

Oracle to DB2 Warehouse on Cloud Migration

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Introduction

Migration from Oracle to DB2 on Cloud have never been easier. This tutorial shows the steps required to migrate an Oracle database to Db2 Warehouse on Cloud. The major steps in database migration are database schema/objects migration and database data migration.

Database schema / objects migration

This step involves migrating schema and objects such as Tables, Views, Stored procedures and any other database objects. While most of the schema from Oracle is compatible to Db2 Warehouse on cloud, it needs to be evaluated and converted to be able to successfully deploy on Db2 cloud.

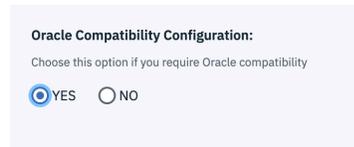
Database data migration

This step involves moving data from source tables to target database. Data needs to be unloaded from source database and loaded to target database.

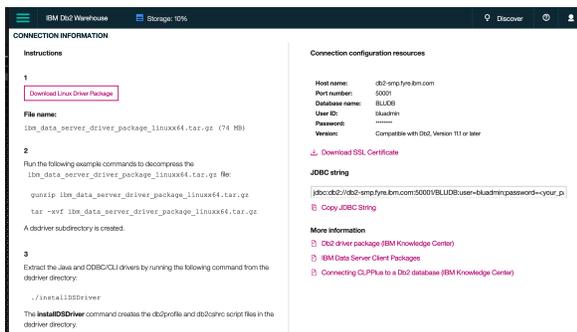
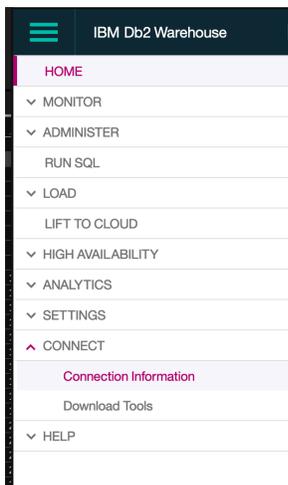
Database Migration Tutorial

As a part of tutorial, we are migrating a sample schema from Oracle on prem to Db2 Warehouse on cloud. We will show how easy it is to migrate using IBM tools.

This tutorial assumes that you already have an IBM Cloud account and have provisioned Db2 Warehouse on Cloud service. While provisioning Db2 Warehouse on Cloud, make sure you had requested the database to be created in Oracle compatibility mode.



Log on to the console and review the database you have on cloud. Also note down the connection configuration of Db2 Warehouse on Cloud by navigating to CONNECT -> Connection Information. This information is required to connect to the database.



We are using IBM Database Conversion Workbench (DCW) tool to help us migrate from Oracle to Db2. This tool can be downloaded freely with IBM id.

For our tutorial, we have installed IBM DCW v4.0.35 on Windows.

This tutorial consists of two steps

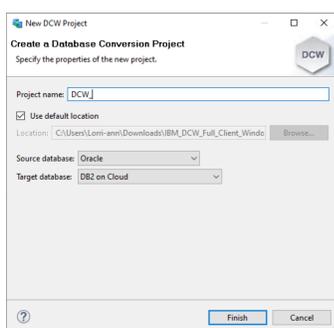
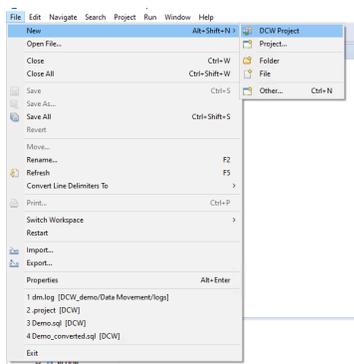
1. Schema migration
2. Data migration

Schema migration

The schema from source database needs to be evaluated for any modifications needed before deployment to target database. Fortunately, as Db2 Warehouse on Cloud is running in Oracle Compatibility mode, most of the schema can be deployed with minimal modifications. To figure out exact modifications needed, use IBM's DCW tool to evaluate.

