Red Hat OpenShift AI

RHOAI Getting Started

Agenda

- Data Science Projects
- Workbenches
- Data Connections
- Model Serving

Data Science Projects

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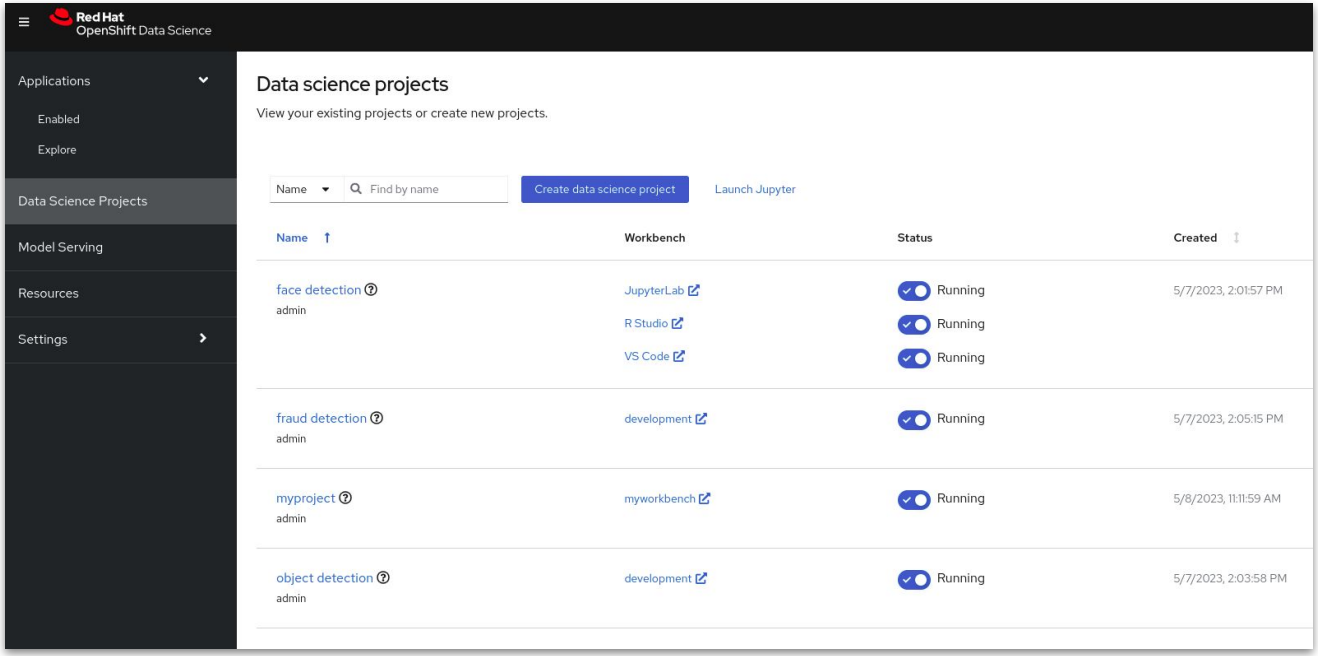
Data Science Projects



