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Oracle Network Services for Oracle Database 23ai

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Public

Purpose statement

This document provides an overview of features and enhancements included in Oracle Database 23ai. It is intended solely to help you assess the business benefits of upgrading and planning for the implementation and upgrade of the product features described.

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Introduction

Oracle Network Services provide connectivity between applications and Oracle Database. This technical brief highlights some of the key network and connectivity enhancements introduced with Oracle Database 23ai.

Centralized Configuration Provider Naming

Centralized Configuration Providers allow connect descriptors to be stored in a central location, instead of being dispersed across multiple client machines in *tnsnames.ora* files. This centralizes network service names and addresses in a single location, facilitating administration of connect descriptors. It also enables the central management of password change policies for all stored database user names and passwords. A Centralized Configuration Provider connect identifier can be used by applications to locate the stored configuration and retrieve the connect descriptor, database user name, password, and other configuration parameters.

Available stores are:

- Azure App Configuration Store
- Oracle Cloud Infrastructure (OCI) Object Storage as a JSON file

The configuration providers can be used by on-premise or cloud applications that are using Oracle Client 23ai. Additionally, JDBC users can access configuration information over HTTPS and from local files, see JDBC Configuration via App Config Providers and Vaults. ODP.NET users can additionally access configuration information from local files.

As an example, when configuration information including credentials has been stored in OCI Object Storage, applications would then connect using syntax like:

```
$ sqlplus /@config-ociobject://objectstorage.us.phoenix1.oraclecloud.com/n/xxxxxxx/sales
```

To aid migration, SQL*Plus 23ai has a new CONFIG command that reads an existing *tnsnames.ora* file and generates JSON syntax suitable for use in a centralized configuration provider.

View documentation: Azure App Configuration Store, OCI Object Storage JSON File, and Centralized Configuration Provider Naming Parameters.

Token Authentication

Oracle Net supports connection using OAuth 2.0 and OCI IAM Token-Based Authentication.

This has also been backported to Oracle Database19c and Oracle Database 21c. For drivers using Oracle Client libraries, OAuth 2.0 needs Oracle Client libraries 19.15 (or later) or 21.7 (or later). OCI IAM needs Oracle Client libraries 19.14 (or later) or 21.5 (or later).

Drivers with Thin modes such as python-oracledb and node-oracledb also have support for token authentication.

Transport Layer Security (TLS) 1.3

Transport Layer Security (TLS) version 1.3 is supported in Oracle Database 23ai.

TLS 1.3 handles initial session setup more efficiently than TLS 1.2 and it also implements newer, more secure cipher suites that improve confidentiality of data in transit.

View documentation: TLS Cipher Suite Authentication, Encryption, Integrity, and TLS Versions.

Easy Connect String support for LDAP and LDAPS

With Oracle Client 23ai, LDAP-based name lookup is possible without requiring the external configuration files *ldap.ora* and *sqlnet.ora*. The connection values that were previously specified in these files can now optionally be passed in an Easy Connect string. The syntax is like:

```
ldap[s]://host[:port]/name[,context]?[parameter=value{&parameter=value}]
```

Applications using Oracle Client 23ai libraries can use the new syntax to connect to any Oracle Database version.

View documentation: Specify LDAP Parameters Directly in a Connect Identifier.

Easy Connect ADDRESS_LIST based grouping

The Easy Connect syntax for connection strings now supports address lists that can specify multiple protocol addresses sharing common characteristics. This grouping can be used when applications use Oracle Client 23ai to connect to any Oracle Database version. The syntax is like:

```
[[protocol:]//]host1{,host12}[:port1]{,host2:port2}{; host1{,host12}[:port1]
}[/[service_name][:server][/instance_name]][?parameter_name=value{&parameter_name=value}]
```

See the documentation Configuring the Easy Connect Naming Method for full details.