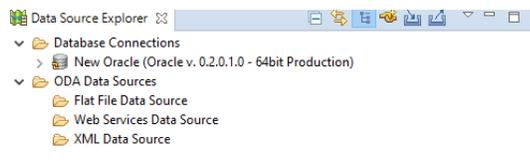
Create a project in DCW

Launch IBM Database Conversion Workbench and create a DCW project as shown. Give a name and make sure you have selected target as "IBM DB2 Warehouse"



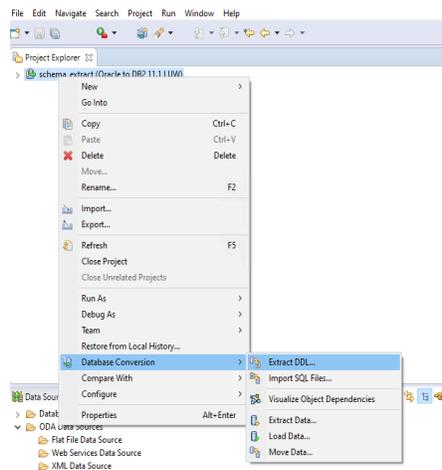
Adding database connection

Add a connection to source database in Data Source Explorer. Right click on Database Connections and click New... The wizard will guide you on adding a connection. You may need to install proper drivers for successful connection. Refer to the included Cheat Sheet for detailed instructions.

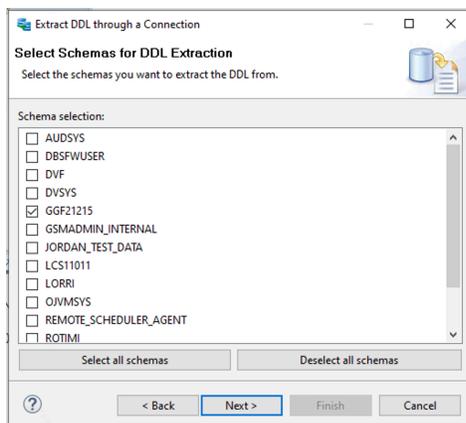


Source Schema Extraction

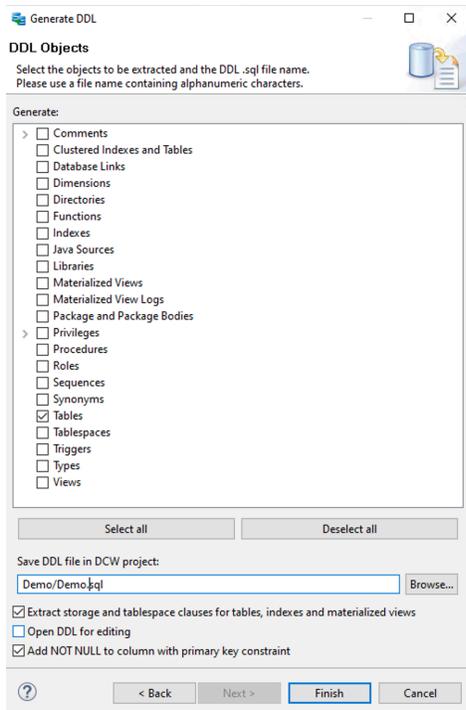
You can use DCW's Extract DDL functionality to extract source schema or you can import the schema file using 'Import SQL Files..', if you had used third party tools to generate schema.



For this tutorial, we are extracting sample schema present in source database.



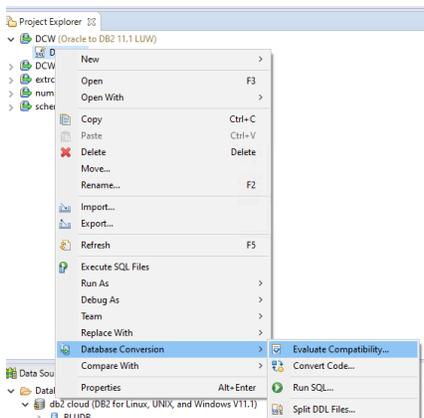
For simplicity, we will select just Tables as DDL objects for schema extraction.



The .sql file will now be available under your DCW project. You can open the sql file for editing.

Schema Compatibility Evaluation and Conversion

Now let's evaluate the schema for compatibility. Right click on the schema sql file and select Database Conversion -> Evaluate Compatibility.



This will generate a html report with details of compatibility.