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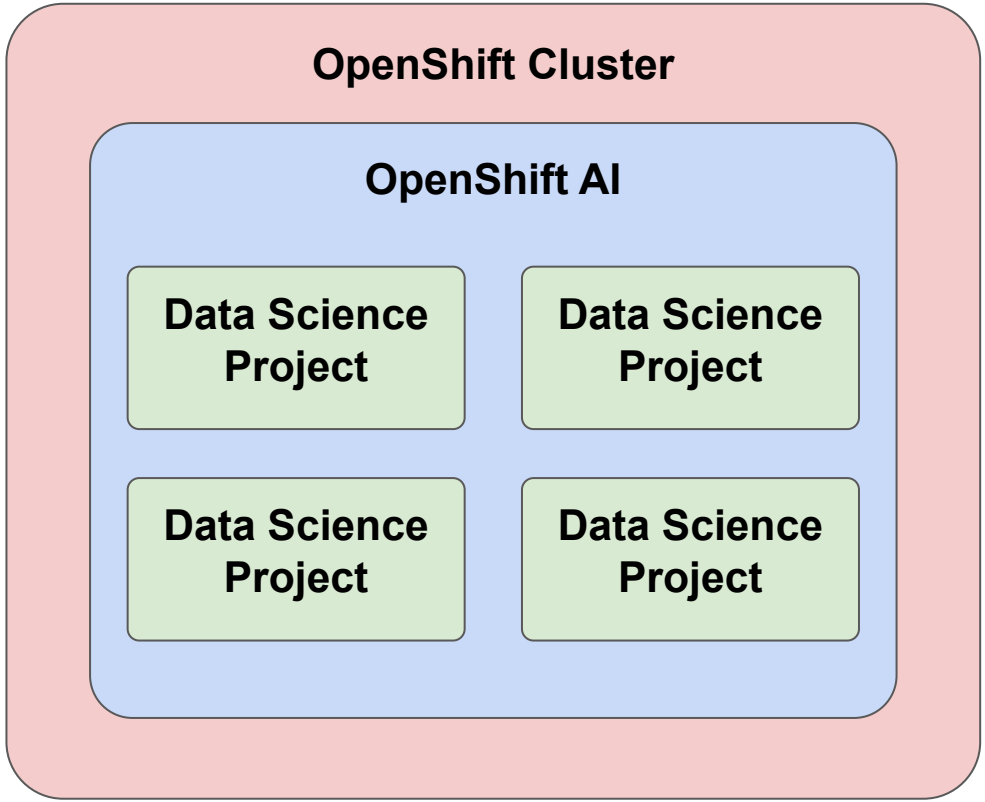
Data Science Projects



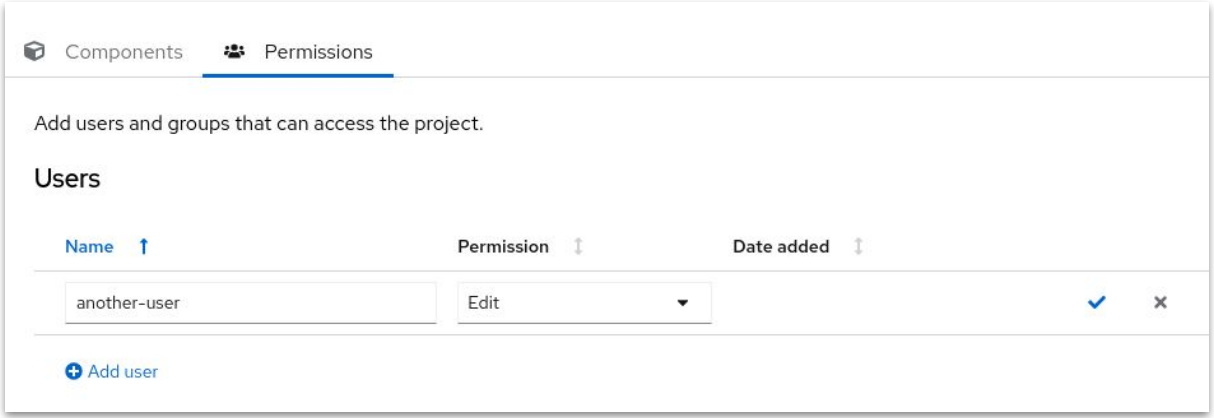
In OpenShift AI, you can have multiple **Data Science Projects (DSP)**.

A **DSP** can be created by administrators, or directly by users if they are allowed to.

Each DSP is **isolated** from the others. Only user with **access privileges** can see what is inside a DSP (applications, data,...).

You can **grant access** to other **users** and **groups** to your DSP.

