

# Managing Cloudera Accelerators for Machine Learning Projects (AMPs)

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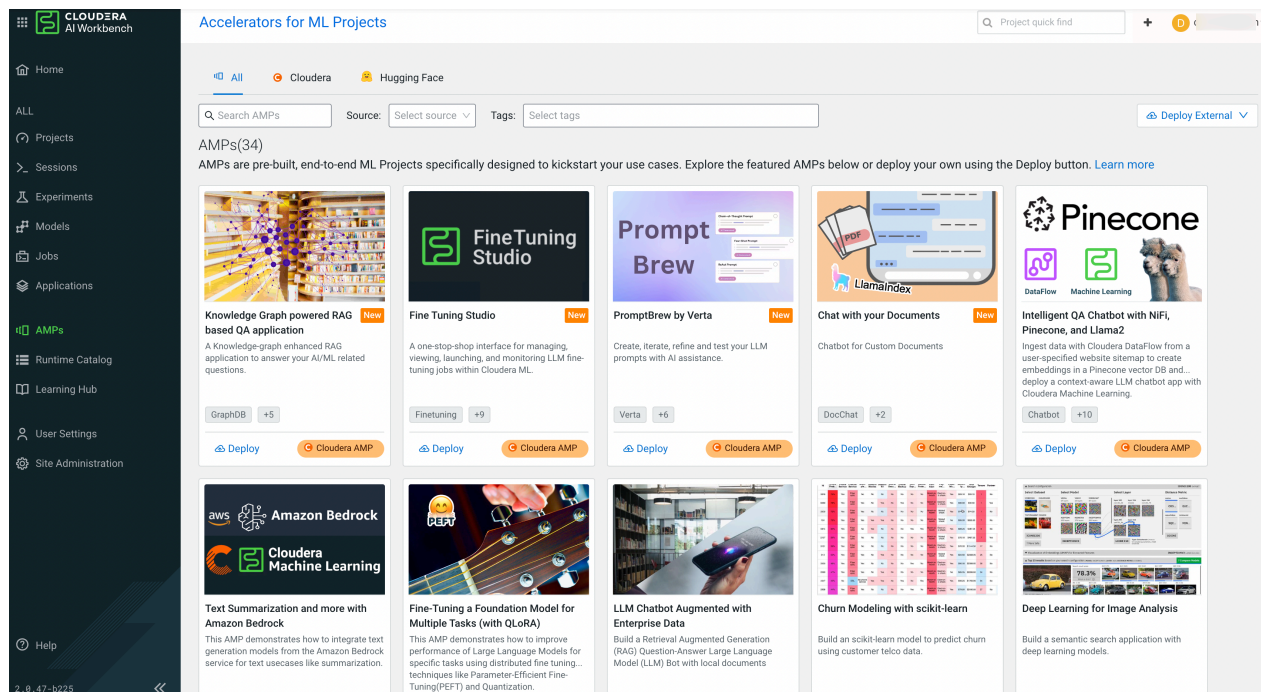
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# Cloudera Accelerators for Machine Learning Projects

Cloudera Accelerators for Machine Learning Projects provide reference example projects in Cloudera AI. More than simplified quickstarts or tutorials, AMPs are fully-developed expert solutions created by Cloudera's research arm, Fast Forward Labs.

These solutions to common problems in this field demonstrate how to fully use the power of Cloudera AI. AMPs show you how to create Cloudera AI projects to solve your own use cases.

AMPs are available to install and run from the Cloudera AI user interface. As new AMPs are developed, they will become available to you for your study and use.



## Using AMPs

Get started with AMPs:

1. Log in to your Cloudera AI workbench, and in the left panel click AMPs.
2. Click on an AMP tile to read its description.
3. Click Configure Project and provide any configuration values required by the AMP. The Description field explains how to determine these configuration values. After you click Launch Project, the installation process may take several minutes.
4. When the installation is complete, click Overview to read the documentation for the AMP and explore the code and project structure.