91.3%
Excellent

Overall Summary

- 0 out of 0 PL/SQL statements are compatible
- 42 out of 46 (91.3 %) SQL statements are compatible
- 2 SQL features not supported (See details)

Oracle
IBM Db2 Warehouse

Summary PL/SQL evaluation **SQL evaluation** BLU evaluation Unrecognized syntax Statistics

SQL features not supported

2 SQL features are not supported by the target database and will require to be manually converted. Click on the items below to review all occurrences and the suggested solution. Then perform the required changes in the source code.

Feature	Description	Count
CREATE DATABASE LINK NOT SUPPORTED	Create database link is not supported as it is, instead DB2 federation can be used to access remote database.	1
GRANT STATEMENTS ARE NOT SUPPORTED	GRANT statements have inconsistent behavior on DB2, thus grant statements are commented out.	3

SQL features that can be converted automatically

Here we see the SQL file is about 91% compatible. Even though we had selected just tables before, few tables related objects are also extracted. However, if it's not fully compatible, it will show things which need attention. Look at the incompatibility's found.

In above case, we find that "Create Database Link" sqls and "Grant Statement" sqls are incompatible. So, we open the sql file for edit and comment out the statements or take necessary steps to fix them. In this case the incompatible statements are commented out.

```
--[DDL_EXTRACTION] OBJECT_TYPE "ROLE"
--[DDL_EXTRACTION] OBJECT_TYPE "GRANT ROLE"
--[DDL_EXTRACTION] OBJECT_TYPE "GRANT TABLE"
--[DDL_EXTRACTION] OBJECT_TYPE "GRANT COLUMN"
--[DDL_EXTRACTION] OBJECT_TYPE "GRANT SYSTEM PRIVILEGES"
--GRANT CREATE TABLE TO "GGF21215";
--GRANT UNLIMITED TABLESPACE TO "GGF21215";
--GRANT CREATE SESSION TO "GGF21215";
--[DDL_EXTRACTION] OBJECT_TYPE "TABLE COMMENT"
--[DDL_EXTRACTION] OBJECT_TYPE "COLUMN COMMENT"
--[DDL_EXTRACTION] INFO "Additional Objects"
--[DDL_EXTRACTION] OBJECT_TYPE "DIMENSION"
--[DDL_EXTRACTION] OBJECT_TYPE "JAVA SOURCE"
--[DDL_EXTRACTION] OBJECT_TYPE "DATABASE LINK"
--CREATE PUBLIC DATABASE LINK "REMOTE.FYFE.IBM.COM" using 'nopassword' ;
--[DDL_EXTRACTION] OBJECT_TYPE "DIRECTORY"
```

Then we re-run the evaluation again, you should get 100% compatible.

Compatibility Report 

100.0%
Excellent

Overall Summary

- 0 out of 0 PL/SQL statements are compatible
- 22 out of 22 (100.0 %) SQL statements are compatible

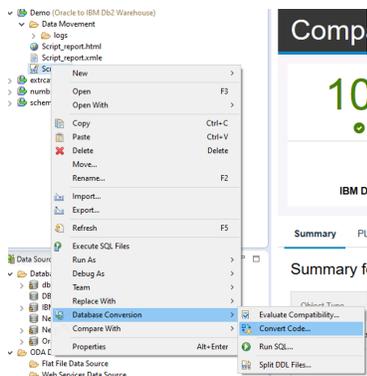
Oracle
IBM Db2 Warehouse

Summary PL/SQL evaluation SQL evaluation BLU evaluation Unrecognized syntax Statistics

Summary for PL/SQL statements

Object Type	Total Count	Requires Attention	% Requires Attention
Anonymous Blocks	0	0	0.0 %
Package Heads	0	0	0.0 %
Package Body	0	0	0.0 %
Functions	0	0	0.0 %
Procedures	0	0	0.0 %
Triggers	0	0	0.0 %
Total Objects	0	0	0.0 %

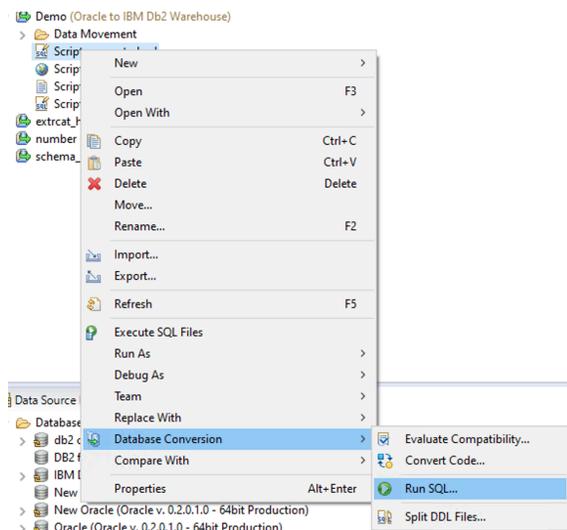
The next step is to 'Convert code' which makes the code deployable.



