

Cloudera Data Science Workbench

## Using the Workbench

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# CLOUDERA

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## Using the Workbench

The workbench console provides an interactive environment tailored for data science, supporting R, Python and Scala.

The Workbench currently supports R, Python, and Scala engines. You can use these engines in isolation, as you would on your laptop, or connect to your CDH cluster using Cloudera Distribution of Apache Spark 2 and other libraries.

The workbench UI includes four primary components:

- An editor where you can edit your scripts.
- A console where you can track the results of your analysis.
- A command prompt where you can enter commands interactively.
- A terminal where you can use a Bash shell.

The screenshot displays the Cloudera Data Science Workbench interface. On the left, a file explorer shows a project named 'Python Template Project' with files 'analysis.py', 'README.md', and 'seaborn-data'. The main editor shows a Python script 'analysis.py' with code for data manipulation and visualization. On the right, a terminal window shows the execution of the script, and a data visualization plot titled 'Tips Regression' is displayed. The plot shows a scatter plot of 'total\_bill' vs 'tip' with a regression line, a histogram of 'total\_bill', and a histogram of 'tip'. The plot includes the text 'pearsonr = 0.68; p = 6.7e-34'. Annotations with arrows point to the 'Project file system', 'Terminal access to running engine', and 'Interactive command prompt'.

Typically, you would use the following steps to run a project in the workbench:

## Start a New Session

The first step to run a project in the workbench is to start a new session.

### About this task



**Note:** Shell start up files are not run during session start up. CDSW sessions are not bash shells, so shell start up files such as `bashrc`, `zsh`, and `ksh` are not run. If you want to set an environment variable, you can use the CDSW environment variables feature. This will ensure the environment variable is injected in all contexts: sessions, terminals, experiments, models, jobs, etc. If you want to run more complicated code during startup (for example, conditional statements), consider using `PYTHONSTARTUP`, see [Startup.py](#) or `Rprofile`, see [Managing R with .Rprofile](#), [.Renviron](#), [Rprofile.site](#), [Renviron.site](#), [rsession.conf](#), and [repos.conf](#).

**Procedure**

1. Navigate to your project's Overview page.
2. Click New Session.

The information presented on this page will depend on which default engine you have chosen for your project: Runtime or Legacy Engines. You can change the default engine later in this task.

The **Start A New Session** dialog box opens.

3. Check the settings for your session:

If your project is using ML Runtimes, you will see the following settings:

**Start A New Session**

**Not authenticated to Hadoop**  
Before you can connect to your secure Hadoop cluster, you must enter your credentials under [Settings > Hadoop Authentication](#)

**Session Name**

Untitled Session

**Runtime**

**Editor** ⓘ Please select one

**Kernel** ⓘ Please select one

**Edition** ⓘ Please select one

**Version** Please select one

**Runtime Image**

**Resource Profile**

1 vCPU / 2 GiB Memory

Cancel Start Ses

**Editor**

Selects the Editor; currently only Workbench is supported and therefore the selector is static.

**Kernel**

Selects the Kernel, for example Python 3.7, R4.0.

**Edition**

Selects the Runtime Edition. Initially only Standard variants are supported.

**Version**

Selects the ML Runtimes version.



**Note:** The selector options only consider the configurations supported by the actual deployments and certain selections will automatically limit others. For example, certain versions are only relevant for Python or certain editors are supported only with certain kernels.

If your project is using Legacy Engines, you will see the following settings:

## Start A New Session



### Not authenticated to Hadoop

Before you can connect to your secure Hadoop cluster, you must enter your credentials under [Settings > Hadoop Authentication](#)

### Session Name

### Engine

Editor ⓘ

Kernel ⓘ

Engine Image - [Configure](#) Base Image v13 - [docker.repository.cloudera.com/cdsw/engine:13](https://docker.repository.cloudera.com/cdsw/engine:13)

### Resource Profile

#### Editor

Selects the Editor; currently only Workbench is supported and therefore the selector is static.