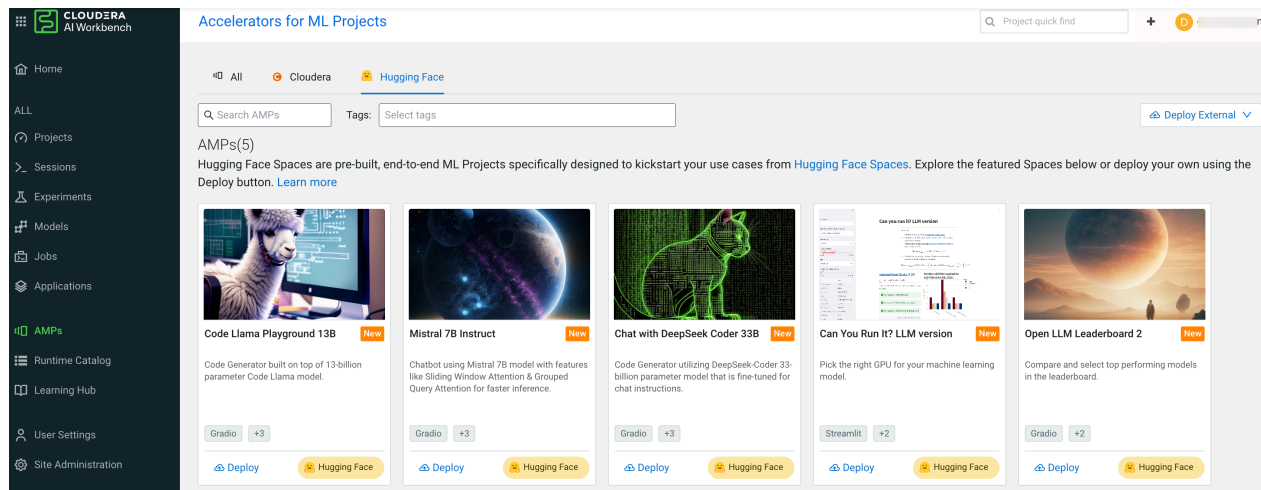
**Note:** If nothing appears in the AMPs panel, an administrator may need to reconfigure and refresh the catalog. In Site Administration AMPs, click Refresh. The administrator can also refresh periodically to add newly developed AMPs to the panel.

## Related Information

[Custom AMP Catalog](#)

## HuggingFace Spaces and Community AMPs

You can run HuggingFace Spaces or Community AMPs, which are both types of machine learning projects, in your Cloudera AI Workbench. In the HuggingFace tab in AMPs are several HF spaces that are tested and supported on Cloudera AI.



HuggingFace is an online community for machine learning ([Hugging Face](https://huggingface.co)). It serves as a repository for machine learning projects and datasets. Spaces are individual projects or applications. Community AMPs are machine learning prototypes created by the Cloudera AI community.

There are a few things to keep in mind when launching HuggingFace Spaces or Community AMPs in your Cloudera AI Workbench.

- To launch a HuggingFace project, you first need to create a free account on HuggingFace and obtain an access token.
- Make sure that the Hugging Face project actually works. Many of the projects are community-created projects that may be experimental or no longer maintained.
- The HuggingFace Space must use the gradio or streamlit libraries to run on Cloudera AI.
- The Community tab is not visible by default. To enable this tab, in Site Administration Settings, select: Allow users to deploy community AMPs.

### Enable users to deploy external spaces

By default, users cannot deploy Hugging Face spaces outside the curated collection in the Hugging Face tab.

To enable users to deploy external Hugging Face spaces, in Site Administration Settings, select:

- Allow users to deploy external Hugging Face Space

When selected, the ability to deploy external HuggingFace spaces is available.

### Launch a HuggingFace or Community project

You can launch a HuggingFace Space or community project by clicking Deploy for the respective space.

In Configure Project, you can set some parameters for the space.

If needed, enter your Hugging Face access token. The environment variables HF\_TOKEN and HUGGING\_FACE\_HUB\_TOKEN both require the same value.



**Note:** Do not reduce any of the values specified for cpu, memory, or gpu.

Click Launch Project to deploy the project in your workbench. Cloudera AI will run scripts to download the project from the HuggingFace space and install it in Cloudera AI. This process can take some time.

