



Informatica® Data Integration - Free & PayGo

Oracle Connector

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Preface

Use *Oracle Connector* to learn how to read from Oracle by using Data Integration. Learn to create an Oracle connection, develop mappings, and run mapping, and data transfer tasks in Data Integration. You can also learn how to configure pushdown optimization using an Oracle connection.

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CHAPTER 1

Introduction to Oracle Connector

You can use Oracle Connector to connect to Oracle databases from Data Integration to read data. You can also use Oracle Connector to connect to Oracle Database Cloud Service and Oracle databases that are enabled for advanced security, and to Oracle Autonomous Database.

You can use Oracle objects as sources in mappings, mapping tasks, and data transfer tasks.

You can configure SSL authentication to establish one-way or two-way secure communication with the Oracle server. You cannot configure the SSL authentication when you use the Hosted Agent.

Oracle Connector assets

Create assets in Data Integration to integrate data using Oracle Connector.

When you use Oracle Connector, you can include the following Data Integration assets:

- Data transfer task
- Mapping
- Mapping task

For more information about configuring assets and transformations, see *Mappings*, *Transformations*, and *Tasks* in the Data Integration documentation.

Oracle Connector example

You are an operations analyst who manages the customer support website of your organization. You want to get the complete statistics and elaborate reports about the support your organization gives to the customers.

You can use Oracle Connector to read data and maintain a database. You can configure a mapping task to read data from Oracle. You can then write the data to data visualization tools such as Tableau to visually analyze the data.

Administration of Oracle Connector

As a user, you can use Oracle Connector to connect to an SSL-enabled Oracle database after you create a truststore certificate and keystore certificate.

Before you use a secure Oracle connection, complete the following prerequisite tasks:

1. Create a truststore certificate.
2. Create a keystore certificate. Applicable only when Client authentication is enabled in the Oracle database.

Adding the server certificate to the truststore

Add the server certificate to the client's truststore to establish a secure Oracle connection.

Use the following keytool command to add the server certificate to the client's truststore:

```
keytool -import -trustcacerts -alias ca -file <server certificate with path> -keystore  
<name of truststore to be generated with extension> -storepass <password for truststore>  
-storetype <store type>
```

For example, consider you have a server certificate `oratls_server.cert` in the following location: `C:\SSL\oracle`

1. Run the following command to create the truststore `truststore.jks` with the truststore password "password":

```
C:\SSL\oracle> keytool -import -trustcacerts -alias ca -file oratls_server.cert -keystore  
truststore.jks -storepass password -storetype JKS
```

2. Run the following command to create the PKCS12 truststore `truststore.p12` with truststore password "password":

```
C:\SSL\oracle> keytool -import -trustcacerts -alias ca -file oratls_server.cert -keystore  
truststore.p12 -storepass password -storetype PKCS12
```

Creating a keystore certificate

Create a keystore certificate when client authentication is enabled in the Oracle server. You must create a keystore certificate that contains all the client certificates to establish an Oracle connection.

Perform the following steps to create a keystore certificate:

1. Download and install the Oracle client from the Oracle website.
2. Run the following command to create an Oracle wallet:

```
orapki wallet create -wallet <Path where wallet is to be created> -auto_login -pwd  
<wallet password>
```

3. Run the following command to create a self-signed client certificate to the Oracle wallet:

```
orapki wallet add -wallet <Path where wallet is to be created> -dn "CN=<common  
name>, OU=<organization unit>, O=<organization>, L=<locality>, ST=<state>,  
C=<country>" -keysize <key size in bits> -self_signed-validity <number of days> -pwd  
<wallet password>
```

The command runs and creates the pkcs12 certificate at the specified location.

You must specify the values of the `CN=<common name>`, `OU=<organization unit>`, `O=<organization>`, `L=<locality>`, `ST=<state>`, `C=<country>`, `keysize <key size in bits>`, `self_signed -validity <number of days>`, and `pwd <wallet password>` from the server certificate.

4. Run the following orapki command to export the self-signed client certificate:

```
orapki wallet export -wallet <wallet path> -dn "CN=<common name>, OU=<organization unit>, O=<organization>, L=<locality>, ST=<state>, C=<country>" -cert <Name of the exported certificate with path>
```

The **-dn** command identifies the client certificate uniquely as the server wallet contains multiple client certificates installed.

