persistent messaging using Cloud Object stores.

[DBMS_PIPE](#)

- The `DBMS_MLE` package is updated to support the use of JavaScript modules.

[DBMS_MLE](#)

- The `DBMS_AQMIGTOOL` package simplifies migration from Oracle Database Advanced Queuing (AQ) to Transactional Event Queue (TxEventQ) with orchestration automation, source and target compatibility diagnostics and remediation, and a unified user experience.

[DBMS_AQMIGTOOL](#)

- The `DBMS_XMLSCHEMA_UTIL` package provides an interface for XML schema validation.

[DBMS_XMLSCHEMA_UTIL](#)

- The `DBMS_SPACE` package provides an interface for analyzing and shrinking a bigfile tablespace.

[DBMS_SPACE](#)

- [DBMS_CACHEUTIL](#) has new `TRUE_CACHE_KEEP` and `TRUE_CACHE_UNKEEP` procedures to manage assignments to the `KEEP` buffer pool for Oracle True Cache.

- The following new procedures are introduced in the `DBMS_APP_CONT` package to enhance the Application Continuity functionality:

- `APPLY_REPLAY_RULE`
- `GET_REPLAY_RULES`
- `RESET_REPLAY_RULES`

- The following new procedures are introduced in the `DBMS_APP_CONT_ADMIN` package to enhance the Application Continuity protection check:
 - `ENABLE_AC`
 - `ENABLE_TAC`
 - `ACCHK_SET_FILTER`
 - `ACCHK_SHOW_FILTERS`
 - `ACCHK_CLEAR_FILTER`
 - `DISABLE_FAILOVER`
 - `ENABLE_RESET_STATE`
 - `MODIFY_SERVICE`
 - `SET_DRAINING`
 - `SET_LOAD_BALANCING`
- The `DBMS_CLOUD_AI` package allows you to create AI profiles and configure them for access to a Large Language Model (LLM).
[DBMS_CLOUD_AI](#)
- The `DBMS_CLOUD_NOTIFICATION` package allows you to send messages or the output of a SQL query to a provider.
[DBMS_CLOUD_NOTIFICATION](#)
- The `DBMS_CLOUD_PIPELINE` package allows you to create data pipelines for loading and exporting data in the cloud.
[DBMS_CLOUD_PIPELINE](#)
- The `DBMS_CLOUD_REPO` package provides for use of and management of cloud hosted code repositories from Oracle Database.
[DBMS_CLOUD_REPO](#)

Deprecated Features

Review this list of deprecated features in Oracle Database release 23ai *Oracle Database PL/SQL Packages and Types Reference*.

Oracle recommends that you do not use deprecated features or values in new applications. Support for deprecated features is for backward compatibility only. For more information about deprecated features, see *Oracle Database Upgrade Guide*.

Deprecation of the `mkstore` wallet management command line tool

The `mkstore` wallet management command line tool is deprecated with Oracle Database 23ai, and can be removed in a future release.

To manage wallets, Oracle recommends that you use the `orapki` command line tool.

Deprecation of `DBMS_RESULT_CACHE` Function Names

Oracle is changing the names of several `DBMS_RESULT_CACHE` function names in Oracle Database 23ai.

The following functions and procedures are deprecated:

- `BLACK_LIST` function. Use `BLOCK_LIST` function.

- `BLACK_LIST_ADD` procedure. Use `BLOCK_LIST_ADD` procedure.
- `BLACK_LIST_CLEAR` procedure. Use `BLOCK_LIST_CLEAR` procedure
- `BLACK_LIST_REMOVE` procedure. Use `BLOCK_LIST_REMOVE` procedure
- `OBJECT_BLACK_LIST` function. Use `OBJECT_BLOCK_LIST` function
- `OBJECT_BLACK_LIST_ADD` procedure. Use `OBJECT_BLOCK_LIST_ADD` procedure.
- `OBJECT_BLACK_LIST_CLEAR` procedure. Use `OBJECT_BLOCK_LIST_CLEAR` procedure.
- `OBJECT_BLACK_LIST_REMOVE` procedure. Use `OBJECT_BLOCK_LIST_REMOVE` procedure.

Deprecation of `DBMS_XMLSTORE`

The PL/SQL package `DBMS_XMLSTORE` is deprecated in Oracle Database 23ai.

`DBMS_XMLSTORE` is a non-standard Oracle-proprietary package that enables you to store and manipulate XML data in Oracle Database. This package is deprecated, and can be desupported in a future release. Oracle recommends that you use regular SQL DML and with standard XQuery and SQL/XML to store and manage XML data. Using standard functionality provides future-proof way to store and manipulate XML data.

Deprecation of `DBMS_XMLGEN` PL/SQL Package

The PL/SQL package `DBMS_XMLGEN` is deprecated in Oracle Database 23ai.

