

## Using BI tools with CDW

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## Built-in BI clients and drivers in CDW

You can connect BI tools and SQL clients such as Beeline, impala-shell, impyla, Tableau, and so on to Cloudera Data Warehouse (CDW) and use them to explore and query data in the Data Lakehouse.

CDW provides built-in downloadables such as Hive JDBC driver for connecting JDBC-compliant tools to the Virtual Warehouses, Beeline CLI, Impala JDBC and ODBC drivers for connecting to Impala Virtual Warehouses, and a JDBC driver for using with Unified Analytics. You can download these from the Resources and Downloads tile present on the **Overview** page.

Cloudera recommends that you use the latest versions of Beeline, JDBC or ODBC drivers, impala-shell, or Impyla to connect to CDW. The versions of these BI client tools that are installed on the CDP Base nodes could be old and may not have newer features that CDW supports.

## Downloading root certificates for Kubernetes environments from CDW Private Cloud



You can download the signed certificates for Hive in the JKS format and for Impala in the PEM format from the Cloudera Data Warehouse (CDW) user interface, and use them to connect to Impala or Hive Virtual Warehouses from the BI clients such as Impala-shell, Impyla, or Beeline.

Suppose your organization uses a custom Certificate Authority (CA) to sign security certificates for Embedded Container Service (ECS) or OpenShift Container Platform (OCP) environments. In that case, you can obtain the TLS certificates for the Kubernetes environment without depending on your Administrators (DWAdmin users).

### Downloading root certificates from CDW web UI

You can download the root certificates for establishing a secure connection from BI clients to a Virtual Warehouse from the Virtual Warehouse more options menu in Cloudera Data Warehouse (CDW) Private Cloud.

#### Procedure

1. Log in to the Data Warehouse service.
2. Go to the Virtual Warehouses tab, locate the Virtual Warehouse you want to connect to, and click  Download Kubernetes cluster certificates .
3. (Impala) On the **Kubernetes certificate** modal, click **Copy certificate**.  
This copies the TLS certificate to the clipboard. Save the copied content in a text file.  
(Hive and Unified Analytics) On the **Kubernetes certificate** modal, click Download truststore and note the Java truststore password either by clicking  or Copy password.

## Downloading the Beeline CLI tarball

Download the Beeline CLI tarball from Cloudera Data Warehouse (CDW) to your local system and use the Beeline client to connect to a Hive Virtual Warehouse and run queries. The archive file contains all the dependent JARs and libraries that are required to run the Beeline script.



#### Before you begin

From the Cloudera Management Console user profile, note the Workload User Name and Workload Password.



**Attention:** Ensure that Java is installed on the node on which you want to download and use the Beeline CLI.

## Procedure

1. Log in to the CDP web interface and navigate to the Data Warehouse service.
2. In the **Overview** page of the Data Warehouse service, click See More in the Resources and Downloads tile.
3. Select Beeline CLI and click  to download the file.
4. Save the apache-hive-beeline-x.x.xxxx.tar.gz file in your local system and extract the tarball.
5. In the Data Warehouse service **Overview** page, for the Virtual Warehouse you want to connect to the client, click  and select Copy JDBC URL.
6. Paste the copied JDBC URL in a text file, to be used in later steps.

```
jdbc:hive2://<your-virtual-warehouse>.<your-environment>.<dwx.company.com>/default;transportMode=http;httpPath=cliservice;ssl=true;retries=3
```

7. Open a terminal window and go to the folder where the tarball is extracted to start Beeline.  
bin/beeline

This starts an interactive Beeline shell where you can connect to Hive and run SQL queries.