5. Install the self-signed client certificate in the server Oracle wallet.

Note: The client authentication fails if you do not add the self-signed client certificate to the server database Oracle wallet.

6. Add the server certificate as a trusted certificate to the Oracle wallet.

Run the following command to add the server certificate:

```
orapki wallet add -wallet <wallet path> -trusted_cert -cert <Name of the server certificate with path> -pwd <wallet password>
```

Note: You must use the same wallet password for all orapki commands.

Example Tasks

Perform the following tasks to create a keystore certificate:

1. Run the following command to create an Oracle wallet:

```
C:\app\client\ksuwalka\product\12.1.0\client_1\BIN>orapki wallet create -wallet  
C:\app\client\ksuwalka\product\12.1.0\client_1\owm\wallet -auto_login -pwd oracle4u
```

2. Run the following command to create a self-signed client certificate to the Oracle wallet:

```
C:\app\client\ksuwalka\product\12.1.0\client_1\BIN>orapki wallet add -wallet C:\app  
\client\ksuwalka\product\12.1.0\client_1\owm\wallet -dn "CN=inw1pc07_kriti, OU=DEV,  
O=infa,L=blr, ST=ka, C=IN" -keysize 2048 -self_signed -validity 3650 -pwd oracle4u
```

The ewallet.p12 certificate is created in the following location: C:\app\client\ksuwalka\product\12.1.0\client_1\owm\wallet

3. Run the following orapki command to export the self-signed client certificate:

```
C:\app\client\ksuwalka\product\12.1.0\client_1\BIN>orapki wallet export -wallet  
C:\app\client\ksuwalka\product\12.1.0\client_1\owm\wallet -dn "CN=inw1pc07_kriti,  
OU=DEV, O=infa,L=blr, ST=ka, C=IN" -cert C:\Users\ksuwalka\Desktop  
\client_inw1pc07.cert
```

4. Add the server certificate as a trusted certificate to the Oracle wallet. Run the following command to add the server certificate:

```
C:\app\client\ksuwalka\product\12.1.0\client_1\BIN>orapki wallet add -wallet C:\app  
\client\ksuwalka\product\12.1.0\client_1\owm\wallet -trusted_cert -cert C:\SSL\oracle  
\oratls_server.cert -pwd oracle4u
```

You can now use the keystore C:\app\client\ksuwalka\product\12.1.0\client_1\owm\wallet\ewallet.p12 with keystore password oracle4u.

Rules and guidelines for Oracle sources in tasks

Use the following rules and guidelines for Oracle sources in a task:

- You can use database tables, synonyms, or views as sources.
- When you create a saved query to read data from an Oracle database, you must omit the final semicolon from the SQL statement.

- You can't use the `select * from <TABLE_NAME>` SQL command in a saved query. You must provide the explicit column list.
- When the source column name that you read has hyphens and you use the **Create New at Runtime** option to create a target, the hyphens in the table name are converted to underscores in the target column.
- When you read from Oracle, ensure that the Oracle table name or column name does not contain Unicode characters.

CHAPTER 2

Oracle connections

Create an Oracle connection to connect to Oracle databases to read data.

You can use Oracle connections in mappings, mapping tasks, and data transfer tasks.

Oracle connection properties

When you create an Oracle connection, configure the connection properties.

The following table describes the Oracle connection properties:

Property	Description
Connection Name	Name of the connection. Each connection name must be unique within the organization. Connection names can contain alphanumeric characters, spaces, and the following special characters: _ . + -, Maximum length is 255 characters.
Description	Description of the connection. Maximum length is 4000 characters.
Type	Type of connection. Select Oracle from the list.
Runtime Environment	The name of the runtime environment where you want to run the tasks. Specify a Secure Agent or a Hosted Agent.
Oracle Subtype	The Oracle connection subtype that you can use to connect to Oracle on-premises or Oracle Autonomous Database. Select one of the following options: - Oracle ADB. Connects to Oracle Autonomous Database. - Oracle On-premise. Connects to Oracle on-premises.
User Name	User name for the database login. The user name can't contain a semicolon.
Password	Password for the database login. The password can't contain a semicolon.
Host	Name of the machine that hosts the database server.
Port	Network port number used to connect to the database server. Default is 1521.