`DBMS_XMLGEN` is a non-standard Oracle-proprietary package that is provided to generate and convert XML documents from SQL queries or with PL/SQL. This package is deprecated, and can be desupported in a future release. Oracle recommends that you use SQL/XML operators to generate XML from relational columns instead. Using ANSI SQL/XML operators for any generation and modification of XML documents provides a standardized and future-proof way to work with XML documents.

Deprecation of XML DB Repository

The Oracle XML DB Repository is deprecated with Oracle Database 23ai.

Oracle recommends that you replace any functionality used in XML DB Repository with alternative technologies. As a result of this deprecation, all XML DB Repository interfaces (for example Repository-specific Java classes `oracle.xdb.servlet`, `oracle.xdb.event`, and `oracle.xdb.spi`) are consequently deprecated as well.

Deprecation of `DBMS_HANG_MANAGER` Package

The `DBMS_HANG_MANAGER` package is deprecated in Oracle Database 23ai. Use `DBMS_BLOCKER_RESOLVER` instead.

The `DBMS_HANG_MANAGER` package provides a method of changing some configuration parameters and constraints to address session issues. This package is being replaced with `DBMS_BLOCKER_RESOLVER`. `DBMS_HANG_MANAGER` can be removed in a future release.

Deprecation of Traditional Auditing Packages and Functions

Traditional auditing packages and functions are deprecated in Oracle Database 23ai.

With the desupport of traditional auditing, the PL/SQL packages and functions associated with traditional auditing are deprecated. This deprecation includes the packages and functions `INIT_CLEANUP`, `DEINIT_CLEANUP`, and `IS_CLEANUP_INITIALIZED`. While these packages or functions continue to operate in Oracle Database 23ai, you can neither add to or modify traditional auditing configurations.

Deprecation of Oracle OLAP

Analytic workspaces, the OLAP DML programming language, financial reporting, and the OLAP Java API continue to be deprecated in Oracle Database 23ai.

Be aware that OLAP will not be supported beyond the term of the current release (Oracle Database 23ai) premier support. Oracle strongly recommends that you do not start new projects using OLAP and begin migrating applications using OLAP to alternatives now. If your application requires an in-database dimensional model, then consider using Oracle Analytic Views. Analytic views provide a dimensional semantic model, calculations, and query semantics using data in Oracle Database. When used with columnar tables, analytic views provide query performance similar to the OLAP Option. If your application requires support for advanced dimensional analytics, what-if analysis, or forecasting, then consider Oracle Essbase. Oracle Essbase is a multidimensional database management system with support for complex dimensional business analytics.

Related Topics

- Oracle Database Changes Desupports and Deprecations in *Oracle Database Upgrade Guide*

Desupported Features

This section lists the desupported features in Oracle Database Release 23ai *Oracle Database PL/SQL Packages and Types Reference*.

For more information about desupported features in this release, see *Oracle Database Upgrade Guide*

The following features are desupported in this release:

Desupport of Oracle Enterprise Manager Database Express

Oracle Enterprise Manager Database Express (EM Express) is desupported in Oracle Database Release 23ai.

EM Express is a web-based database management tool that is built inside Oracle Database. It supports key performance management and basic database administration functions. EM Express was deprecated in Oracle Database 21c. Many of EM Express's capabilities are now available in Oracle Cloud Infrastructure (OCI) Database Management service, Oracle Enterprise Manager Cloud Control, or Oracle SQL Developer.

Desupport of Service Attribute Value `SESSION_STATE_CONSISTENCY = STATIC` Parameter

The service attribute values `FAILOVER_TYPE = TRANSACTION` with `SESSION_STATE_CONSISTENCY = STATIC` are no longer a supported service attribute combination.

In previous releases, you could use the service parameter `SESSION_STATE_CONSISTENCY` to manage session state automatically using Application Continuity by setting `SESSION_STATE_CONSISTENCY` to `DYNAMIC` or `STATIC`. However, starting with Oracle Database 23ai, you can no longer use the `STATIC` option. Instead, use one of the following failover options:

- `FAILOVER_TYPE = AUTO` with `SESSION_STATE_CONSISTENCY = AUTO`
- `FAILOVER_TYPE = TRANSACTION` with `SESSION_STATE_CONSISTENCY = DYNAMIC`

These configurations enforce session state tracking in Oracle Database, ensuring that session state is preserved at session migration and session failover.

Desupport of Oracle Wallet Manager (OWM)

Starting with Oracle Database 23ai, the Oracle Wallet Manager (OWM) is desupported. Oracle recommends using the `orapki` command line tool to replace OWM.

Related Topics

- Oracle Database Changes Desupports and Deprecations in *Oracle Database Upgrade Guide*