

Cloudera Data Engineering

Cloudera Data Engineering Top Tasks

Date published: 2022-09-30

Date modified:

The Cloudera logo is displayed in a bold, orange, sans-serif font. The word "CLOUDERA" is written in all caps, with a stylized 'E' that has three horizontal bars.

<https://docs.cloudera.com/>

Legal Notice

© Cloudera Inc. 2024. All rights reserved.

The documentation is and contains Cloudera proprietary information protected by copyright and other intellectual property rights. No license under copyright or any other intellectual property right is granted herein.

Unless otherwise noted, scripts and sample code are licensed under the Apache License, Version 2.0.

Copyright information for Cloudera software may be found within the documentation accompanying each component in a particular release.

Cloudera software includes software from various open source or other third party projects, and may be released under the Apache Software License 2.0 (“ASLv2”), the Affero General Public License version 3 (AGPLv3), or other license terms. Other software included may be released under the terms of alternative open source licenses. Please review the license and notice files accompanying the software for additional licensing information.

Please visit the Cloudera software product page for more information on Cloudera software. For more information on Cloudera support services, please visit either the Support or Sales page. Feel free to contact us directly to discuss your specific needs.

Cloudera reserves the right to change any products at any time, and without notice. Cloudera assumes no responsibility nor liability arising from the use of products, except as expressly agreed to in writing by Cloudera.

Cloudera, Cloudera Altus, HUE, Impala, Cloudera Impala, and other Cloudera marks are registered or unregistered trademarks in the United States and other countries. All other trademarks are the property of their respective owners.

Disclaimer: EXCEPT AS EXPRESSLY PROVIDED IN A WRITTEN AGREEMENT WITH CLOUDERA, CLOUDERA DOES NOT MAKE NOR GIVE ANY REPRESENTATION, WARRANTY, NOR COVENANT OF ANY KIND, WHETHER EXPRESS OR IMPLIED, IN CONNECTION WITH CLOUDERA TECHNOLOGY OR RELATED SUPPORT PROVIDED IN CONNECTION THEREWITH. CLOUDERA DOES NOT WARRANT THAT CLOUDERA PRODUCTS NOR SOFTWARE WILL OPERATE UNINTERRUPTED NOR THAT IT WILL BE FREE FROM DEFECTS NOR ERRORS, THAT IT WILL PROTECT YOUR DATA FROM LOSS, CORRUPTION NOR UNAVAILABILITY, NOR THAT IT WILL MEET ALL OF CUSTOMER’S BUSINESS REQUIREMENTS. WITHOUT LIMITING THE FOREGOING, AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, CLOUDERA EXPRESSLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, QUALITY, NON-INFRINGEMENT, TITLE, AND FITNESS FOR A PARTICULAR PURPOSE AND ANY REPRESENTATION, WARRANTY, OR COVENANT BASED ON COURSE OF DEALING OR USAGE IN TRADE.

Contents

Creating Sessions in Cloudera Data Engineering.....	4
Creating jobs in Cloudera Data Engineering.....	5
Automating data pipelines using Apache Airflow in Cloudera Data Engineering.....	9
Monitoring Data Engineering service resources with Grafana dashboards.....	11
Connecting to Grafana dashboards in Cloudera Data Engineering Private Cloud.....	11
Accessing Grafana dashboards.....	15

