

Querying Data

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Querying data in Cloudera Data Warehouse

This topic describes how to query data in your Virtual Warehouse on Cloudera Data Warehouse (CDW).

About this task

The CDW service includes the Hue SQL editor that you can use to submit queries to Virtual Warehouses. For example, you can use Hue to submit queries to an Impala Virtual Warehouse.

Procedure

1. Log in to the Data Warehouse service as DWUser.
The **Overview** page is displayed.
2. Click Hue on the Virtual Warehouse tile.
3. Enter your query into the editor and submit it to the Virtual Warehouse.

Submitting queries with Hue

You can write and edit queries for Hive or Impala Virtual Warehouses in the Cloudera Data Warehouse (CDW) service by using Hue.

About this task

For detailed information about using Hue, see [Using Hue](#).

Required role: DWUser

Before you begin

Hue uses your LDAP credentials that you have configured for the CDP cluster.

Procedure

1. Log into the CDP web interface and navigate to the Data Warehouse service.
2. In the Data Warehouse service, navigate to the **Overview** page.

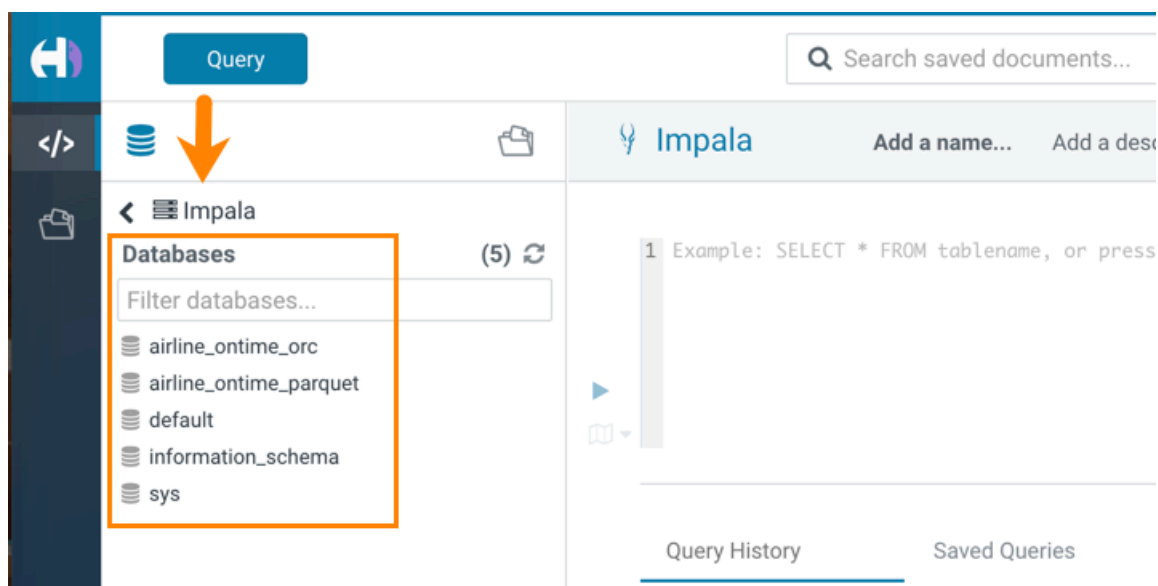


Note: You can also launch Hue from the **Virtual Warehouse** page using the same steps.

3. To run Impala queries:


- a) Click HUE on the Impala Virtual Warehouse tile.


The query editor is displayed:




- b) Click a database to view the tables it contains.

When you click a database, it sets it as the target of your query in the main query editor panel.

- c) Type a query in the editor panel and click the run icon  to run the query.

You can also run multiple queries by selecting them and clicking .