## Launch a HuggingFace Space outside the catalog

It is also possible to deploy Hugging Face spaces that are not included in the AMP catalog. Note that there are several caveats on which HuggingFace spaces may be able to work in Cloudera AI, as described above.

Click Deploy External to open the UI for launching an external project, and follow the instructions. The project is imported from HuggingFace or the specified repository

## Creating New AMPs using API

You can create AMPs using API V2.

1. Get the valid runtime\_identifier by using the GET request using filter parameters like kernel, editor, and edition.

For example, if you want to create the AMP and it requires the following runtime based on project-metadata.yaml of the AMP, then use the filter like {"kernel": "Python 3.9", "editor": "Workbench", "edition": "Standard"} to get a smaller list of runtimes:

```
curl -X GET "https://<workbenchURL>/api/v2/runtimes?search_filter=%7B%22kernel%22%3A%22Python%203.9%22%2C%22editor%22%3A%22Workbench%22%2C%22edition%22%3A%22Standard%22%7D" -H "accept: application/json" -H "Authorization: Bearer <API Token>"
```

This command will display a list of runtimes that match the filter.

2. Using the runtime\_identifier obtained in the previous step, you can create an AMP. Following is the sample payload used to trigger the creation of one of the AMPs. You can add additional key-value pairs as needed under the environment object based on the project-metadata.yaml file of the AMP you are trying to create.

```
{
  "configure_prototype_request": {
    "execute_amp_steps": true,
    "run_import_tasks": true,
    "runtime_identifier": "docker.repository.cloudera.com/cloudera/cds/ml-runtime-workbench-python3.9-standard:2024.05.2-b14"
  },
  "create_project_request": {
    "description": "amps v2",
    "environment": {
      "HF_TOKEN": "<HF TOKEN>"
    },
    "git_url": "https://github.com/cloudera/CML_AMP_Image_Analysis",
    "name": "amps_v2",
    "template": "git",
    "visibility": "private"
  }
}
```

Example: The following is an example of creating an AMP that requires multiple environment variables with IBM WatsonXAI.

```
{
  "configure_prototype_request": {
```

```

    "execute_amp_steps": true,
    "run_import_tasks": true,
    "runtime_identifier": "docker.repository.cloudera.com/cloudera/cds/ml
-runtime-pbj-workbench-python3.9-standard:2024.10.1-b12"
  },
  "create_project_request": {
    "description": "watson amps v2",
    "environment": {
      "IBM_WATSONXAI_ENDPOINT": "https://us-south.ml.cloud.ibm.com",
      "IBM_API_KEY": "<Put valid key>",
      "IBM_PROJECT_ID": "<Put valid project ID>"
    },
    "git_url": "https://github.com/agupta-git/CML_AMP_watsonxai",
    "name": "watson_v2",
    "template": "git",
    "visibility": "private"
  }
}

```

3. You can now see that a new project has been created in your Cloudera AI Workbench which is carrying out the tasks listed in its project-metadata.yaml file. After all the tasks are executed, your new AMP-project will be ready to use.

## Custom AMP Catalog

An AMP catalog is a collection of AMPs that can be added to a workbench as a group. Cloudera AI ships with the Cloudera AMP catalog, containing AMPs developed by Cloudera Fast Forward Labs, but you can also create and add your own catalog, containing AMPs developed by your organization.

To create an AMP catalog, you need to create a YAML file called the catalog file. This file is hosted on GitHub or another git server. This could be either a public or a private git server.

The catalog file contains information about each AMP in the catalog, and provides a link to the AMP repository itself. The catalog file specification is shown in Catalog File Specification.

You can also look at the Cloudera catalog file for an example. To view the file, click directly on the URL for Cloudera in Catalog Sources.

For more details on creating the AMPs that you will include in your catalog, see Creating New AMPs.

One use case you might consider is creating a fork of the Cloudera AMP catalog, in order to host it internally. In this case, you will need to edit the URLs in the catalog and project metadata files to point to the appropriate internal resources.

## Adding a catalog

The collection of AMPs available to end users can draw from one or more sources. For example, you might have an internal company catalog in addition to the default Cloudera catalog. The catalog must be provided with a catalog file and one or more project metadata YAML files.