Creating Sessions in Cloudera Data Engineering

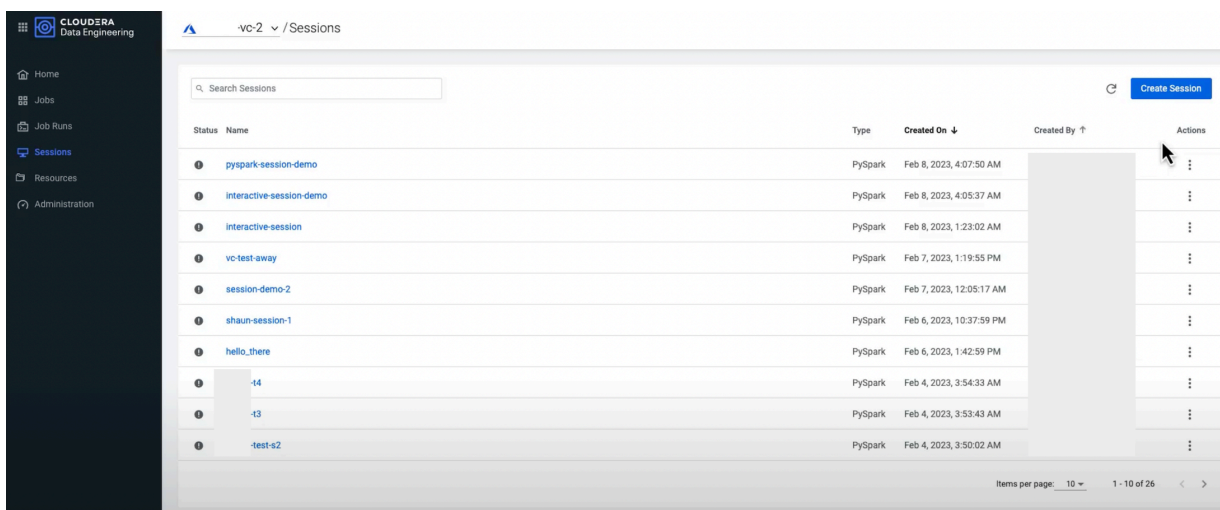
A Cloudera Data Engineering (CDE) Session is an interactive short-lived development environment for running Spark commands to help you iterate upon and build your Spark workloads.

About this task

The commands that are run in a CDE Session are called Statements. You can submit the Statements through the connect CLI command or the Interact tab in the CDE UI for a Session. Python and Scala are the supported Session types. Learn how to use Cloudera Data Engineering (CDE) Sessions using the user interface and CLI.

Procedure

1. In the Cloudera Data Platform (CDP) console, click the Data Engineering tile. The Home page displays.
2. Click Sessions in the left navigation menu and then click Create Session.



3. Enter a Name for the Session.
4. Select a Type, for example, PySpark or Scala.
5. Select a Timeout value.
The Session will stop after the indicated time has passed.
6. Optionally, enter a Description for the Session.
7. Optionally, enter the Configurations.
8. Set the Compute options.
 - Optional: GPU Acceleration (Technical Preview): You can accelerate your session using GPUs. Click Enable GPU Accelerations checkbox to enable the GPU acceleration and configure selectors and tolerations if you want to run the job on specific GPU nodes. When you run this session, this particular session will request GPU resources.

9. Under **Files and Resources**, you can upload Jar, Python, Egg, Zip, and other files. You can also add a resource, repositories, or a Python environment to be used in this session.

Files that are uploaded to a session are stored in the app/mount directory.

10. Click Create.

The Connect tab displays a list of connectivity options available to interact with the Session. The Interact tab allows you to interact with the Session, and becomes available once the Session is running.

11. To delete a Session, open the Session and click Delete.



Note: If you delete a Session, doing so will result in the termination of an active session and the loss of any attached logs and details.

Creating jobs in Cloudera Data Engineering

A job in Cloudera Data Engineering (CDE) consists of defined configurations and resources (including application code). Jobs can be run on demand or scheduled.

Before you begin



Important: You must create the cluster, initialize each cluster, and configure each user who need to submit jobs before creating jobs.

In Cloudera Data Engineering (CDE), jobs are associated with virtual clusters. Before you can create a job, you must create a virtual cluster that can run it. For more information, see [Creating virtual clusters](#).

Procedure

1. In the Cloudera Data Platform (CDP) console, click the Data Engineering tile. The CDE Home page displays.
2. In the left navigation menu click Jobs. The Jobs page is displayed.
3. Click Create Job. The Job Details page is displayed.