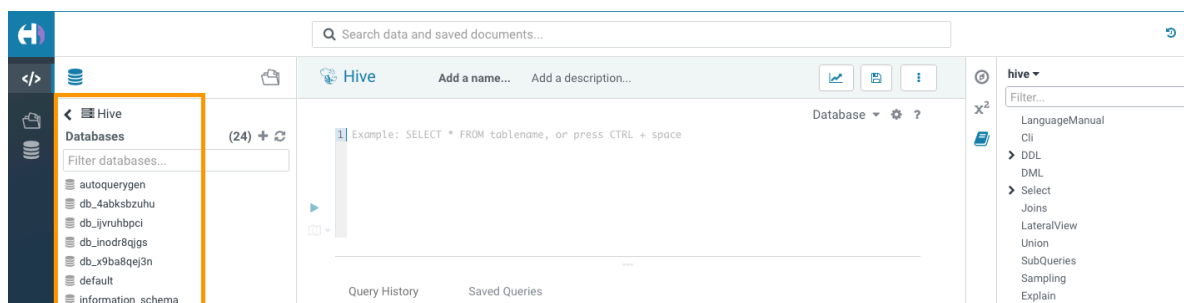


Note: Use the Impala language reference to get information about syntax in addition to the SQL auto-complete feature that is built in. To view the language reference, click the book icon  to the right of the query editor panel.

4. To run Hive queries:


- a) Click HUE on the Hive Virtual Warehouse tile.


The Hive query editor is displayed:




- b) Click a database to view the tables it contains.

When you click a database, it sets it as the target of your query in the main query editor panel.

- c) Type a query in the editor panel and click the run icon  to run the query.

You can also run multiple queries by selecting them and clicking .



Note: Use the Hive language reference to get information about syntax in addition to the SQL auto-complete feature that is built in. To view the language reference, click the book icon  to the right of the query editor panel.

Related Information

[Advanced Hue configurations \(safety valves\) in CDW](#)

Viewing query history in Cloudera Data Warehouse

In Cloudera Data Warehouse (CDW), you can view all queries that were run against a Database Catalog from Hue, Beeline, Hive Warehouse Connector (HWC), Tableau, Impala-shell, Impyla, and so on.

About this task

You need to set up Query Processor administrators to view the list of all queries from all users, or to restrict viewing of queries.

Procedure

1. Log in to the CDP web interface and navigate to the Data Warehouse service.
2. In the Data Warehouse service, navigate to the **Overview** page.
3. From a Virtual Warehouse, launch Hue.
4. Click on the Jobs icon on the left-assist panel.
The **Job Browser** page is displayed.
5. Go to the **Queries** tab to view query history and query details.

Related Information

[Viewing Hive query details](#)

[Viewing Impala query details](#)

[Adding Query Processor Administrator users and groups in Cloudera Data Warehouse](#)

Creating a user-defined function in Cloudera Data Warehouse Private Cloud

You export user-defined functionality (UDF) to a JAR from a Hadoop- and Hive-compatible Java project and store the JAR on your cluster. Using Hive commands, you register the UDF based on the JAR, and call the UDF from a Hive query.

Before you begin

- You must have access rights to upload the JAR to your cluster. Minimum Required Role: Configurator (also provided by Cluster Administrator, Full Administrator).
- Make sure Hive on Tez or Hive LLAP is running on the cluster.
- Make sure that you have installed Java and a Java integrated development environment (IDE) tool on the machine, or virtual machine, where you want to create the UDF.

Setting up the development environment

You can create a Hive UDF in a development environment using IntelliJ, for example, and build the UDF. You define the Cloudera Maven Repository in your POM, which accesses necessary JARS `hadoop-common-<version>.jar` and `hive-exec-<version>.jar`.

Procedure

1. Open IntelliJ and create a new Maven-based project. Click Create New Project. Select Maven and the supported Java version as the Project SDK. Click Next.
2. Add archetype information.
For example:
 - GroupId: com.mycompany.hiveudf
 - ArtifactId: hiveudf
3. Click Next and Finish.
The generated pom.xml appears in sample-hiveudf.
4. To the pom.xml, add properties to facilitate versioning.
For example:

```
<properties>
  <hadoop.version>TBD</hadoop.version>
  <hive.version>TBD</hive.version>
</properties>
```