As an example, the connection string:

```
salesserver1:1521;saleserver2:1522/sales.us.example.com?sdu=16384
```

is equivalent to using an ADDRESS_LIST parameter:

```
(DESCRIPTION =
  (SDU=16384)
  (ADDRESS_LIST =
   (ADDRESS=(PROTOCOL=tcp)(HOST=saleserver1)(PORT=1521)))
  (ADDRESS_LIST =
    (ADDRESS=(PROTOCOL=tcp)(HOST=saleserver2)(PORT=1522)))
  (CONNECT_DATA=(SERVICE_NAME=sales.us.example.com)))
```

System wallets for One-way TLS

With Oracle Database 23ai, a Transport Layer Security (TLS) connection that uses a common root certificate for the database server does not require a client wallet.

This feature has also been backported to Oracle Database 19.14 and 21.7.

View documentation: Transport Layer Security Connections without a Client Wallet .

Default Database SDU increase to 64 KB

The Oracle Net Session Data Unit (SDU) default SDU for all database servers is now 64 KB for shared, pooled, and dedicated server processes.

The Oracle Client default remains 8 KB. Since the SDU used by connections is negotiated between the client and server at connection time, this database change means that client applications can choose to increase the SDU to 64 KB to improve throughput without having to reconfigure the database network listener. Larger SDUs give better network throughput due to fewer system calls and lower CPU usage at the expense of memory. See Configuring Session Data Unit.

Improved Oracle Network error messages

Common database connection error messages have been reviewed and reworded. For example, in Oracle Database 23ai, the error ORA-12514 message is:

```
ORA-12514: Cannot connect to database. Service your_service_name is not registered with the
listener at your_host_port. (CONNECTION_ID=connection_id)
```

Along with the improved information about the problem, the generated CONNECTION_ID value can be used to correlate errors with database and network trace files.

A new error portal contains database messages with their Cause and Action help information. Tools and language drivers will show a URL to the relevant portal entry when printing database error messages. By following the link, further troubleshooting information is available. The additional help for the example error can be seen in the error portal for ORA-12514.

SQL*Plus -P option and PING command

New SQL*Plus 23ai "ping" functionality makes checking network connectivity easier from hosts where the `tnsping` command line utility is not easily installable. With SQL*Plus 23ai, you can use -P (case insensitive) to check that the Oracle Net network listener for a database service is up and running:

```
$ sqlplus -p localhost/orclpdb1

Attempting to contact:
(DESCRIPTION=(CONNECT_DATA=(SERVICE_NAME=orclpdb1))(ADDRESS=(PROTOCOL=tcp)(HOST=localhost)(PO
RT=1521)))

Ok (36.858 msec)
```

Available documentation: About Starting Command-line SQL*Plus.

An additional new SQL*Plus `PING` command has similar functionality. Available documentation: `PING command`.

Connection performance improvements

The Oracle Database 23ai release has several improvements in the database stack and the Oracle Cloud networking infrastructure which improve connection performance in various scenarios. Some changes reduce the time to connect to the database, while others improve the transport across established connections. Some changes are driver-specific.

Some of the changes are:

- Internal protocol and driver optimizations to reduce overheads and connection establishment times when connecting to Oracle Database 23ai.
- Internal network protocol changes that make drivers such as python-oracledb's async support and node-oracledb support more efficient when fetching large columns.
- TCP Fast Open is available for Oracle Autonomous Database (Shared). This is available to applications hosted on OCI infrastructure, or on-premises if peered to an OCI VCN. It can also be used when connecting ADB-S 19c databases. The feature reduces the latency in round-trips after connection has been established. Drivers can be individually configured to use the new capability. For example python-oracledb has a new `use_tcp_fast_open` parameter that can be set when connecting.

Concise logging

The Oracle Network logs now use a concise logging format to reduce their size and make them easier to read.

Conclusion

The new networking functionality in Oracle Database 23ai continues to make using Oracle Database easier and better. New protocols, new syntax, improved tooling, faster implementations, and better ease of use make Oracle Database 23ai a leading environment for development and deployment of database systems.

General References

- Oracle Database 23ai Net Services Administrator's Guide
- Oracle Database 23ai Net Services Reference
- Oracle Database 23ai New Features

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