Job Details

Job Type *

Spark 3.2.3 Airflow

Name *

Select Application Files

[Upload](#) or [Select from Resource](#)

Main Class

Arguments (Optional)

 [+](#)

Configurations (Optional)

 [+](#)

Data Connector (Optional)

Advanced Options

Upload additional files, customize no. of executors, driver and executor cores and memory

Schedule

Turn on to schedule Job, enable catchup and jobs dependants

4. Provide the Job Details:

- a) Select Spark for the job type. If you are creating the job from the Home page, select the virtual cluster where you want to create the job.
- b) Specify the Name.
- c) Select File or URL for your application file, and provide or specify the file. You can upload a new file or select a file from an existing resource.

If you select the URL option and specify an Amazon AWS S3 URL, add the following configuration to the job:

config_key: spark.hadoop.fs.s3a.delegation.token.binding

config_value: org.apache.knox.gateway.cloud.idbroker.s3a.IDBDelegationTokenBinding

- d) If your application code is a JAR file, specify the Main Class.
- e) Specify arguments if required. You can click the Add Argument button to add multiple command arguments as necessary.
- f) Enter Configurations if needed. You can click the Add Configuration button to add multiple configuration parameters as necessary.



Important: For Spark jobs, setting the `spark.app.id` property at the Spark job level configuration or within the Spark application code is not supported in CDE.

- g) Optional: Select the name of the data connector from the Data Connector drop-down list. The UI displays the storage information that is internally overwritten.
 - h) If your application code is a Python file, select the Python Version, and optionally select a Python Environment.
5. Click Advanced Configurations to display more customizations, such as additional files, initial executors, executor range, driver and executor cores, and memory.

By default, the executor range is set to match the range of CPU cores configured for the virtual cluster. This improves resource utilization and efficiency by allowing jobs to scale up to the maximum virtual cluster resources available, without manually tuning and optimizing the number of executors per job.

GPU Acceleration (Technical Preview): You can accelerate your Spark jobs using GPUs. Click Enable GPU Accelerations checkbox to enable the GPU acceleration and configure selectors and tolerations if you want to run the job on specific GPU nodes. When this job is created and run, this particular job will request GPU resources.



Warning: You must ensure this virtual cluster has been configured with GPU resource quota. Otherwise, the jobs will be in the Pending state as no GPU resource can be allocated to the pod.

6. Click Schedule to display scheduling options.

You can schedule the application to run periodically using the Basic controls or by specifying a Cron Expression.

7. Click Alerts and provide the email id to receive alerts. Click + to add more email IDs. Optionally, you can select when you want email alerts whether for job failures or missed job service-level agreements or both.



Note: You must configure the Configure Email Alerting option while creating a virtual cluster to send your email alerts. For more information about configuring email alerts, see [Creating virtual clusters](#).

8. If you provided a schedule, click Schedule to create the job. If you did not specify a schedule, and you do not want the job to run immediately, click the drop-down arrow on Create and Run and select Create. Otherwise, click Create and Run to run the job immediately.

Automating data pipelines using Apache Airflow in Cloudera Data Engineering

Cloudera Data Engineering (CDE) enables you to automate a workflow or data pipeline using Apache Airflow Python DAG files. Each CDE virtual cluster includes an embedded instance of Apache Airflow. You can also use CDE with your own Airflow deployment. CDE on CDP Private Cloud currently supports only the CDE job run operator.

Before you begin



Important: Cloudera provides support for Airflow [core operators and hooks](#), but does not provide support for Airflow provider packages. Cloudera Support may require you to remove any installed provider packages during troubleshooting.

About this task

The following instructions are for using the Airflow service provided with each CDE virtual cluster. For instructions on using your own Airflow deployment, see [Using the Cloudera provider for Apache Airflow](#).

Procedure

1. Create an Airflow DAG file in Python. Import the CDE operator and define the tasks and dependencies. For example, here is a complete DAG file:

```
from dateutil import parser
from datetime import datetime, timedelta
from datetime import timezone
from airflow import DAG
from cloudera.airflow.providers.operators.cde import CdeRunJobOperator

default_args = {
    'owner': 'psherman',
    'retry_delay': timedelta(seconds=5),
    'depends_on_past': False,
    'start_date': datetime(2024, 2, 10, tz="UTC"),
}

example_dag = DAG(
    'airflow-pipeline-demo',
    default_args=default_args,
    schedule_interval='@daily',
    catchup=False,
    is_paused_upon_creation=False
)

ingest_step1 = CDEJobRunOperator(
    connection_id='cde-vc01-dev',
    task_id='ingest',
    retries=3,
    dag=example_dag,
    job_name='etl-ingest-job'
)

prep_step2 = CdeRunJobOperator(
    task_id='data_prep',
    job_name='insurance-claims-job'
)
```

```
ingest_step1 >> prep_step2
```