5. In the pom.xml, define the repositories.
Use internal repositories if you do not have internet access.

```
<repositories>
  <repository>
    <releases>
      <enabled>true</enabled>
      <updatePolicy>always</updatePolicy>
      <checksumPolicy>warn</checksumPolicy>
    </releases>
    <snapshots>
      <enabled>false</enabled>
      <updatePolicy>never</updatePolicy>
      <checksumPolicy>fail</checksumPolicy>
    </snapshots>
    <id>HDPReleases</id>
    <name>HDP Releases</name>
    <url>http://repo.hortonworks.com/content/repositories/releases/</u
rl>
    <layout>default</layout>
  </repository>
  <repository>
    <id>public.repo.hortonworks.com</id>
    <name>Public Hortonworks Maven Repo</name>
    <url>http://repo.hortonworks.com/content/groups/public/</url>
    <snapshots>
      <enabled>false</enabled>
    </snapshots>
  </repository>
  <repository>
    <id>repository.cloudera.com</id>
    <url>https://repository.cloudera.com/artifactory/cloudera-repos/<
/url>
  </repository>
</repositories>
```

6. Define dependencies.
For example:

```
<dependencies>
  <dependency>
    <groupId>org.apache.hive</groupId>
```

```

    <artifactId>hive-exec</artifactId>
    <version>${hive.version}</version>
  </dependency>
  <dependency>
    <groupId>org.apache.hadoop</groupId>
    <artifactId>hadoop-common</artifactId>
    <version>${hadoop.version}</version>
  </dependency>
</dependencies>

```

Creating the UDF class

You define the UDF logic in a new class that returns the data type of a selected column in a table.

Procedure

1. In IntelliJ, click the vertical project tab, and expand hiveudf: hiveudf src main . Select the java directory, and on the context menu, select **New Java Class** , and name the class, for example, **TypeOf**.
2. Extend the **GenericUDF** class to include the logic that identifies the data type of a column.

For example:

```

package com.mycompany.hiveudf;

import org.apache.hadoop.hive ql.exec.UDFArgumentException;
import org.apache.hadoop.hive ql.metadata.HiveException;
import org.apache.hadoop.hive ql.udf.generic.GenericUDF;
import org.apache.hadoop.hive.serde2.objectinspector.ObjectInspector;
import org.apache.hadoop.hive.serde2.objectinspector.primitive.\
PrimitiveObjectInspectorFactory;
import org.apache.hadoop.io.Text;
public class TypeOf extends GenericUDF {
    private final Text output = new Text();
    @Override
    public ObjectInspector initialize(ObjectInspector[] arguments) throws U
DFArgumentException {
        checkArgsSize(arguments, 1, 1);
        checkArgPrimitive(arguments, 0);
        ObjectInspector outputOI = PrimitiveObjectInspectorFactory.writableSt
ringObjectInspector;
        return outputOI;
    }

    @Override
    public Object evaluate(DeferredObject[] arguments) throws HiveException
    {
        Object obj;
        if ((obj = arguments[0].get()) == null) {
            String res = "Type: NULL";
            output.set(res);
        } else {
            String res = "Type: " + obj.getClass().getName();
            output.set(res);
        }
        return output;
    }

    @Override
    public String getDisplayString(String[] children) {
        return getStandardDisplayString("TYPEOF", children, ",");
    }
}

```


}

Building the project and uploading the JAR

You compile the UDF code into a JAR and add the JAR to the classpath on the cluster.

About this task

Use the direct reference method to configure the cluster to find the JAR. It is a straight-forward method, but recommended for development only.

Procedure

1. Build the IntelliJ project.

```
...
[INFO] Building jar: /Users/max/IdeaProjects/hiveudf/target/TypeOf-1.0-SNAPSHOT.jar
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 14.820 s
[INFO] Finished at: 2019-04-03T16:53:04-07:00
[INFO] Final Memory: 26M/397M
[INFO] -----
-----
```

Process finished with exit code 0

2. In IntelliJ, navigate to the JAR in the /target directory of the project.
3. Configure the cluster so that Hive can find the JAR using the direct reference method.
 - a) Upload the JAR to HDFS.
 - b) Move the JAR into the Hive warehouse. For example, in CDP Data Center:

```
$ hdfs dfs -put TypeOf-1.0-SNAPSHOT.jar /warehouse/tablespace/managed/hiveudf-1.0-SNAPSHOT.jar
```

4. In IntelliJ, click Save.
5. Click Actions Deploy Client Configuration .
6. Restart the Hive service.

Registering the UDF

In Cloudera Data Warehouse (CDW), you run a command from Hue to make the UDF functional in Hive queries. The UDF persists between HiveServer restarts.