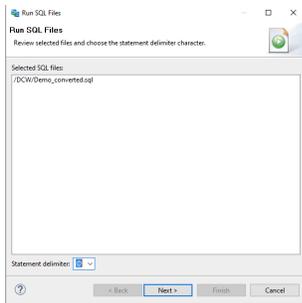
Once you convert the code, a new file with `_converted.sql` extension is generated in the same project. Now, you are ready for schema deployment onto target.

Deploying schema to target Db2 Warehouse on Cloud

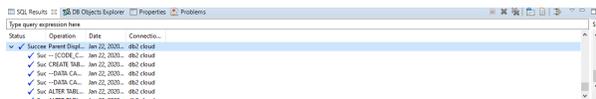
Add connection to the target, using same steps as before (See Add database connection). Here you will also need Db2 Warehouse on Cloud's service credentials. Once connection is successfully established, you can execute the schema sql on target using Run SQL.,.



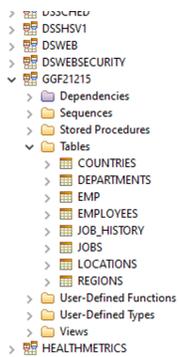
Make sure you specify proper statement delimiter character (`@` by default) and select connection to catalogued to Db2 Warehouse on Cloud.



When the ddls from schema file executes, the results are shown in SQL Results view.



In the Data Source Explorer view, right click on the DB2 Warehouse on Cloud connection you had created earlier, click Refresh. You verify that schema is successfully created in the target database.



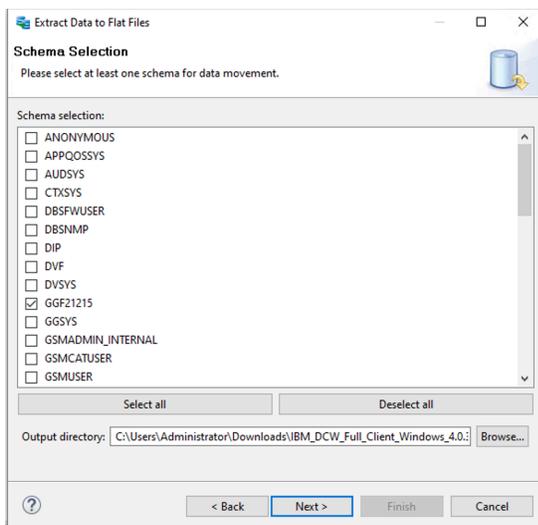
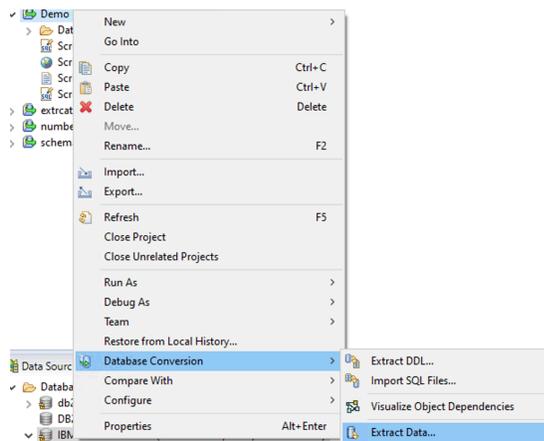
This completes the schema migration from Oracle to Db2 Warehouse on Cloud.