Here are some examples of things you can define in the DAG file:

CDE job run operator

Use `CDEJobRunOperator` to specify a CDE job to run. This job must already exist in the virtual cluster specified by the `connection_id`. If no `connection_id` is specified, CDE looks for the job in the virtual cluster where the Airflow job runs.

```
from cloudera.cdp.airflow.operators.cde_operator import CDEJobRunOperator
...
ingest_step1 = CDEJobRunOperator(
    connection_id='cde-vc01-dev',
    task_id='ingest',
    retries=3,
    dag=example_dag,
    job_name='etl-ingest-job'
)
```

Email Alerts

Add the following parameters to the DAG `default_args` to send email alerts for job failures or missed service-level agreements or both.

```
'email_on_failure': True,
'email': 'abc@example.com',
'email_on_retry': True,
'sla': timedelta(seconds=30)
```

Task dependencies

After you have defined the tasks, specify the dependencies as follows:

```
ingest_step1 >> prep_step2
```

For more information on task dependencies, see [Task Dependencies](#) in the Apache Airflow documentation.

For a tutorial on creating Apache Airflow DAG files, see the [Apache Airflow documentation](#).

2. Create a CDE job.

- a) In the Cloudera Data Platform (CDP) console, click the Data Engineering tile. The CDE Home page displays.
- b) In the left navigation menu click Jobs. The Jobs page is displayed.
- c) Click Create Job. The Job Details page is displayed.
- d) Select the Airflow job type.
- e) Name: Provide a name for the job.
- f) DAG File: Use an existing file or add a DAG file to an existing resource or create a resource and upload it.
 1. Select from Resource: Click Select from Resource to select a DAG file from an existing resource.
 2. Upload: Click Upload to upload a DAG file to an existing resource or to a new resource that you can create by selecting Create a resource from the Select a Resource dropdown list. Specify the resource name and upload the DAG file to it.



Note: You must configure the Configure Email Alerting option while creating a virtual cluster to send your email alerts. For more information about configuring email alerts, see [Creating virtual clusters](#).

You can add the email alert parameters to the DAG `default_args` to get email alerts for job failures and missed service-level agreements. An example of email alert configurations is listed in *Step 1*.

3. Click Create and Run to create the job and run it immediately, or click the dropdown button and select Create to create the job.

Monitoring Data Engineering service resources with Grafana dashboards

Grafana is a visualisation and analytics software that enables the development of dashboards to monitor metrics data. You can access pre-built Grafana dashboards to monitor your jobs and virtual clusters in Cloudera Data Engineering (CDE).

The CDP metrics are stored centrally in the Prometheus database and monitored by Prometheus. Grafana uses these metrics for data visualization. Your workload databases are not involved in any way.

You can immediately view the following pre-built dashboards for viewing runtime metrics in CDE:

Kubernetes Dashboard

This dashboard includes generalized visualizations of CDE job run statuses. It displays the following information:

- Number of succeeded, failed, and killed jobs for the given period
- Total number of jobs in the Starting phase
- Total number of jobs in the Running phase

Virtual Cluster Metrics Dashboard

This dashboard includes visualizations of service requests, pod counts and job statuses for the selected Virtual Cluster. The available metrics are:

- Time series of CPU requests of running pods (includes virtual cluster service overhead)
- Time series of memory requests of running pods (includes virtual cluster service overhead)
- The response time of Livy's requests
- Time series for the number of pods in running and pending states
- Total number of running pods and pending pods
- Time series of starting and running jobs, and the total number of successful jobs

Connecting to Grafana dashboards in Cloudera Data Engineering Private Cloud

This topic describes how to access Grafana dashboards for advanced visualization of Virtual Cluster's metrics such as memory and CPU usage in Cloudera Data Engineering (CDE) Private Cloud.