8. Run the connect command to connect to Hive using the JDBC URL that you copied earlier.

```
beeline> !connect [***JDBC URL***]
```



**Note:** If the root certificate is untrusted, set the value of ssl to false.

```
Connecting to jdbc:hive2://<your-virtual-warehouse>.<your-environment>.<dwx.company.com>/default;transportMode=http;httpPath=cliservice;ssl=true;retries=3
```

9. Enter the Workload User Name and Workload Password when you are prompted for the user credentials.

```
Enter username for jdbc:hive2://<your-virtual-warehouse>.<your-environment>.<dwx.company.com>/default: [***WORKLOAD USERNAME***]
Enter password for jdbc:hive2://<your-virtual-warehouse>.<your-environment>.<dwx.company.com>/default: [***WORKLOAD PASSWORD***]
Connected to: Apache Hive (version 3.1.2000.7.0.2.2-24)
Driver: Hive JDBC (version 3.1.2000.7.0.2.2-24)
Transaction isolation: TRANSACTION_REPEATABLE_READ
```

10. To verify if you are connected to HiveServer2 on the Virtual Warehouse, run the following SQL command:  
SHOW TABLES;

```
INFO : Compiling command(queryId=hive_20200214014428_182d2b63-a510-421f-8bbc-65a4ae24d1d6): show tables
INFO : Semantic Analysis Completed (retrial = false)
INFO : Completed compiling command(queryId=hive_20200214014428_182d2b63-a510-421f-8bbc-65a4ae24d1d6); Time taken: 0.054 seconds
INFO : Executing command(queryId=hive_20200214014428_182d2b63-a510-421f-8bbc-65a4ae24d1d6): show tables
INFO : Starting task [Stage-0:DDL] in serial mode
INFO : Completed executing command(queryId=hive_20200214014428_182d2b63-a510-421f-8bbc-65a4ae24d1d6); Time taken: 0.018 seconds
INFO : OK
-----
```

```
table_name
-----
-----
No rows selected (0.311 seconds)
```

## Connecting to Hive Virtual Warehouses from Tableau

This topic describes how to connect to Tableau with Hive Virtual Warehouses on Cloudera Data Warehouse (CDW) service.


### About this task

Required role: DWUser

### Before you begin

Before you can use Tableau with Hive Virtual Warehouses, you must have created a Database Catalog that is populated with data. You have the option to populate your Database Catalog with sample data when you create it. You must also create a Hive Virtual Warehouse, which is configured to connect to the Database Catalog that is populated with data.

### Procedure

1. Download the latest version of the Hive ODBC driver from [Cloudera Downloads page](#).
2. Install the driver on the local host where you intend to use Tableau Desktop.
3. Log in to the CDP web interface and navigate to the Data Warehouse service.
4. Go to the **Virtual Warehouses** tab, locate the Hive Virtual Warehouse you want to connect to, and select Copy JDBC URL from . This copies the JDBC URL to your system's clipboard.
5. Paste the copied JDBC URL into a text file. It should look similar to the following:

```
jdbc:hive2://<your-virtual-warehouse>.<your-environment>.<dwx.company.com>/default;transportMode=http;httpPath=cliservice;ssl=true;retries=3
```