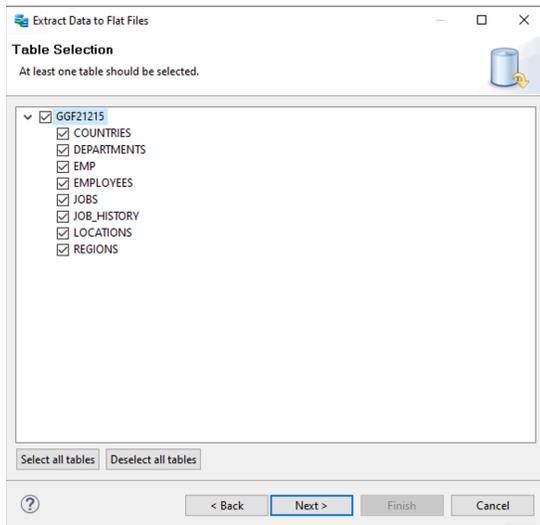
Data migration

Extracting source data

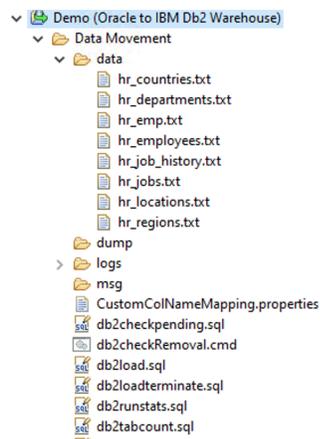
For moving data, DCW provides an easy mechanism to unload data from source. In the DCW project you just created, click Extract data and select Oracle database as source. You can select the schema and tables to be unloaded.

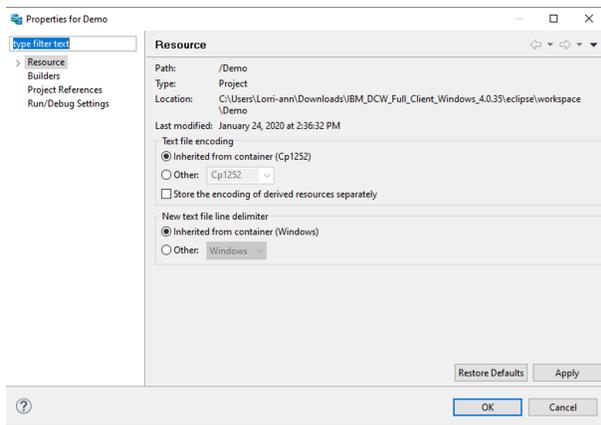
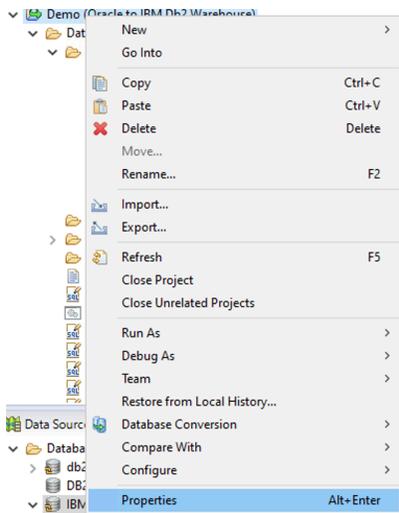
Follow through the Extract Data wizard, select Oracle connections as source. Select demo schema we had used before for DDL extract.





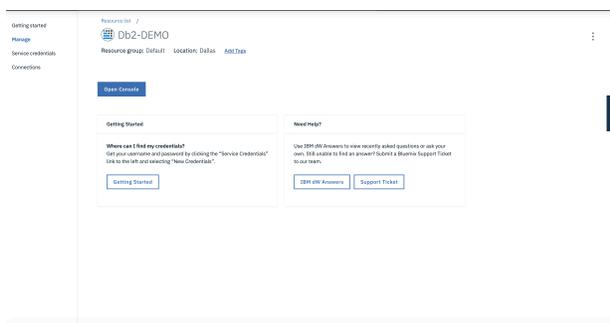
Accept the defaults and click Finish. The data extraction happens, and the data is unloaded under selected project under directory called 'Data Movement/data'. Note down path to the directory by right-click on the project.



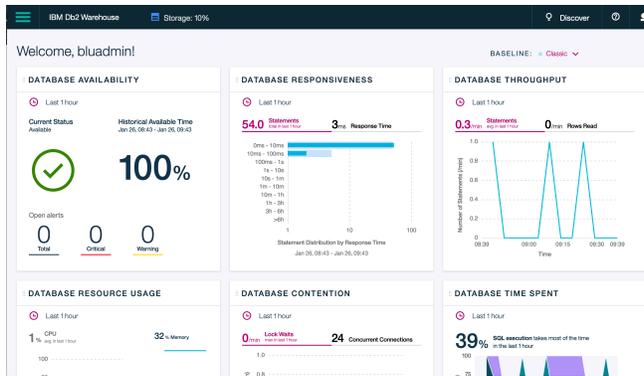


Loading data to target Db2 Warehouse on Cloud

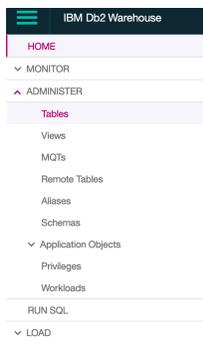
Log on to IBM Cloud and navigate to your Db2 Warehouse on Cloud service. Click Open Console to open the console for you Db2.