Collaborate in a project



Workbenches

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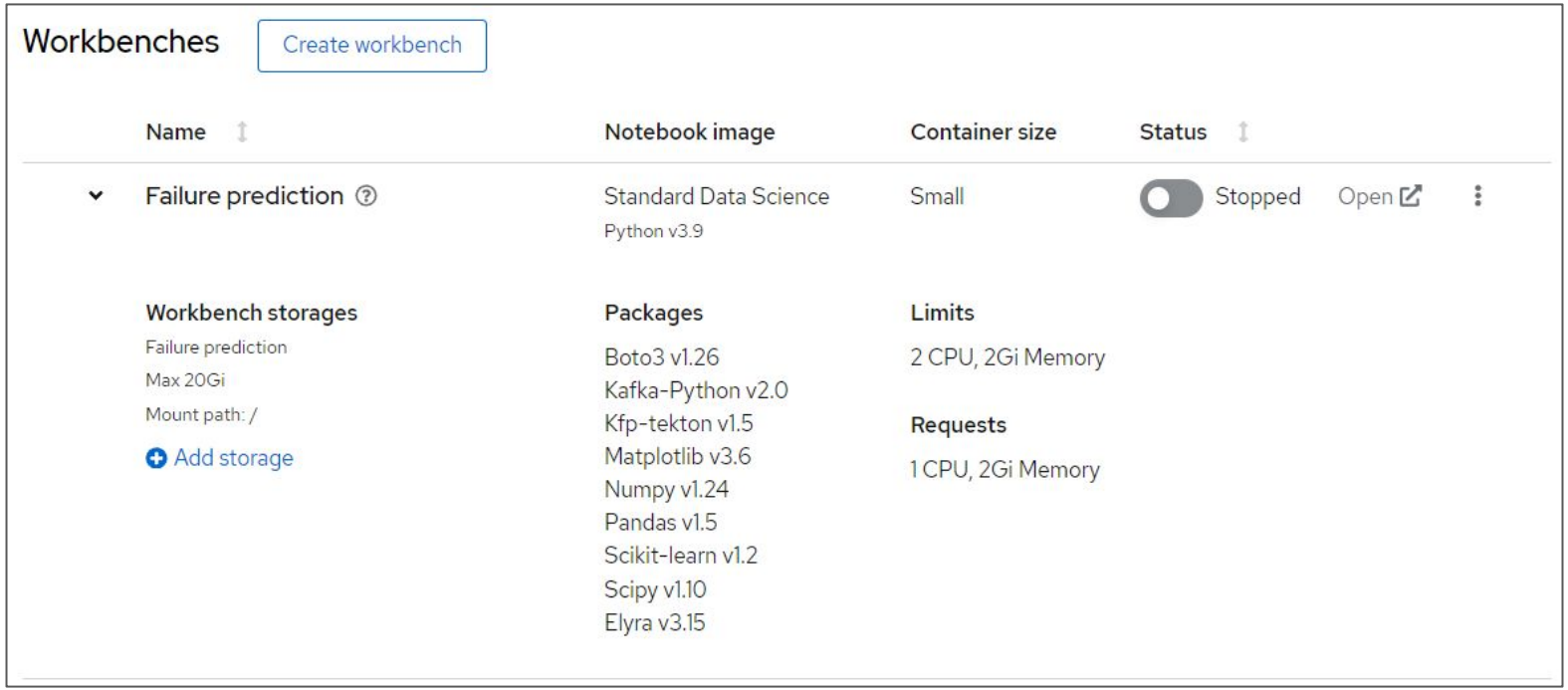
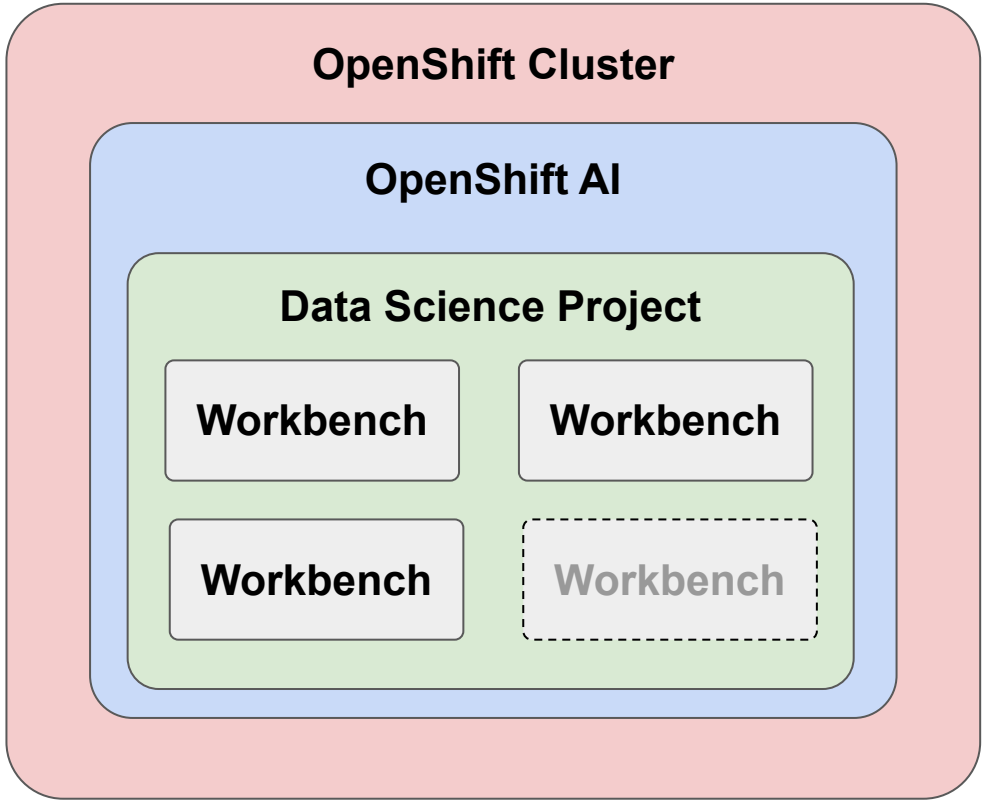
Workbenches