Property	Description
Service Name	Service name or System ID (SID) that uniquely identifies the Oracle database. Specify the SID in the following format to connect to Oracle databases: <code>SID:<ORACLE_SID></code>
Schema	Schema used for the Oracle connection.
Code Page	The code page of the database server.
Encryption Method	The method that the Secure Agent uses to encrypt the data exchanged between the Secure Agent and the database server. Not applicable when you use the Hosted Agent.
Crypto Protocol Version	Cryptographic protocols to use when you enable SSL encryption. Not applicable when you use the Hosted Agent.
Validate Server Certificate	Validates the certificate that is sent by the database server. If you specify the <code>HostNameInCertificate</code> parameter, the Secure Agent also validates the host name in the certificate.
Trust Store	The location and name of the truststore file.
Trust Store Password	The password to access the contents of the truststore file.
Host Name in Certificate	Host name of the machine that hosts the secure database. If you specify a host name, the Secure Agent validates the host name included in the connection with the host name in the SSL certificate.
Key Store	The location and the file name of the keystore.
Key Store Password	The password for the keystore file required for secure communication.
Key Password	The password for the individual keys in the keystore file required for secure communication.
Connection Retry Period	Number of seconds the Secure Agent attempts to reconnect to the Oracle database if the connection fails. If the Secure Agent can't connect to the database in the retry period, the operation fails. Used for all operations. Default is 0.

Property	Description
Metadata Advanced Connection Properties	<p>Additional properties for the JDBC driver to fetch the metadata.</p> <p>If you specify more than one property, separate each key-value pair with a semicolon.</p> <p>For example, <code>ConnectionRetryCount=2;</code> <code>ConnectionRetryDelay=20</code></p> <p>To connect to an Oracle database enabled for advanced security, you can specify the Oracle advanced security options for the JDBC driver.</p> <p>For example, <code>EncryptionTypes=AES256;</code> <code>EncryptionLevel=accepted;DataIntegrityLevel=accepted;</code> <code>DataIntegrityTypes=SHA1</code></p>
Runtime Advanced Connection Properties	<p>Additional properties for the ODBC driver to run mappings.</p> <p>If you specify more than one property, separate each key-value pair with a semicolon.</p> <p>For example, <code>charset=sjis;readtimeout=180</code></p> <p>To connect to an Oracle database enabled for advanced security, you can specify the Oracle advanced security options for the ODBC driver.</p> <p>For example, <code>EncryptionTypes=AES256;EncryptionLevel=1;</code> <code>DataIntegrityLevel=1;DataIntegrityTypes=SHA1;</code> <code>DataIntegrityTypes=SHA1</code></p>

You can configure the following Oracle-specific custom properties under the Secure Agent configuration properties:

Custom property	Description
OdbcDataDirectNonWapi	<p>For mappings and mapping tasks that use relational multibyte data, add the <code>OdbcDataDirectNonWapi</code> property and set the property to 0 to process Unicode data.</p> <p>Note: When you set this property to 0, the processing time of single-byte data might increase.</p> <p>Enter the following values:</p> <ul style="list-style-type: none"> - For Type, select DTM. - For Sub-type, select INFO. - For Name, enter <code>OdbcDataDirectNonWapi</code>. - For Value, enter 0.
oracle.use.varchar.for.number	<p>For mappings and mapping tasks that have an Oracle source and a Salesforce target, set the <code>oracle.use.varchar.for.number</code> custom property if the Oracle source contains many fields with the Number data type. Values for fields with the Number data type don't load correctly in Salesforce. Enter the following values:</p> <ul style="list-style-type: none"> - For Type, select Tomcat. - For Name, enter <code>oracle.use.varchar.for.number</code>. - For Value, enter <code>true</code>.

Oracle connection rules and guidelines

Consider the following rules and guidelines when you create an Oracle connection:

- An Oracle table name can have a maximum of 30 characters.
- When you run a task that contains an Oracle database in the Public schema, ensure that the schema does not contain too many objects. If the schema contains too many objects, the task times out. You can remove some objects from the Oracle database or move the objects into another database schema.
- Schema name is case sensitive when the name of the schema contains hyphens.

CHAPTER 3

Mappings and mapping tasks with Oracle Connector

Use the Data Integration Mapping Designer to create a mapping. When you create a mapping, configure a source to represent an Oracle object.

Describe the flow of data from source and target along with the required transformations before the agent writes data to the target. When you create a mapping task, select the mapping that you want to use. Use the Mapping Task wizard to create a mapping task. Validate and run the mapping to read data from sources and write to a target. The mapping task processes data based on the data flow logic you define in the mapping.