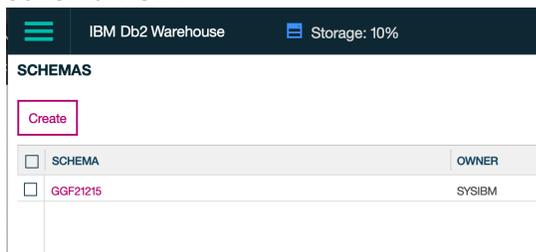
You will see the dashboard indicating the health of your database.



From the burger menu, navigate to Schemas and Tables and see that the newly created schema and tables exist.

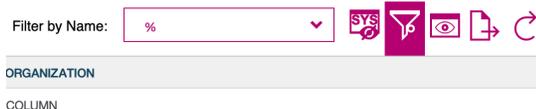


Schema view:



Tables view:

Click the funnel filter on top right corner



Enter the schema name as filter with contains and click Apply

Filter

Match: All rules Any rules

Schema contains

You can see the schema and tables.

TABLE	SCHEMA	ORGANIZATION
LOCATIONS	GGF21215	COLUMN
EMP	GGF21215	COLUMN
COUNTRIES	GGF21215	COLUMN
JOBS	GGF21215	COLUMN
EMPLOYEES	GGF21215	COLUMN
REGIONS	GGF21215	COLUMN
DEPARTMENTS	GGF21215	COLUMN
JOB_HISTORY	GGF21215	COLUMN

Navigate to LOAD -> Load from file

MONITOR	ADMINISTER	LOAD	ANALYTICS	HELP
Load from File				
Load from S3				
Load OpenData				
LEFT TO CLOUD				
HIGH AVAILABILITY				
CONNECT				
HELP				

This sets up you to load data action. In the Specify source file, click on 'Choose a file' and navigate to the directory where you unloaded files earlier. Select hr_locations.txt file.

Click on 'Drag a file here' from 'Data Movement/data' directory or unloaded files to this window. Select hr_locations.txt file and drop it into the browser window. Click next.

Load from an Excel file or a delimited text file, such as a comma-separated value (CSV) file, either on your client or on the server. The maximum size of a client file that you upload by using HTTP is 2 GB.

1. Specify source file 2. Choose the target 3. Select a table 4. Load complete

File location:

Transfer mechanism: Supported files are not compressed and file is client-side transferred. Supported files are not compressed and file is client-side transferred.

File characterization: Does one or more columns contain dates or times? Yes No

Code page:

Separator character: Comma Tab Other:

Does the file have columns that contain dates or times? Yes No

Specify the file characteristics such as delimiter. In our file the delimiter character is set to ~

Load from file

Load from an Excel file or a delimited text file, such as a comma-separated value (CSV) file, either on your client or on the server. The maximum size of a client file that you upload by using HTTP is 2 GB. [Learn more](#)

1. Specify source file 2. Choose the target 3. Select a table 4. Load complete

File location: [Clear](#) [New](#)

Transfer mechanism: Recommended files are size uncompressed text files or Excel spreadsheets.

File Name: [Upload completed successfully](#)

File characteristics: Does the file contain the column names? [Yes](#) [No](#)

Code page:

Separator character:

Comma

Tab

Colon

Other:

Does the file have columns that contain dates or times? [Yes](#) [No](#)

[Cancel](#) [Finish](#)

This will show the preview contents of the file.