Before you begin

You need to set up UDF access using a Ranger policy as follows:

1. Log in to the Data Warehouse service and open Ranger from the Database Catalog associated with your Hive Virtual Warehouse.
2. On the **Service Manager** page, under the HADOOP SQL section, select the Database Catalog associated with the Hive Virtual Warehouse in which you want to run the UDFs.

The list of policies is displayed.

3. Select the all - database, udf policy and add the users needing access to Hue. To add all users, you can specify {USER}.

About this task

In this task, the registration command differs depending on the method you choose to configure the cluster for finding the JAR. If you use the Hive aux library directory method that involves a symbolic link, you need to restart the HiveServer pod after registration. If you use the direct JAR reference method, you do not need to restart HiveServer. You must recreate the symbolic link after any patch or maintenance upgrades that deploy a new version of Hive.

Procedure

1. Open Hue from the Hive Virtual Warehouse in CDW.
2. Run the registration command by including the JAR location in the command as follows:

```
CREATE FUNCTION udftypeof AS 'com.mycompany.hiveudf.TypeOf01' USING JAR
'hdfs:///warehouse/tablespace/managed/TypeOf01-1.0-SNAPSHOT.jar';
```

3. Restart the HiveServer.

You can either delete the hiveserver2-0 pod using Kubernetes, or, you can edit an HS2 related configuration, and CDP restarts the HiveServer pod.



Note: If you plan to run UDFs on LLAP, you must restart the query executor and query coordinator pods after registering the UDF.

4. Verify whether the UDF is registered.

```
SHOW FUNCTIONS;
```

You scroll through the output and find default.typeof.

Calling the UDF in a query

After registration of a UDF, you do not need to restart Hive before using the UDF in a query. In this example, you call the UDF you created in a SELECT statement, and Hive returns the data type of a column you specify.

Before you begin

- For the example query in this task, you need to create a table in Hive and insert some data.

This task assumes you have the following example table in Hive:

| students.name | students.age | students.gpa |
|-----------------|--------------|--------------|
| fred flintstone | 35 | 1.28 |
| barney rubble | 32 | 2.32 |

- As a user, you need to have permission to call a UDF, which a Ranger policy can provide.

Procedure

1. Use the database in which you registered the UDF.

```
USE default;
```

2. Query Hive using the direct reference method:

```
SELECT students.name, udftypeof(students.name) AS type FROM students WHERE
age=35;
```

You get the data type of the name column in the students table:

| students.name | type |
|--------------------------|---|
| fred flintstone table | Type: org.apache.hadoop.hive.serde2.io.HiveVarcharWri |

Starting the SQL AI Assistant in Hue

A SQL AI Assistant has been integrated into Hue with the capability to leverage the power of Large Language Models (LLMs) for various SQL tasks. It helps you to create, edit, optimize, fix, and succinctly summarize queries using natural language and makes SQL development faster, easier, and less error-prone. You can also generate comments and insert them into your queries to improve readability.

About this task




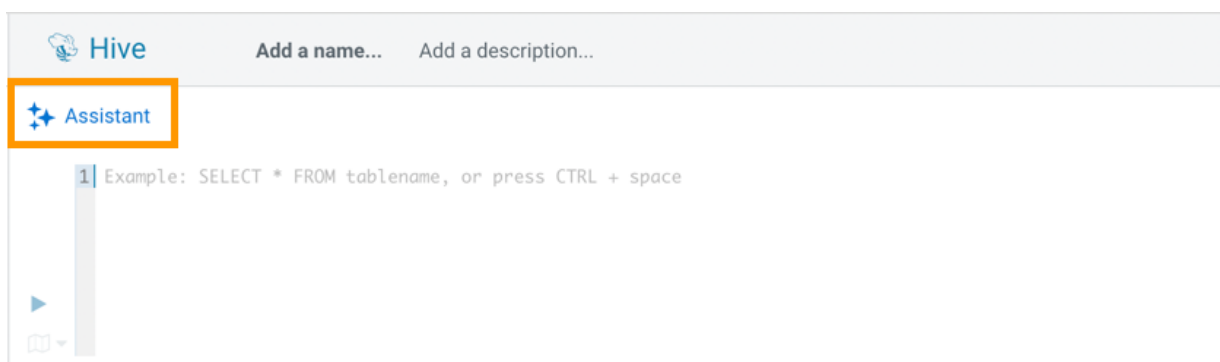
Attention: The SQL AI Assistant operates only on the database that you have selected in the Hue editor, and not necessarily on the one that is displayed on the left-assist bar.