For CDE Service


1. In the Cloudera Data Platform (CDP) console, click the Data Engineering tile. The Home page displays.

2. Click Administration in the left navigation menu and locate a Service in the Services column and click Service Details on the environment for which you want to see the Grafana dashboard.

The screenshot shows the Cloudera Data Engineering Administration interface. On the left, a dark navigation menu lists: Home, Jobs, Job Runs, Sessions (with a 'New' button), Repositories (with a 'New' button), Resources, and Administration (highlighted in blue). The main content area is titled 'Administration' and shows a 'Services' section with a gear icon and a count of '1'. A service card is visible, showing a green checkmark in a circle and the text 'Enabled'.

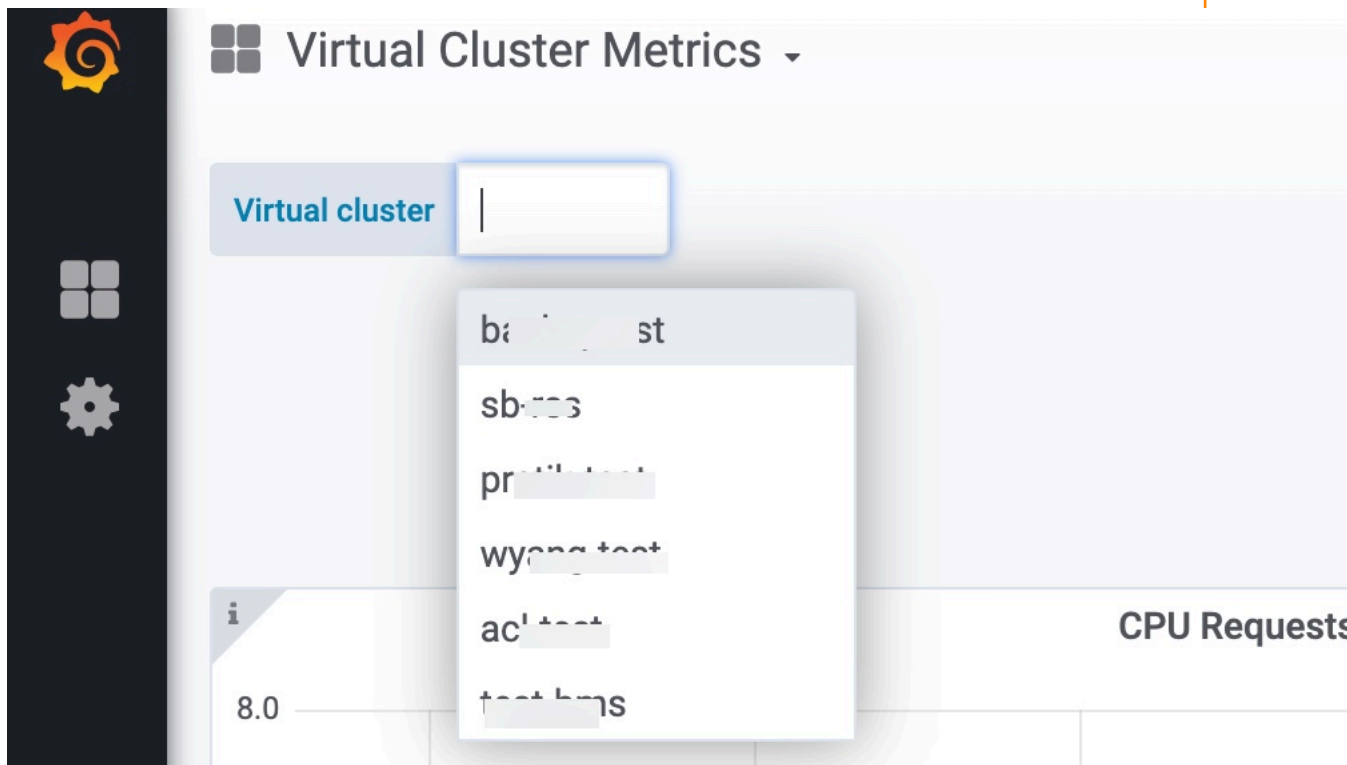
3. In the Administration/Service page, click Grafana Charts. A read-only version of the Grafana interface opens in a new tab in your browser.