Oracle sources in mappings

To read data from an Oracle database, configure an Oracle object as the Source transformation in a mapping.

Specify the name and description of the Oracle source. Configure the source, query options, and advanced properties for the source object.

The following table describes the properties that you can configure for an Oracle source:

Property	Description
Connection	Name of the source connection. You can select an existing connection, create a new connection, or define parameter values for the source connection property. If you want to overwrite the source connection properties at runtime, select the Allow parameter to be overridden at run time option. Specify the parameter file directory and name in the advanced session properties.
Source Type	Type of the Oracle source object available. You can choose from the following source types: <ul style="list-style-type: none">- Single- Multiple- Query- Parameter

Property	Description
Parameter	<p>A parameter file where you define values that you want to update without having to edit the task. Select an existing parameter for the source object or click New Parameter to define a new parameter for the source object.</p> <p>The Parameter property appears only if you select parameter as the source type.</p> <p>If you want to overwrite the parameter at runtime, select the Allow parameter to be overridden at run time option.</p> <p>When the task runs, the Secure Agent uses the parameters from the file that you specify in the advanced session properties.</p>
Object	<p>Name of the source object for the mapping.</p> <p>You can specify a custom query for a source object.</p>
Filter	<p>Configure a simple filter or an advanced filter to remove rows at the source. You can improve efficiency by filtering early in the data flow.</p> <p>A simple filter includes a field name, operator, and value. Use an advanced filter to define a more complex filter condition, which can include multiple conditions using the AND or OR logical operators.</p>
Sort	Select the fields and type of sorting to use. To sort data for a parameterized source, you must use a parameter for the sort options.
Select distinct rows only	Select this option to read only distinct rows.

The following table describes the advanced properties that you can configure for an Oracle source:

Advanced Property	Description
Tracing Level	Amount of detail that appears in the log for this transformation. You can choose terse, normal, verbose initialization, or verbose data. Default is normal.
Pre SQL	Pre-SQL command that must be run before reading data from the source.
Post SQL	Post-SQL command that must be run after reading data from the source.
Output is deterministic	<p>Relational source or transformation output that does not change between session runs when the input data is consistent between runs.</p> <p>When you configure this property, the Secure Agent does not stage source data for recovery if transformations in the pipeline always produce repeatable data.</p>
Output is repeatable	<p>Relational source or transformation output that is in the same order between session runs when the order of the input data is consistent.</p> <p>When output is deterministic and output is repeatable, the Secure Agent does not stage source data for recovery.</p>
SQL Override	The SQL statement to override the default query generated from the specified source type to read data from the Oracle source.
Schema Name	Overrides the schema name of the source object.

Oracle lookups in mapping

You can create lookups for objects using an Oracle connection. You can retrieve data from an Oracle lookup object based on the specified lookup condition.

When you configure a lookup in Oracle, you select the lookup connection and lookup object.

You can also set the default column value for the return field in a Lookup transformation in an Oracle mapping.

The following table describes the Oracle lookup object properties that you can configure in a Lookup transformation:

Property	Description
Connection	Name of the lookup connection. You can select an existing connection, create a new connection, or define parameter values for the lookup connection property. If you want to overwrite the lookup connection properties at runtime, select the Allow parameter to be overridden at run time option. Specify the parameter file directory and name in the advanced session properties.
Source Type	Type of the Oracle lookup object available. Select one of the following lookup object types: <ul style="list-style-type: none">- Single Object- Query- Parameter When the lookup source is large, you can use a custom query to reduce the number of columns to query.
Parameter	A parameter file where you define values that you want to update without having to edit the task. Select an existing parameter for the lookup object or click New Parameter to define a new parameter for the lookup object. The Parameter property appears only if you select parameter as the source type. If you want to overwrite the parameter at runtime, select the Allow parameter to be overridden at run time option. When the task runs, the Secure Agent uses the parameters from the file that you specify in the advanced session properties.
Lookup Object	Name of the Oracle lookup object.
Multiple Matches	The behavior when the lookup condition returns multiple matches. You can select one of the following options: <ul style="list-style-type: none">- Return first row- Return last row- Return any row- Return all rows- Report error
SQL Override	The SQL statement to override the default query that creates lookup data from an Oracle source.
Schema Name	Overrides the schema name of the lookup object.