Before you begin

Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

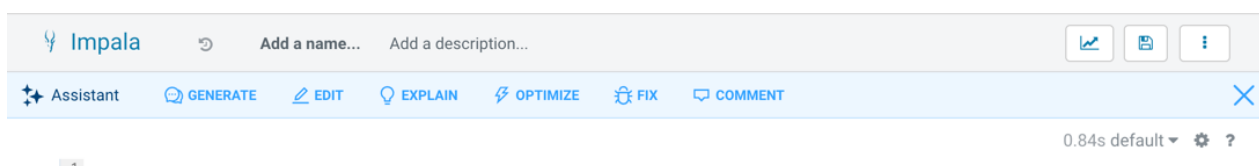
Procedure

1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Click  Assistant on the Hue SQL editor:



Results

The following options are displayed:



Related Information

[About setting up the SQL AI Assistant in CDW](#)


Generating SQL from natural language in Hue

The SQL AI Assistant in Cloudera Data Warehouse (CDW) helps you to generate SQL queries by entering a prompt in natural language. You can then insert the generated SQL in the Hue SQL editor and run it as usual.

Before you begin

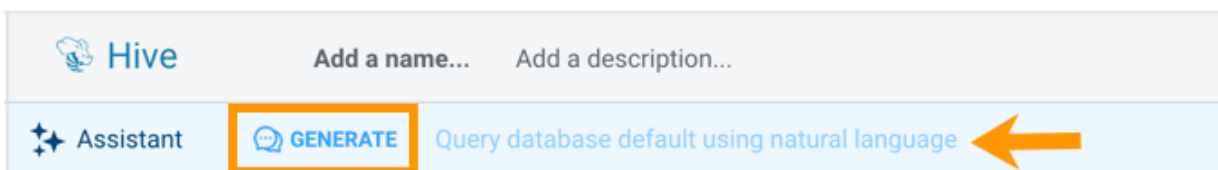
Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

Procedure

1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Click  Assistant on the Hue SQL editor:



4. Click GENERATE.



A SQL query is generated based on your input prompt. Click Insert to insert the query into the editor and run it.

Related Information

[About setting up the SQL AI Assistant in CDW](#)


Editing the query in natural language in Hue

You can edit a query in natural language and generate it again to fine-tune your results using the Hue SQL AI Assistant. You can then insert the SQL query into the editor and run it as usual.

Before you begin

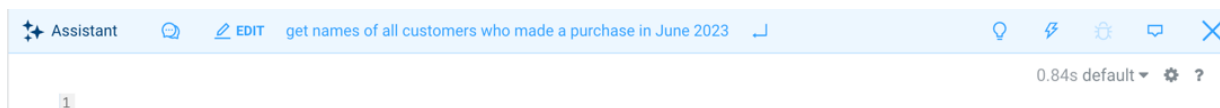
Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

Procedure

1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Click  Assistant on the Hue SQL editor:



4. Click EDIT.



Select the query from the list and edit it as needed. Then press enter to regenerate the SQL.

Related Information

[About setting up the SQL AI Assistant in CDW](#)

Getting an explanation of a SQL query in natural language in Hue


You can use the SQL AI Assistant to breakdown and understand a complex SQL query in natural language.