Workbenches



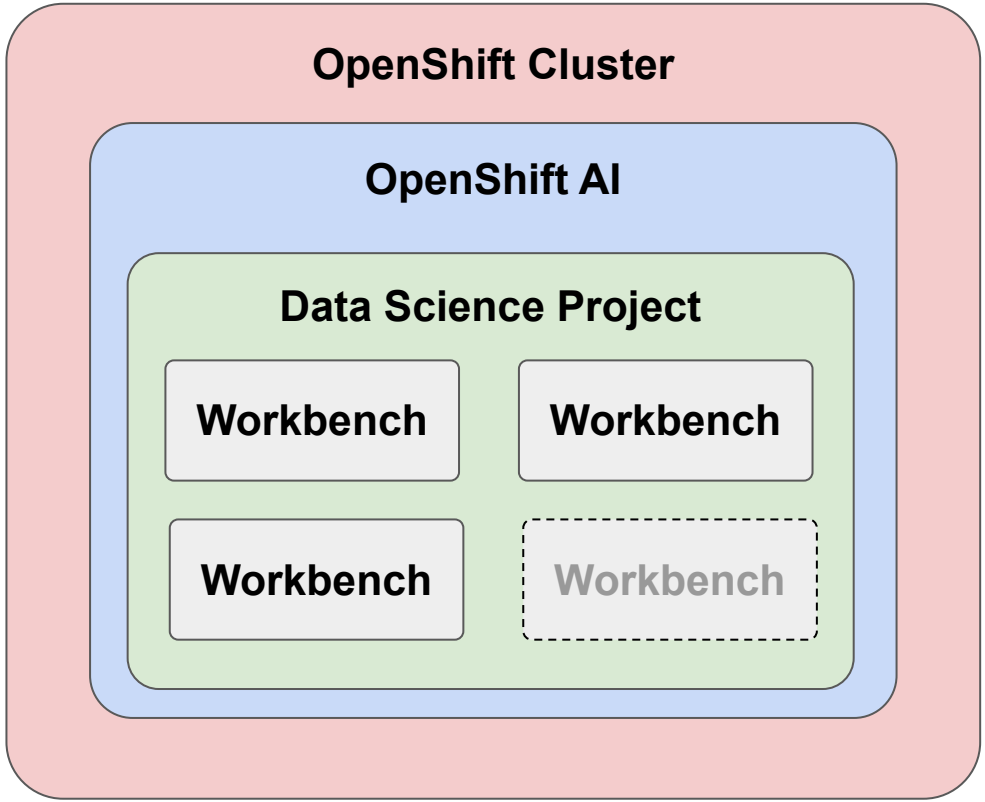
A **Workbench** is a **working space** that you create in a Data Science Project.