Pushdown optimization

When you read data from an Oracle source, transform the data, and write the data to a target, you can configure pushdown optimization to push the transformation logic to the source or target database system. If the source and target databases are the same, you can configure full pushdown optimization for improved performance.

When the Secure Agent applies pushdown optimization, it pushes transformation logic to a database. The Secure Agent translates the transformation logic into SQL queries and sends the SQL queries to the database. The database runs the SQL queries to process the transformations.

Pushdown optimization improves mapping performance when the database can process the transformation logic faster than the Secure Agent. The Secure Agent also reads less data from the database.

The amount of transformation logic that the Secure Agent pushes to the database depends on the database, the transformation logic, and the mapping task. The Secure Agent processes all transformation logic that it cannot push to a database.

When you configure pushdown optimization for the mapping, the Secure Agent analyzes the optimized mapping from the source to the target or until it reaches a downstream transformation that it cannot push to the source database. The Secure Agent generates and executes a SELECT statement for each source that has transformation logic pushed down. Then, it reads the results of this SQL query and processes the remaining transformations in the mapping.

Note: When you push down transformation logic to the database, ensure that the database has enough resources to process the queries faster. Otherwise, there could be a performance degradation.

Full pushdown optimization is enabled by default in mapping tasks.

The Secure Agent can push the following transformation logic to an Oracle source:

Transformations	Supported Pushdown Type
Aggregator	Source, Full
Expression	Source, Full
Filter	Source, Full
Joiner	Source, Full
Sorter	Source, Full
Union	Source, Full
Router	Full

Full pushdown

When the Secure Agent applies full pushdown optimization, it pushes all the transformation logic in the mapping to the target database.

Full pushdown optimization is enabled by default in mapping tasks.

Source pushdown

When the Secure Agent applies source pushdown, it analyzes the mapping from source to target or until it reaches a downstream transformation it can't push to the source database.

The Secure Agent generates and executes a SELECT statement based on the transformation logic for each transformation it can push to the database. Then, it reads the results of this SQL query and processes the remaining transformations.

You can configure a mapping to use source pushdown if the source and target reside in different databases. For example, if a mapping contains an Oracle source and a Microsoft SQL Server target, you can configure source pushdown to push some transformation logic for processing to the Oracle source.

Pushdown optimization functions

When you use pushdown optimization, the Secure Agent converts the expression in the transformation by determining equivalent functions and pushes down the expression to process in the database. If there is no equivalent function in the database, the Secure Agent processes the transformation logic.

The following table summarizes the availability of pushdown functions in Oracle:

Functions	Pushdown Type
ABS()	Source, Full
AVG()	Source, Full
COS()	Source, Full
COUNT()	Source, Full
DATE_COMPARE()	Source, Full
DECODE()	Source, Full
EXP()	Source, Full
IIF()	Source, Full
IN()	Source, Full
ISNULL()	Source, Full
LOWER()	Source, Full
MAX()	Source, Full
MIN()	Source, Full
POWER()	Source, Full
SIN()	Source, Full
SQRT()	Source, Full
SUM()	Source, Full

Functions	Pushdown Type
TAN()	Source, Full
UPPER()	Source, Full

Supported functions for Expression transformation

When you configure pushdown optimization using an Expression transformation, the Secure Agent tries to push the configured Expression transformation to Oracle.

The following table summarizes the availability of pushdown functions in an Expression transformation in Oracle:

Functions	Pushdown Type
ADD_TO_DATE()	Full
CEIL()	Full
CONCAT()	Full
COSH()	Full
DATE_COMPARE()	Full
FLOOR()	Full
GET_DATE_PART()	Full
INSTR()	Full
LENGTH()	Full
LOG()	Full
LTRIM()	Full
MOD()	Full
ROUND(NUMBER)	Full
RTRIM()	Full
SIGN()	Full
SINH()	Full
STDDEV()	Full
SUBSTR()	Full
SYSDATE()	Full