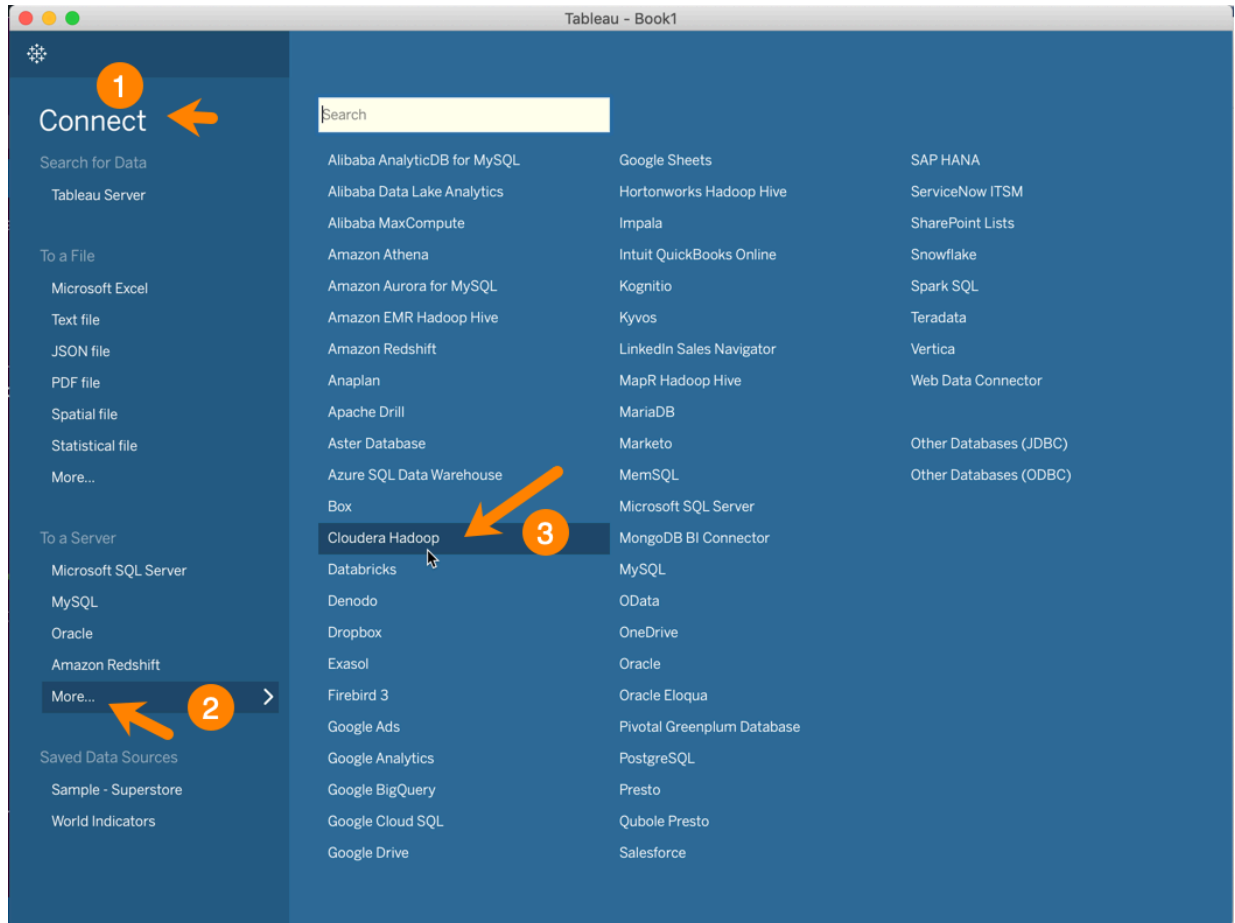


**Note:** If the root certificate is untrusted, set the value of ssl to false.

6. From the text file where you just pasted the URL, copy the host name from the JDBC URL to your system's clipboard. For example, the host name in the URL is:

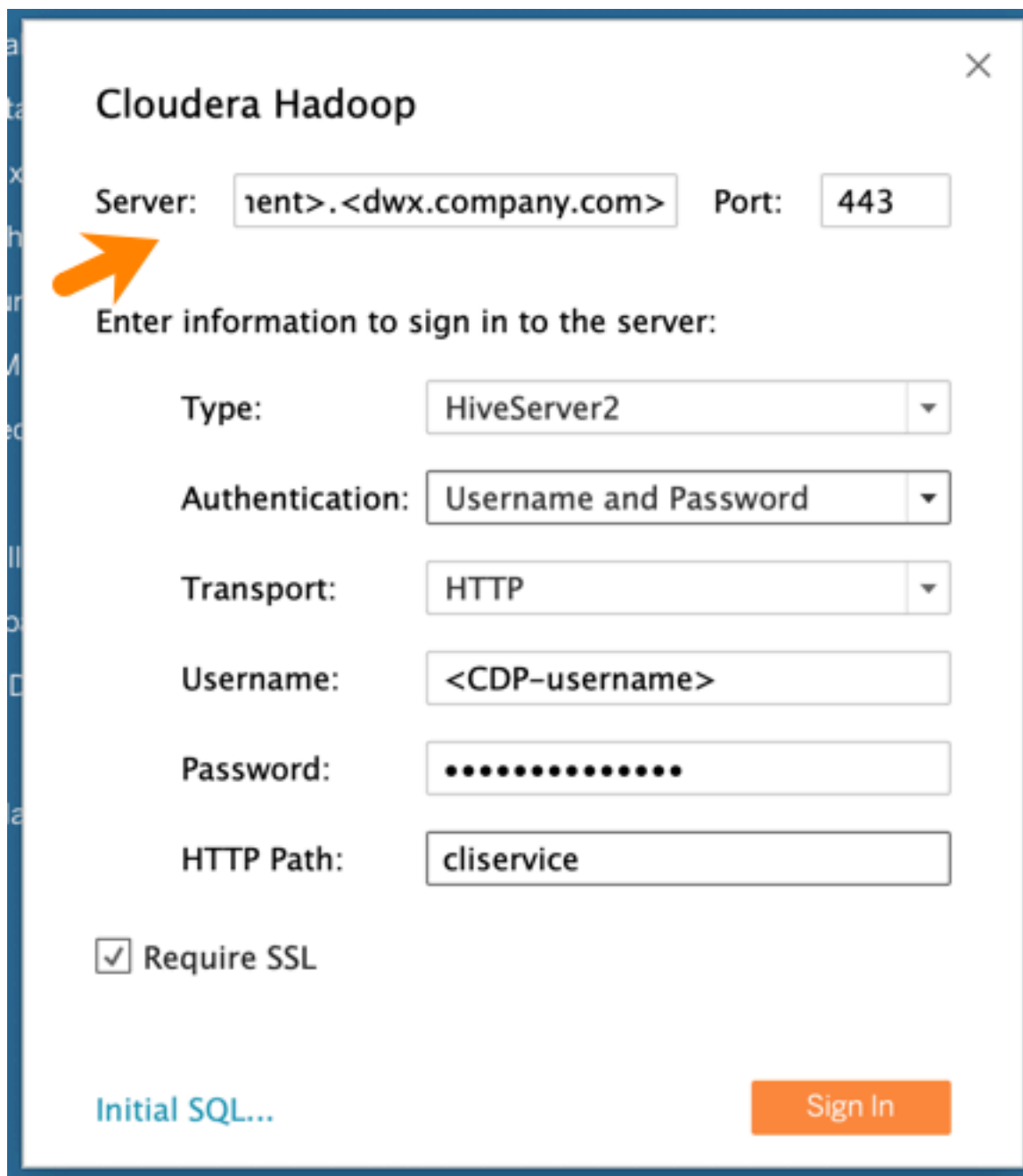
```
<your-virtual-warehouse>.<your-environment>.<dwx.company.com>
```

7. Start Tableau and navigate to ConnectMore...Cloudera Hadoop :



This launches the Cloudera Hadoop dialog box.

8. In the Tableau Cloudera Hadoop dialog box, paste the host name you copied to your clipboard in Step 7 into the Server field:



**Cloudera Hadoop**

Server:  Port:

Enter information to sign in to the server:

Type:

Authentication:

Transport:

Username:

Password:

HTTP Path:

☒ Require SSL

[Initial SQL...](#) [Sign In](#)

9. Then in the Tableau Cloudera Hadoop dialog box, set the following other options:

- Port: 443
- Type: HiveServer2
- Authentication: Username and Password
- Transport: HTTP
- Username: Username you use to connect to the CDP Data Warehouse service.
- Password: Password you use to connect to the CDP Data Warehouse service.
- HTTP Path: cliservice
- Require SSL: Make sure this is checked.

10. Click Sign In.



### Related Information

[Cloudera Hadoop connection option described in the Tableau documentation](#)

## Downloading a JDBC driver from Cloudera Data Warehouse

To use third-party BI tools, your client users need a JDBC JAR to connect your BI tool and the service. You learn how to download the JDBC JAR to give to your client, and general instructions about how to use the JDBC JAR.

### Before you begin

Before you can use your BI tool with the Data Warehouse service:


- You created a Database Catalog.

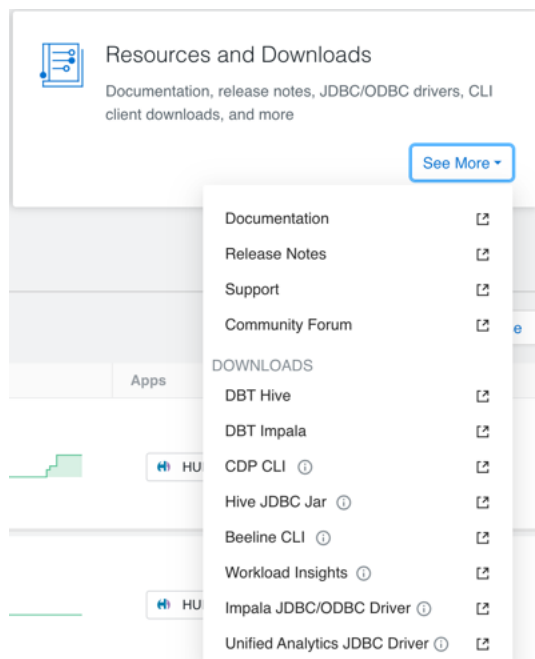
You have the option to populate your Database Catalog with sample data when you create it.