### About this task

Specify Catalog File URL if your git hosting service allows you to access the raw content of the repo without authenticating. (That is, the source files can be retrieved with a curl command, and do not require logging into a web page). Otherwise, specify the Git Repository URL. To use a git repository as a catalog source, the catalog file and the AMP files must be in a repository that can be cloned with `git clone` without authentication.

### Procedure

1. As an Administrator, go to Site Administration AMPs .
2. Select Git Repository URL or Catalog File URL to specify a new source. Paste or enter the URL to the new source, and file name for the catalog file if necessary.
3. Click Add Source.  
The catalog YAML file is loaded, and the projects found there are displayed in Catalog Entries.
4. If there are projects that are not yet ready for use, or that should not be displayed in the catalog, deselect Enabled in the Catalog Entries.

## Catalog File Specification

The Catalog file is a YAML file that contains descriptive information and metadata for the displaying the AMP projects in the Project Catalog.

### Fields

Fields are in snake\_case. Each project in the catalog uses the following fields:

Field Name	Type	Example	Description
name	string	name: Cloudera	Required. Name of the catalog, displayed as Source in the Prototype Catalog tab.
entries	string	entries:	Required. Contains the entries for each project.
title	string	title: Churn Modeling	Required. The title of the AMP, as displayed in the Prototype Catalog.
label	string	label: churn-prediction	Required.
short_description	string	short_description: Build an scikit-learn model...	Required. A short description of the project. Appears on the project tile in the Prototype Catalog.
long_description	string	long_description: >- This project demonstrates...	Required. A longer description that appears when the user clicks on the project tile.
image_path	string	image_path: >- https://raw .git...	Required. Path to the image file that displays in the Prototype Catalog.
tags	string	tags: - Churn Prediction - Logistic Regression	Required. For sorting in the Prototype Catalog pane.
git_url	string	git_url: "https:..."	Required. Path to the git repository for the project.



Field Name	Type	Example	Description
git_ref	string	git_ref: 9e56b6578e37185777380e244741b3e83d9016a3	Optional. Git ref (branch name or commit hash/tag name).
is_prototype	boolean	is_prototype: true	Optional. Indicates the AMP should be displayed in the Prototype Catalog. Use if coming_soon is not used.
coming_soon	boolean	coming_soon: true	Optional. Displays the AMP in the Prototype Catalog with a “COMING SOON” watermark. Use if is_prototype is not used.

Example:

```
name: Cloudera

entries:
  - title: Churn Modeling with scikit-learn
    label: churn-prediction
    short_description: Build an scikit-learn model to predict churn using
customer telco data.
    long_description: >-
      This project demonstrates how to build a logistic regression classific
ation model to predict the probability
      that a group of customers will churn from a fictitious telecommunicatio
ns company. In addition, the model is
      interpreted using a technique called Local Interpretable Model-agnos
tic Explanations (LIME). Both the logistic
      regression and LIME models are deployed using Cloudera AI's real-time
model deployment capability and interact with a
      basic Flask-based web application.
    image_path: >-
      https://raw.githubusercontent.com/cloudera/Applied-ML-Prototypes/mas
ter/images/churn-prediction.jpg
    tags:
      - Churn Prediction
      - Logistic Regression
      - Explainability
      - Lime
    git_url: "https://github.com/cloudera/CML_AMP_Churn_Prediction"
    is_prototype: true
```

## AMPs in airgapped environments

In an airgapped installation, the default AMPs catalog included at installation and default AMPs may be inaccessible. Hence, you must allow hostnames in your proxy configuration or configure your environment for AMPs to work.

### AMPs in airgapped environment with Proxy

If you are using a proxy setup, then you must allow the following hostnames for AMPs to work.