#### Kernel

Selects the Kernel. Initially only Python Runtimes are supported.

**Engine Image**

Selects the engine image. Click Configure to display the Project Setting > Advanced window to modify your environment variables and shared memory limit.

**Resource Profile**

The shared memory limit.

## Execute Code

You can enter and execute code at the command prompt or the editor. The editor is best for code you want to keep, while the command prompt is best for quick interactive exploration.

**About this task**

Command Prompt - The command prompt functions largely like any other. Enter a command and press Enter to execute it. If you want to enter more than one line of code, use Shift+Enter to move to the next line. The output of your code, including plots, appears in the console.



```
> ls
analysis.py  README.md  seaborn-data/
> !pip install beautifulsoup4
```

Enter a command and press Enter

If you created your project from a template, you should see project files in the editor. You can open a file in the editor by clicking the file name in the file navigation bar on the left.

Editor - To run code from the editor:

**Procedure**

1. Select a script from the project files on the left sidebar.
- 2.

To run the whole script click  on the top navigation bar, or, highlight the code you want to run and press Ctrl+Enter (Windows/Linux) or cmd+Enter (macOS).

When doing real analysis, writing and executing your code from the editor rather than the command prompt makes it easy to iteratively develop your code and save it along the way.

If you require more space for your editor, you can collapse the file list by double-clicking between the file list pane and the editor pane. You can hide the editor using editor's View menu.

## Code Autocomplete

You can enter and execute code at the command prompt or the editor. The editor is best for code you want to keep, while the command prompt is best for quick interactive exploration.

The Python and R kernels include support for automatic code completion, both in the editor and the command prompt. Use single tab to display suggestions and double tab for autocomplete.

## Project Code Files

All project files are stored to persistent storage within the respective project directory at /var/lib/cds/current/projects.



2. Alternatively you can stop a session by typing the following command:

R

```
quit()
```

Python

```
exit
```

Scala

```
quit()
```

Sessions automatically stop after an hour of inactivity.

## Jupyter Magic Commands

Cloudera Data Science Workbench's Scala and Python kernels are based on Jupyter kernels. Jupyter kernels support varying magic commands that extend the core language with useful shortcuts. This section details the magic commands (magics) supported by Cloudera Data Science Workbench.



**Note:** Jupyter magic commands apply only to legacy engine projects.

Line magics begin with a single %: for example, %timeit. Cell magics begin with a double %%: for example, %%bash.

### Python

The examples below show how to retrieve the password from an environment variable and use it to connect.

You can access data using [pyodbc](#) or [SQLAlchemy](#).

```
# pyodbc lets you make direct SQL queries.
!wget https://pyodbc.googlecode.com/files/pyodbc-3.0.7.zip
!unzip pyodbc-3.0.7.zip
!cd pyodbc-3.0.7;python setup.py install --prefix /home/cdsw
import os

# See http://www.connectionstrings.com/ for information on how to construct
  ODBC connection strings.
db = pyodbc.connect("DRIVER={PostgreSQL Unicode};SERVER=localhost;PORT=54
32;DATABASE=test_db;USER=cdswuser;OPTION=3;PASSWORD=%s" % os.environ["POSTGR
ESQL_PASSWORD"])
cursor = cnxn.cursor()
cursor.execute("select user_id, user_name from users")

# sqlalchemy is an object relational database client that lets you make data
base queries in a more Pythonic way.
!pip install sqlalchemy
import os

import sqlalchemy
from sqlalchemy.orm import sessionmaker
from sqlalchemy import create_engine
db = create_engine("postgresql://cdswuser:%s@localhost:5432/test_db" % os.en
viron["POSTGRESQL_PASSWORD"])
```

```
session = sessionmaker(bind=db)
user = session.query(User).filter_by(name='ed').first()
```

## Scala

Cloudera Data Science Workbench's Scala kernel is based on Apache Toree.

It supports the line magics documented in the Apache Toree [magic tutorial](#).