- You created a Virtual Warehouse and configured it to connect to the Database Catalog.

Of course, to query tables in the Virtual Warehouse from a client, you must have populated the Virtual Warehouse with some data.


### Procedure

1. Log in to the CDP web interface and navigate to the Data Warehouse service.
2. In the **Overview** page of the Data Warehouse service, click **See More** in the Resources and Downloads tile.
3. Select Hive JDBC Jar and click  to download the Apache Hive JDBC JAR file.



4. Provide the JAR file you downloaded to your JDBC client.

On most clients, add the JAR file under the Libraries folder. Refer to your client documentation for information on the location to add the JAR file.

5. In the Data Warehouse service **Overview** page, for the Virtual Warehouse you want to connect to the client, click  and select Copy JDBC URL.

A URL is copied to your system clipboard in the following format:

```
jdbc:hive2://<your_virtual_warehouse>.<your_environment>.<dwx.company.com>/default;transportMode=http;httpPath=cliservice;ssl=true;retries=3
```



**Note:** If the root certificate is untrusted, set the value of ssl to false.

6. Paste the URL into a text editor and configure your client BI tool to connect to the Virtual Warehouse using the following portion of the URL, represents the server name of the Virtual Warehouse:

```
<your_virtual_warehouse>.<your_environment>.<dwx.company.com>
```

7. In your JDBC client, set the following other options:

Authentication: Username and Password

Username: Username you use to connect to the CDP Data Warehouse service.

Password: Password you use to connect to the CDP Data Warehouse service.

## Uploading additional JARs to CDW

You add additional Java Archive (JAR) files to the Cloudera Data Warehouse (CDW) Hive classpath that might be required to support dependency JARs, third-party Serde, or any Hive extensions.

### About this task

- The JARs are added to the end of the Hive classpath and do not override the Hive JARs.
- Cloudera recommends that you do not use this procedure to add User-Defined Function (UDF) JARs. If you do, then you must restart HiveServer2 or reload the UDF. For more information about reloading functions, see the Hive Data Definition Language (DDL) manual.

### Before you begin

You have the EnvironmentAdmin role permissions to upload the JAR to your object storage.

### Procedure


1. Build the archive file.

The archive file can be either a .jar file or a tar.gz file. For a tar.gz archive file, only JARs present in the top level are considered.

For example, if the tar.gz file contains these files — test1.jar, test2.jar, and deps/test3.jar, only test1.jar and test2.jar are considered; deps/test3.jar is excluded.



**Note:** There is no defined priority to use a particular file. If there are multiple files with the same name or same class in multiple jars, any file can be in effect.

2. Upload the archive file to the Hive Virtual Warehouse on CDW object storage, such as HDFS.
3. Log in to the CDW service and from the Overview page, locate the Hive Virtual Warehouse that uses the bucket or container where you placed the archive file, and click  and select Edit.
4. In the Virtual Warehouse Details page, click Configurations Hiveserver2 .
5. From the Configuration files drop-down list, select env.


6. Search for `CDW_HIVE_AUX_JARS_PATH` and add the archive file to the environment variable.

KEY	VALUE
CDW_HIVE_AUX_JARS_PATH	/clusters/<environment_ID>/<warehouseID>/jars/test1.jar

If you add a directory, the .jar or tar.gz files within the directory are copied and extracted. For a tar.gz file, only the JARs present in the top level are copied.

Consider the following JAR path - `/common-jars/common-jars.tar.gz:/common-jars/single-jar.jar:/serde-specific-jar/serde.jar`. In this example, `common-jars.tar.gz` is extracted and `single-jar.jar` and `serde.jar` files are copied.