A Workbench can be based on different development environments: **Jupyter**, **VSCode**, **RStudio**,...

Different **flavors** or Workbenches are provided with OpenShift AI, including different built-in libraries and tools: T**ensorflow**, **PyTorch**,...

You can **extend** the capabilities by **importing** your own **custom Workbench**.

Workbenches - continued



You can have as **many Workbenches** as you want in a Data Science Project.

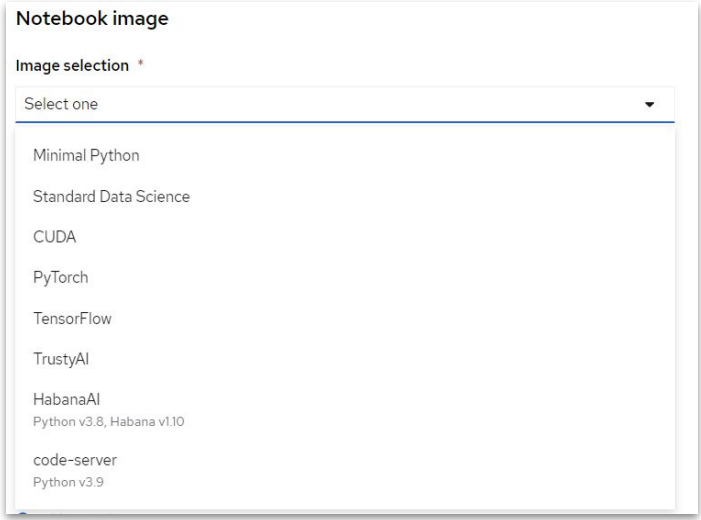
Each **Workbench** can have a **different configuration**: CPU, RAM, GPU, environment,...

Workbenches can be **started and stopped** at any time, their configuration is preserved.

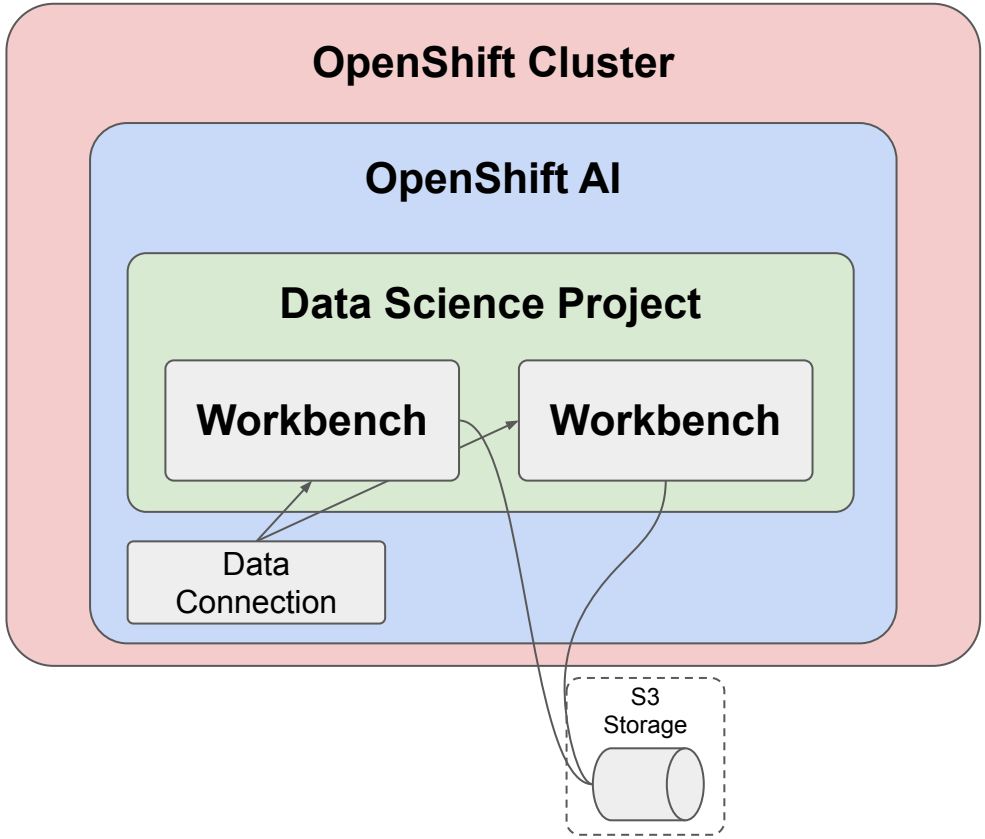
Each **Workbench** has its own dedicated **persistent storage** that gets **reconnected** to it every time you start the Workbench.