- \*.storage.googleapis.com
- \*.raw.githubusercontent.com
- \*.pypi.org
- \*.pythonhosted.org
- \*.pypi.python.org
- github.com
- \*.github.com
- huggingface.co
- \*.huggingface.co
- \*.pinecone.io
- s3.amazonaws.com
- download.pytorch.org
- objects.githubusercontent.com
- cdn-lfs-us-1.hf.co
- cdn-lfs-eu-1.hf.co
- cdn-lfs.hf.co
- hf.co
- \*.hf.co
- registry.npmjs.org
- \*.github.io

These host names shall be specified in the proxy, along with any other endpoints that are needed for your workbench.

## AMPs in fully airgapped environments

Some AMPs are built to work in environments that does not have outbound network access. Learn how to set up the environment for AMPs to work.

### Before you begin

- Host your internal PyPI server.
- Create your [Custom AMP Catalog](#) or download an AMP project from the GitHub repository listed in the below table. After downloading, upload it as a ZIP file during the project creation process.

### Steps

- Each AMP has a requirements.txt file, which lists all the Python packages it needs. This file is present in the root of the public GitHub repository.
- You must ensure that all the packages listed in the requirements.txt are available on your custom-hosted PyPI server.
- Change the PIP\_INDEX\_URL environment variable to point to the custom-hosted PyPI server URL.

Below are the list of AMPs that can be used in the airgapped environments without outbound network access.

Title	Label	Short Description	Git URL
Churn Modeling with scikit-learn	churn-prediction	Build an scikit-learn model to predict churn using customer telco data.	<a href="#">Churn Modeling with scikit-learn</a>
Deep Learning for Anomaly Detection	anomaly-detection	Apply modern and deep learning techniques for anomaly detection to identify network intrusions.	<a href="#">Deep Learning for Anomaly Detection</a>
Canceled Flight Prediction	canceled-flight-prediction	Perform analytics on a large airline dataset with Spark and build an XGBoost model to predict flight cancellations.	<a href="#">Canceled Flight Prediction</a>

Title	Label	Short Description	Git URL
Getting Started with the Cloudera AI API	apiv2	Demonstration of how to use the Cloudera AI API to interact with Cloudera AI.	<a href="#">Getting Started with the Cloudera AI API</a>
AutoML with TPOT	automl-with-tpot	AutoML using TPOT, distributed with Dask.	<a href="#">AutoML with TPOT</a>
Train Gensim's Word2Vec	gensim-w2v	Demonstration of how to train Gensim's Word2Vec for a non-language use case.	<a href="#">Train Gensim's Word2Vec</a>
Continuous Model Monitoring	continuous-model-monitoring	Demonstration of how to perform continuous model monitoring on Cloudera AI using Model Metrics and Evidently.ai dashboards.	<a href="#">Continuous Model Monitoring</a>
Distributed XGBoost with Dask on Cloudera AI	dask-on-cml	How to perform distributed training of an XGBoost model using Dask on Cloudera AI.	<a href="#">Distributed XGBoost with Dask on Cloudera AI</a>

## Configuring Traefik readTimeout for large file uploads

When uploading large files, the default readTimeout of 60 seconds in Traefik might not suffice. In such cases, you can configure Traefik to disable the default timeout.

1. Run the following Kubernetes command to edit the Traefik ConfigMap:

```
kubectl edit configmap traefik-config -n mlx
```

2. In the ConfigMap file, locate and modify the traefik.toml section to include the following custom readTimeout:

```
[entryPoints.websecure.transport]
  [entryPoints.websecure.transport.respondingTimeouts]
    readTimeout = 0
```



**Note:** The readTimeout value is set to 0 to indicate no timeout, ensuring uninterrupted uploads for large files.

For example, after adding the above changes, your traefik.toml file should look similar to:

```
# traefik.toml
[global]
  checkNewVersion = false
  sendAnonymousUsage = false
[entryPoints.web]
  address = ":80"
  [entryPoints.web.http.redirects.entryPoint]
    to = "websecure"
    scheme = "https"
[entryPoints.websecure]
  address = ":443"
  [entryPoints.websecure.transport]
    [entryPoints.websecure.transport.respondingTimeouts]
      readTimeout = 0
  [entryPoints.websecure.http.tls]
```

3. Save and apply the updated ConfigMap to your cluster for the changes to take effect.

```
kubectl rollout restart deployment/traefik -n mlx
```