4.

In the Grafana dashboard, click the grid icon  in the left navigation menu.

5. Select Virtual Cluster Metrics under the Dashboards pane.

6. Click on a virtual cluster name from the dropdown list to view the Grafana charts.



about CPU requests, memory requests, jobs, and other information related to the virtual cluster is displayed.

For Virtual Cluster


1. In the Cloudera Data Platform (CDP) console, click the Data Engineering tile. The CDE Home page displays.
2. Click Administration in the left navigation menu and locate a Service in the Services column.
3. Navigate to the virtual cluster for which you want to see the Grafana dashboard.
4. Click Cluster Details for the virtual cluster.

The Administration/Virtual Cluster page is displayed.

5. Click Grafana Charts.



A read-only version of the Grafana interface opens in a new tab in your browser.

Overview / [\[redacted\]](#)

 **Running**

[\[redacted\]](#) **23Mar**

VERSION	VC ID	CREATED BY	CPU	MEMORY	JOBS
1.1.0-b26	dev-ops-000+77va	S. [redacted]	0	0 B	0 ↗

[CLI TOOL](#) :
 [API DOC](#) 
[JOBS API URL](#) 
[GRAFANA CHARTS](#)

[Configuration](#) Charts Logs

CDE Service

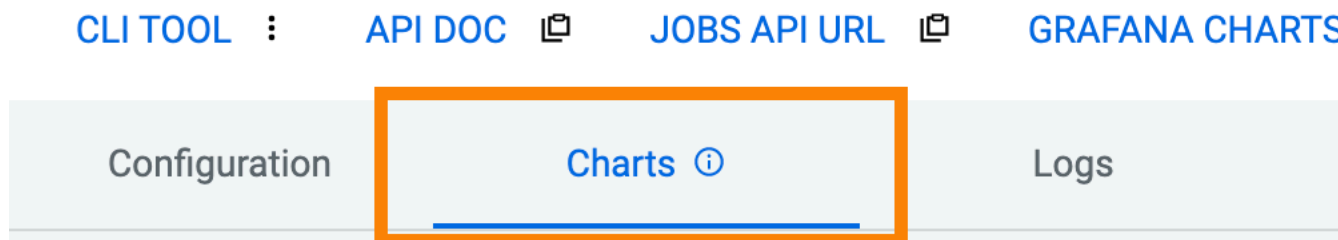
[\[redacted\]](#)

Information about CPU requests, memory requests, jobs, and other information related to the virtual cluster is displayed.

6. In the Virtual Cluster Metrics page, click on a virtual cluster name from the Virtual Cluster dropdown list to view the Grafana charts of that virtual cluster.



Note: You must first view the charts using the GRAFANA CHARTS link. Only then the charts in the Charts tab get loaded. Otherwise, it displays the The web page at <https://service.cde-nrjcrwg7.apps.apps.shared-01.kcloud.cldr.com/grafana/d/usZz/kubernetes?kiosk> might be temporarily down or it may have moved permanently to a new web address. error.




Accessing Grafana dashboards

Cloudera provides pre-built Grafana dashboards comprising metrics data, charts, and other visuals. You can access pre-built Grafana dashboards to monitor your jobs and virtual clusters in Cloudera Data Engineering (CDE). You can immediately view the Kubernetes and Virtual Cluster Metrics pre-built dashboards in CDE.

Before you begin

You must first connect to the Grafana dashboards in CDE Private Cloud to view the Kubernetes and Virtual Cluster Metrics dashboards.

Procedure

1. After you connect to the Grafana Dashboards from the CDE UI, click the  icon to view the left navigation pane.
2. Click Dashboards > Browse. The Dashboards screen is displayed.

3. In the Browse tab of Dashboards, click Kubernetes or Virtual Cluster Metrics to view the respective dashboard.