7. Repeat the previous step and add the archive file or directory for Query coordinator and Query executor.

If the `CDW_HIVE_AUX_JARS_PATH` environment variable is not present, click  and add the following custom configuration:

```
CDW_HIVE_AUX_JARS_PATH= [ ***VALUE*** ]
```

### Results

On applying the configuration changes, Hive Virtual Warehouse restarts and the archive files are available and added to the end of the Hive classpath.

### Related Information

[Hive Data Definition Language manual](#)

## Using Impala shell

This topic describes how to download and install the Impala shell to query Impala Virtual Warehouses in the Cloudera Data Warehouse (CDW) service.

### About this task

Required role: DWUser

You can install the Impala shell on a local computer and use it as a client to connect with an Impala Virtual Warehouse instance. If you are connecting from a node that is already a part of a CDH or CDP cluster, you already have Impala shell and do not need to install it.

### Before you begin

Make sure that you have the latest stable version of Python 2.7 and a pip installer associated with that build of Python installed on the computer where you want to run the Impala shell.



**Note:** The following procedure cannot be used on a Windows computer.

## Procedure

1. Open a terminal window on the computer where you want to install the Impala shell, and run the following pip installer command to install the shell on your local computer:

```
pip install impala-shell
```

After you run this command, if your installation was successful, you receive success messages that are similar to the following messages:


```
Successfully built impala-shell bitarray prettytable sasl sqlparse thrift
thrift-sasl
Installing collected packages: bitarray, prettytable, six, sasl, sqlparse,
thrift, thrift-sasl, impala-shell
Successfully installed bitarray-1.0.1 impala-shell-3.3.0.dev20190730101121
prettytable-0.7.1 sasl-0.2.1 six-1.11.0 sqlparse-0.1.19 thrift-0.11.0 thri
ft-sasl-0.2.1
```

2. To confirm that the Impala shell has installed correctly, run the following command which displays the help for the tool:

```
impala-shell --help
```

If the tool help displays, the Impala shell is installed properly on your computer.

3. To connect to your Impala Virtual Warehouse instance using this installation of Impala shell:
  - a) Log in to the CDP web interface and navigate to the Data Warehouse service.
  - b) Go to the **Virtual Warehouses** tab, locate the Impala Virtual Warehouse you want to connect to, and select
 



Copy Impala shell command .

This copies the shell command to your computer's clipboard. This command enables you to connect to the Virtual Warehouse instance in Cloudera Data Warehouse service using the Impala shell that is installed on your local computer.

4. In the terminal window on your local computer, at the command prompt, paste the command you just copied from your clipboard. The command might look something like this:

```
impala-shell --protocol='hs2-http' --ssl -i "tpcds-impala.your_company.c
om:443"
```

5. Press return and you are connected to the Impala Virtual Warehouse instance. A "Starting Impala Shell..." message similar to the following displays:

```
Starting Impala Shell without Kerberos authentication
SSL is enabled. Impala server certificates will NOT be verified (set --ca_
cert to change)
Warning: --connect_timeout_ms is currently ignored with HTTP transport.
Opened TCP connection to
tpcds-impala.your_company.com:443
Connected to tpcds-impala.your_company.com:443
Server version: impalad version 3.4.0-SNAPSHOT RELEASE (build
d133a7140a3b97508ec77b1c73bb4f55f5dcb928)
*****
*****
Welcome to the Impala shell.
(Impala Shell v3.3.0-SNAPSHOT (a509cff) built on Mon Jul 29 18:37:09 PDT
2019)
Every command must be terminated by a ';'.
*****
*****
```

6. Run the following SQL command to confirm that you are connected properly to the Impala Virtual Warehouse instance:

```
SHOW DATABASES;
```

If you are connected properly, this SQL command should return the following type of information:

```
Query: show databases
```

name	comment
_impala_builtins	System database for Impala builtin functions
default	Default Hive database

Fetches 2 row(s) in 0.30s

If you see a listing of databases similar to the above example, your installation is successful and you can use the shell to query the Impala Virtual Warehouse instance from your local computer.

### Related Information

[Download the latest stable version of Python 2](#)

[Configuring client access to Impala](#)

[Impala shell tool](#)

[Impala shell configuration options](#)

[Impala shell configuration file](#)