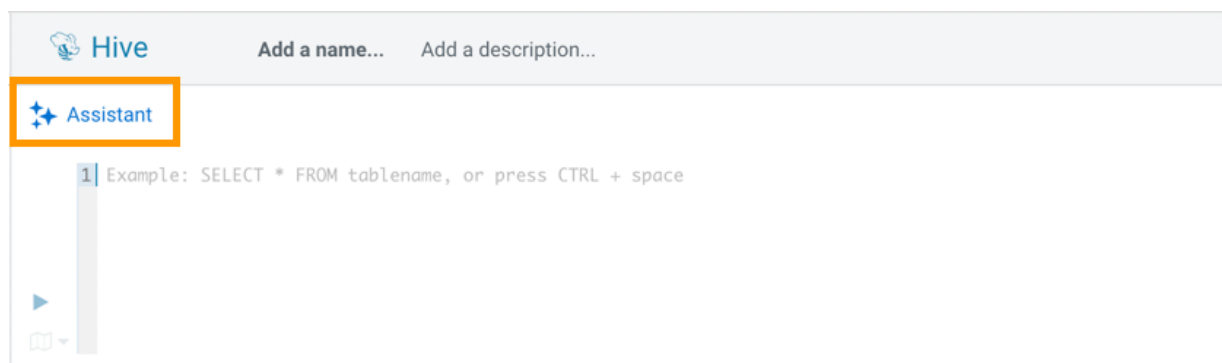
Before you begin

Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

Procedure

1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Insert a SQL query in the Hue editor that you would like to understand in natural language.

4. Click  Assistant on the Hue SQL editor:



5. Click EXPLAIN.



The LLM generates the explanation of the SQL query.

Explained SQL for default

```
1 SELECT name
2 FROM customers
3 WHERE EXISTS (
4   SELECT 1
5   FROM orders
6   WHERE orders.customer_id = customers.id
7     AND orders.order_date BETWEEN '2023-06-01' AND '2023-06-30'
8 );
```

SUMMARY

Returns the names of customers who placed an order between June 1, 2023 and June 30, 2023.

EXPLANATION

The given SQL query performs an EXISTS subquery to check if each customer in the customers table has any orders in the orders table that were placed between '2023-06-01' and '2023-06-30'.

It first selects the name column from the customers table. This is the outer query.

For each customer, it checks if there exists any rows in the orders table where:

- The order customer_id matches the current customer's id
- The order_date is between '2023-06-01' and '2023-06-30'

If there is at least one matching order for a given customer, the EXISTS subquery will return true and that customer's name will be included in the result set.

Insert as comment

Related Information

[About setting up the SQL AI Assistant in CDW](#)


Optimizing a query in Hue

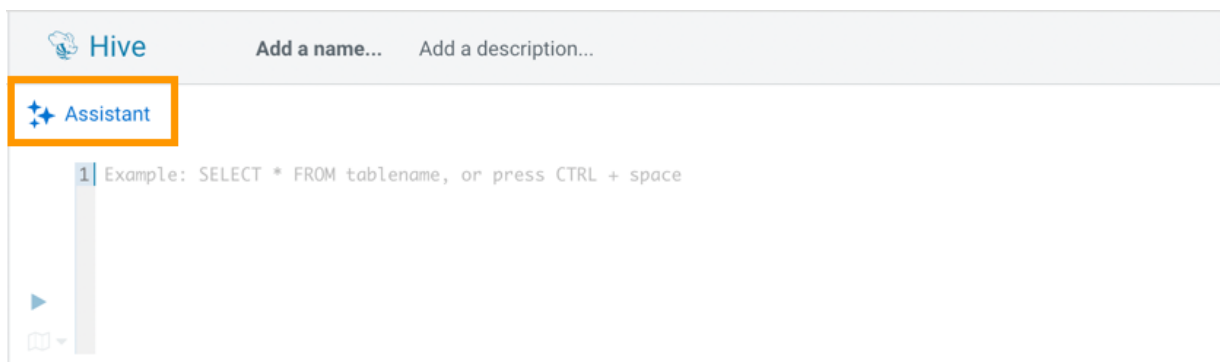
You can use the SQL AI Assistant to optimize a SQL query. Hue identifies the issues in the source query, optimizes it, and provides the optimized version of the SQL query. Hue also summarizes the issues and how it optimized the query in natural language.