Supported Workbenches

- Minimal Python
- Standard Data Science
- CUDA
- PyTorch
- TensorFlow
- TrustyAI
- HabanaAI
- code-server



Workbenches - Data

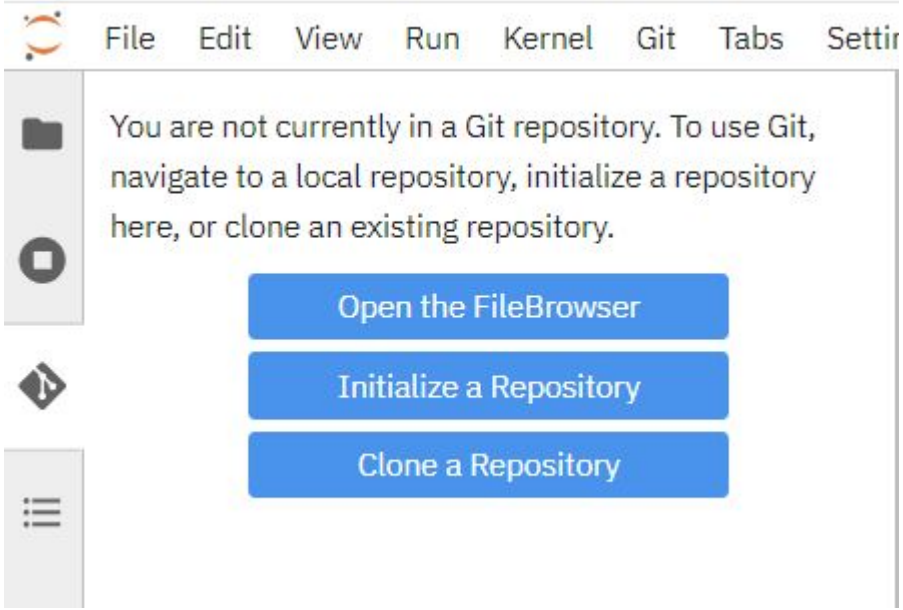


Generally, Workbenches **cannot share** standard **storage**.

However different workbenches can be **connected** simultaneously to the same **Object Storage** resource (S3) to exchange data and resources.

Object Storage resources can be easily **defined** and used in Workbenches using **Data Connections**.