Data preview (first 10 rows) of h_locations.txt

ID	ADDRESS	CITY	STATE	COUNTRY	ZIP
1001	"1001 W. COLA DR Bld"	"OSHA"	"Texas"	"USA"	"75701"
1002	"10021 Colbyville Road"	"OSHA"	"Texas"	"USA"	"75701"
1003	"10031 Shingler Rd"	"OSHA"	"Texas"	"Texas Prefecture"	"75701"
1004	"10041 Kanyan-chi"	"OSHA"	"Newbraska"	"USA"	"75701"
1005	"10051 Jabbenevody Rd"	"OSHA"	"Southlake"	"Texas"	"75701"
1006	"10061 Intevora Blvd"	"OSHA"	"South San Francisco"	"California"	"75701"
1007	"10071 Zynova St"	"OSHA"	"South Brunswick"	"New Jersey"	"75701"
1008	"10081 Charade Rd"	"OSHA"	"Seattle"	"Washington"	"75701"
1009	"10091 Spookia Ave"	"OSHA"	"Tevotte"	"Ontario"	"75701"
1010	"10101 Borewood St"	"OSHA"	"Whitakers"	"Alaska"	"75701"
2000	"1015-15 Langenggen"	"OSHA"	"Belgium"	"USA"	"75701"

Total Rows: 15 / Selected: 0

[Cancel](#) [Back](#) [Next](#)

Next steps are to choose the target table.

Load from file

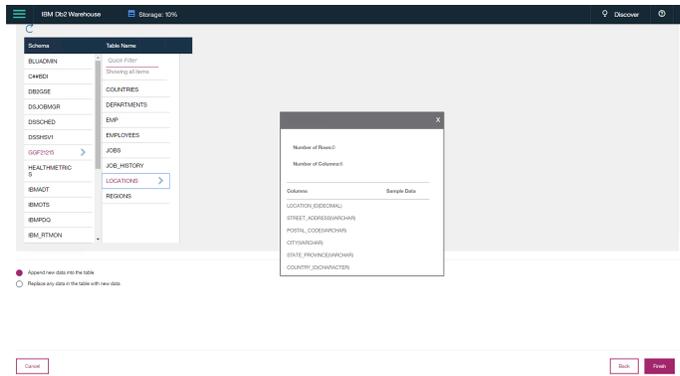
1. Specify source file 2. Choose the target 3. Select a table 4. Load complete

Load into an existing table

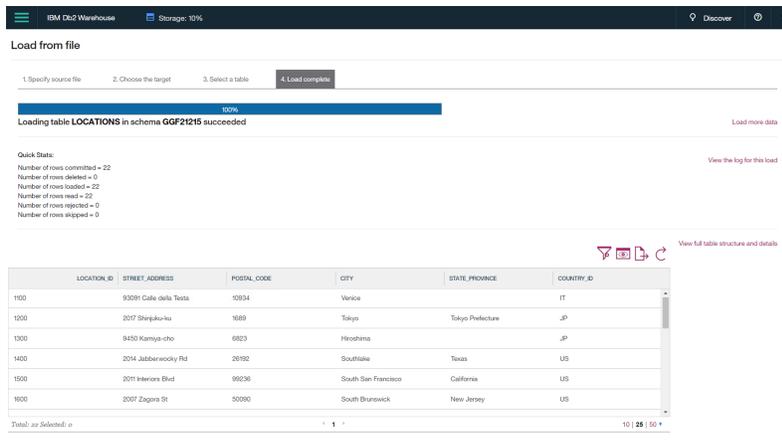
Create a new table and load

[Cancel](#) [Back](#) [Next](#)

As we are loading data into LOCATIONS table, select the respective schema and table as shown and click Finish. This will start the load and data is loaded into the target table.



When the load completes, the status and sample contents of the table are shown.



The LOCATIONS tables have been successfully migrated to Db2 on Cloud. Similarly, you can migrate for the rest of tables.

Conclusion

You have seen here how easy it is to move your Oracle workloads to Db2 Warehouse on Cloud using IBM tools such as DCW.

Related links

[Db2 Warehouse on Cloud](https://www.ibm.com/cloud/db2-warehouse-on-cloud)

<https://www.ibm.com/cloud/db2-warehouse-on-cloud>

[IBM Database Conversion Workbench](https://community.ibm.com/community/user/hybriddatamanagement/communities/community-home?CommunityKey=582cbbdf-3409-4e35-b111-f1c05ee59b99)

<https://community.ibm.com/community/user/hybriddatamanagement/communities/community-home?CommunityKey=582cbbdf-3409-4e35-b111-f1c05ee59b99>