Before you begin

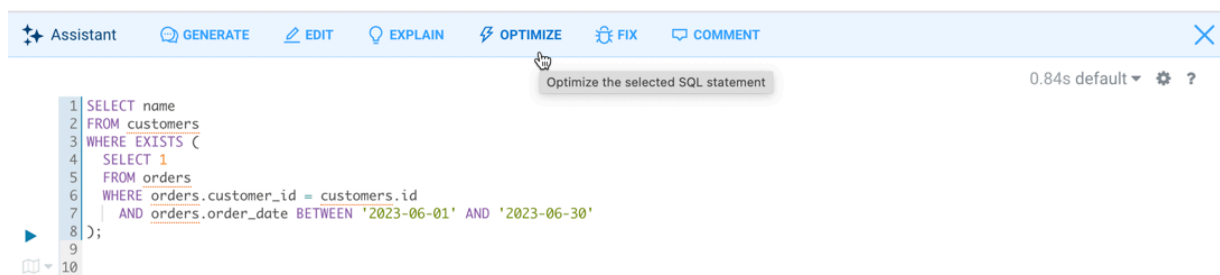
Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

Procedure

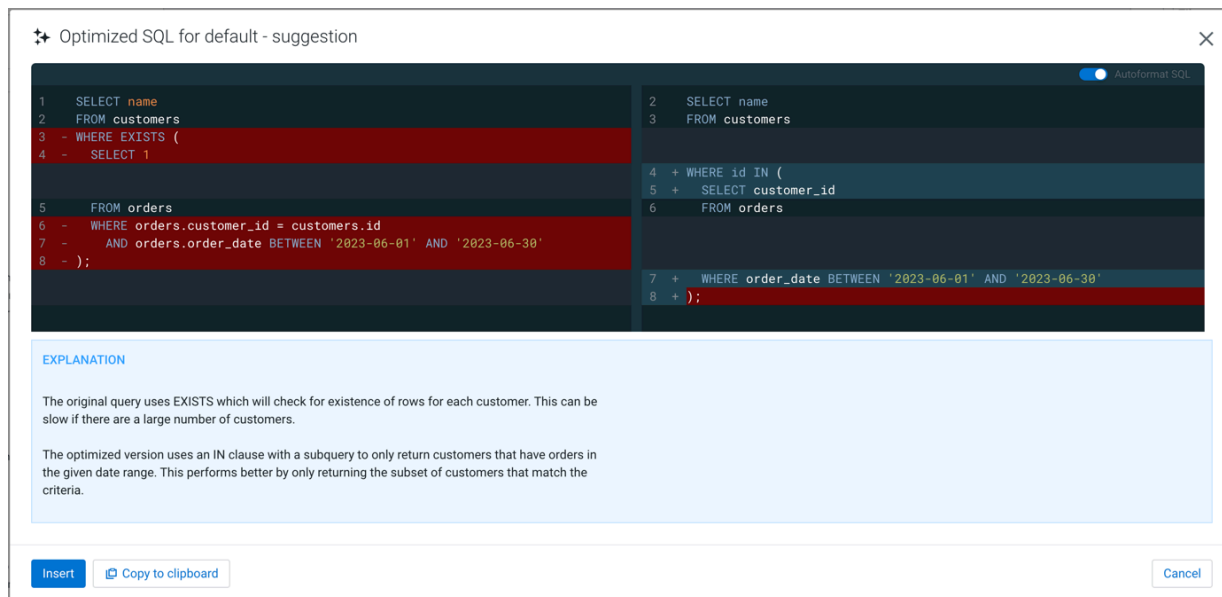
1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Insert a SQL query in the Hue editor that you would like to optimize.
4. Click  Assistant on the Hue SQL editor:



5. Click OPTIMIZE.



Hue displays the original and the optimized SQL query side-by-side. It also provides an explanation of the issues in the original query and how it was optimized.



Related Information

[About setting up the SQL AI Assistant in CDW](#)

Fixing a query in Hue


You can use the SQL AI Assistant to fix a broken SQL query. Hue identifies the issues in SQL syntax and provides the corrected version.