Collaborate using Git



Data Connections

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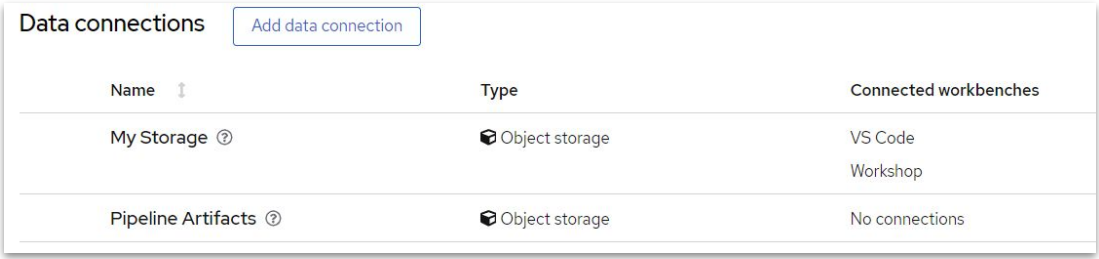
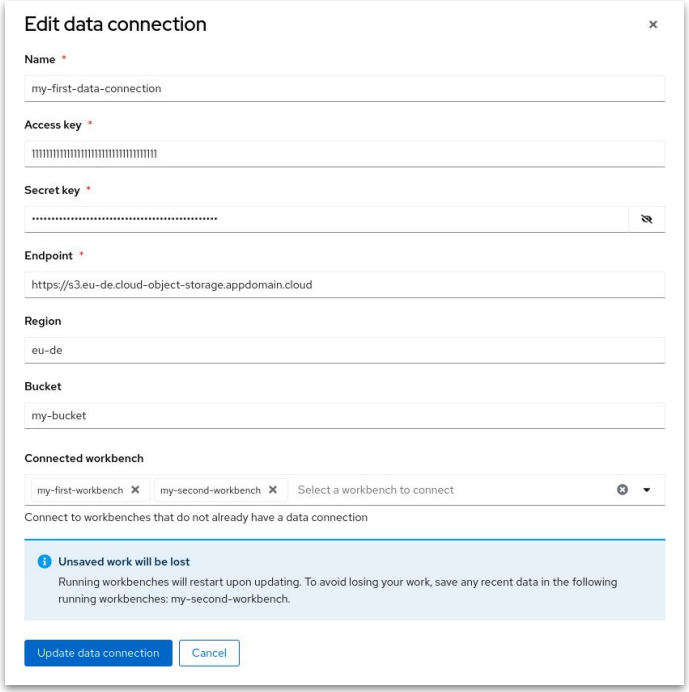
Simple secrets





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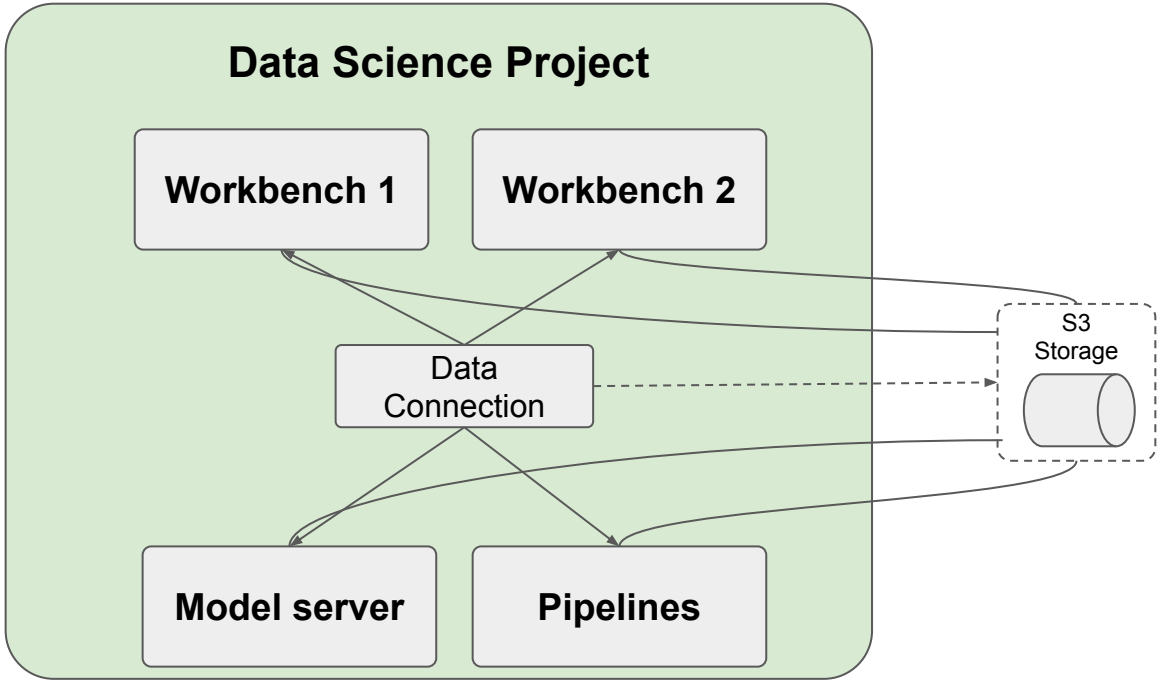
S3 as Central Artifact Store