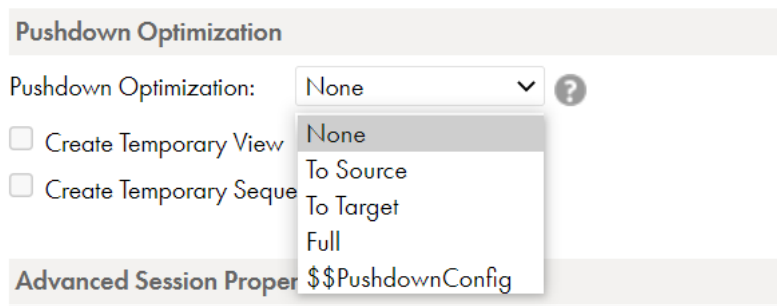
Functions	Pushdown Type
SYSTIMESTAMP()	Full
TANH()	Full
TO_BIGINT	Full
TO_CHAR(DATE)	Full
TO_CHAR(NUMBER)	Full
TO_DATE()	Full
TO_DECIMAL()	Full
TO_FLOAT()	Full
TO_INTEGER()	Full
TRUNC(NUMBER)	Full
VARIANCE()	Full

Configuring pushdown optimization

To optimize a mapping, add the mapping to a task, and then configure pushdown optimization in the mapping task. Full pushdown optimization is enabled by default in mapping tasks.

1. In the **Schedule** tab of the Mapping task, navigate to the **Pushdown Optimization** section.
2. From the **Pushdown Optimization** list, select the required type of pushdown optimization.

The following image shows the types of pushdown optimization that you can configure:



CHAPTER 4

Troubleshooting

Use the following sections to troubleshoot errors in Oracle Connector.

For a list of common error messages and possible solutions, see the article, ["Troubleshooting: Common Error Messages"](#).

Troubleshooting an Oracle connection

A task that uses an Oracle connection runs slower. However, an Oracle connection runs fast when you use an ODBC connection for Oracle.

The default array size for Oracle Connector is 60,000 bytes. You might optimize performance of Oracle Connector by increasing the array size. To increase the array size, you can configure the following custom configuration properties for the Secure Agent:

- Type: Tomcat, Name: ODBCOptimizeRead, Value: Yes
- Type: Tomcat, Name: OdbcOracleDefaultArraySize, Value: <number of bytes>

For example:

- Type: Tomcat, Name: ODBCOptimizeRead, Value: Yes
- Type: Tomcat, Name: OdbcOracleDefaultArraySize: Value: 70000

Note: The OdbcOracleDefaultArraySize custom configuration property does not optimize performance for custom SQL queries.

ERROR: keytool error: java.security.KeyStoreException: TrustedCertEntry not applicable.

You must use Java 1.8 to create a **PKCS12** truststore certificate. You cannot create a **PKCS12** truststore certificate using Java 1.7.

APPENDIX A

Data type reference

Data Integration uses the following data types in mappings and tasks with Oracle:

Oracle native data types

Oracle data types appear in the source transformations when you choose to edit metadata for the fields.

Transformation data types

Set of data types that appear in the transformations. They are internal data types based on ANSI SQL-92 generic data types, which the Secure Agent uses to move data across platforms. Transformation data types appear in all transformations in a mapping.

When Data Integration reads source data, it converts the native data types to the comparable transformation data types before transforming the data.

Oracle and transformation data types

The following table lists the Oracle data types that Data Integration supports and the corresponding transformation data types:

Oracle Data Type	Transformation Data Type	Description
Blob	Binary	1 to 104,857,599 characters
Char	String	1 to 104,857,600 characters
Clob	Text	1 to 104,857,599 characters
Date	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D
Number	Double	Precision 15, scale 0
Number(p,s)	Decimal	Precision of 1 to 28, scale of 0 to 28
Timestamp	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D (precision to the nanosecond)
Varchar	String	1 to 104,857,600 characters
Varchar2	String	1 to 104,857,600 characters

Oracle Data Type	Transformation Data Type	Description
nChar	String	1 to 104,857,600 characters
nVarchar2	String	1 to 104,857,600 characters

Rules and guidelines for data types

Consider the following rules and guidelines for certain Oracle data types:

- The default precision for reading Clob and Blob data types is 32,000. If you configure a mapping to read data with Blob or Clob data types whose precision is more than 32,000, you must manually increase the precision of these data types in the mapping accordingly.
- When you read data that contains the Clob and Blob data types, ensure that the row size does not exceed 100 MB.
- Do not use a SQL transformation to read Clob and Blob data types where the row size exceeds 100 MB.
- When you use an Oracle source with a Salesforce target, if the source contains fields with the Number data type, change the field type to numeric. Values for fields with the Number data type do not load correctly in Salesforce. You can change the type on the **Field Mapping** page. If you have many fields with the Number data type, you can add the `oracle.use.varchar.for.number` custom property for the Secure Agent.

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