Before you begin

Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

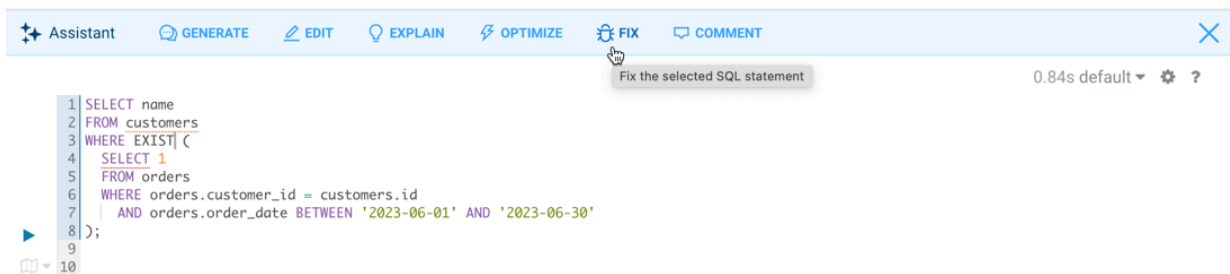
Procedure

1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Insert a SQL query in the Hue editor that you would like to fix.

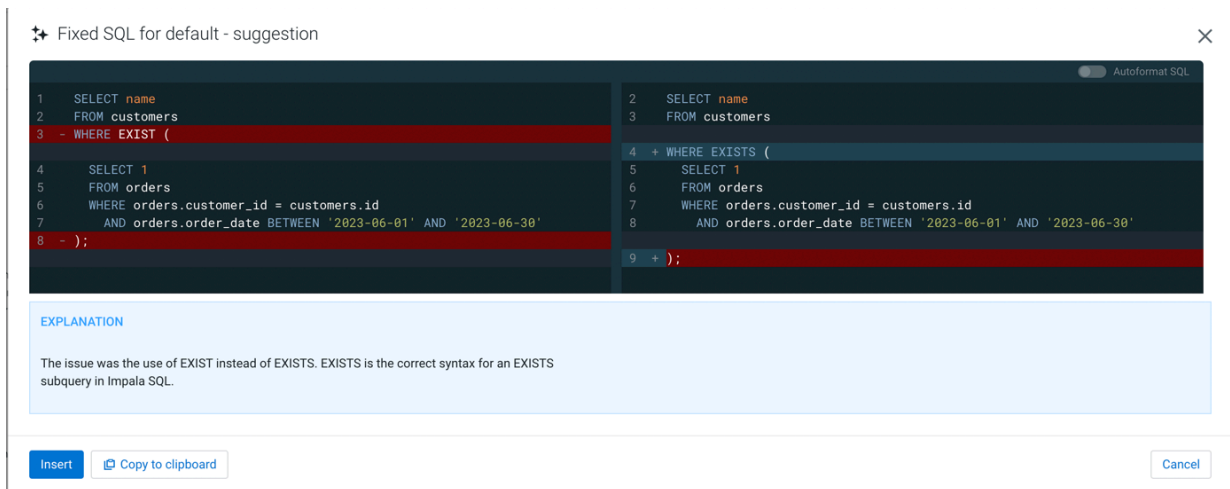
4. Click  Assistant on the Hue SQL editor:



5. Click FIX.



Hue displays the original and the fixed SQL query in a side-by-side comparison.



Click Insert to insert the fixed query in the Hue editor and run it.

Related Information

[About setting up the SQL AI Assistant in CDW](#)


Generating a comment for a query in Hue

The SQL AI Assistant can generate a comment explaining what SQL query does. You can insert it into the query to improve readability.

Before you begin

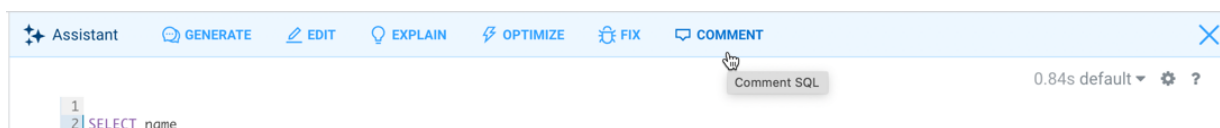
Your administrator must have configured and set up the required infrastructure for you to use the SQL AI Assistant. See [About setting up the Hue SQL AI Assistant](#).

Procedure

1. Log in to the Data Warehouse service as DWUser.
2. Open Hue corresponding to your Virtual Warehouse.
3. Insert a SQL query in the Hue editor for which you want to generate a comment.
4. Click  Assistant on the Hue SQL editor:



5. Click COMMENT.



The SQL AI Assistant generates a detailed comment for the input SQL query.



Click Insert to insert the comment into the query.