Boto3: Interacting with S3

```python
import os
import boto3

key_id = os.getenv("AWS_ACCESS_KEY_ID")
secret_key = os.getenv("AWS_SECRET_ACCESS_KEY")
endpoint = os.getenv("AWS_S3_ENDPOINT")
bucket_name = os.getenv("AWS_S3_BUCKET")

s3_data_path = "dataset.csv"

s3 = boto3.client(
   "s3",
   aws_access_key_id=key_id,
   aws_secret_access_key=secret_key,
   endpoint_url=endpoint,
   use_ssl=True)

s3.download_file(bucket_name, s3_data_path,
"my/local/path/dataset.csv")
```

```python
import os
import boto3

source_path = "model.onnx"
s3_destination_path = "models/model.onnx"

key_id = os.getenv("AWS_ACCESS_KEY_ID")
secret_key = os.getenv("AWS_SECRET_ACCESS_KEY")
endpoint = os.getenv("AWS_S3_ENDPOINT")
bucket_name = os.getenv("AWS_S3_BUCKET")

s3 = boto3.client(
   "s3",
   aws_access_key_id=key_id,
   aws_secret_access_key=secret_key,
   endpoint_url=endpoint,
   use_ssl=True)

s3.upload_file(source_path, bucket_name, Key=s3_destination_path)
```

Model Serving

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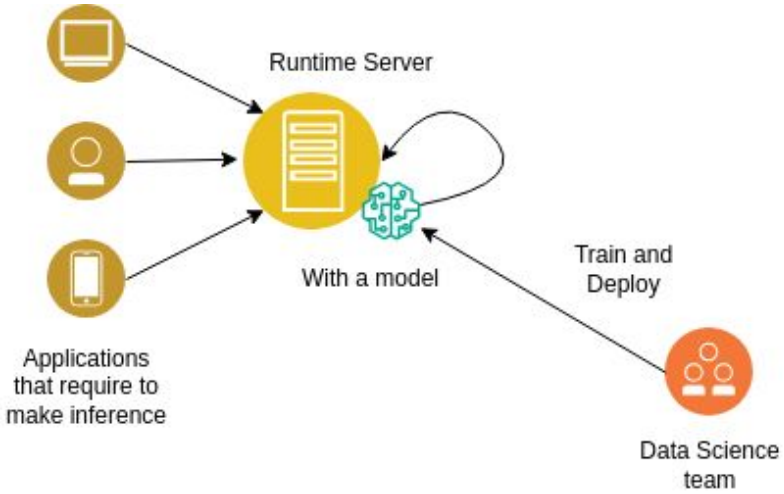
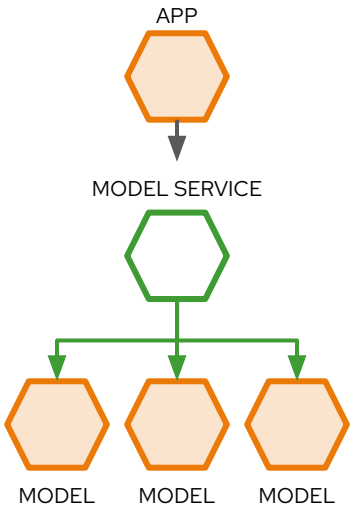
What is Model Serving?

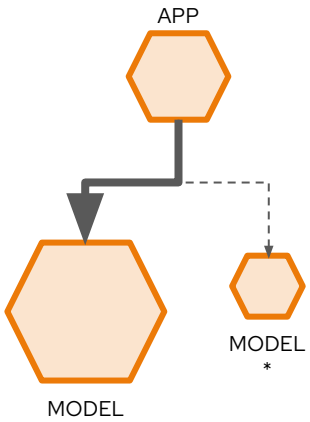


Models as stateless microservices

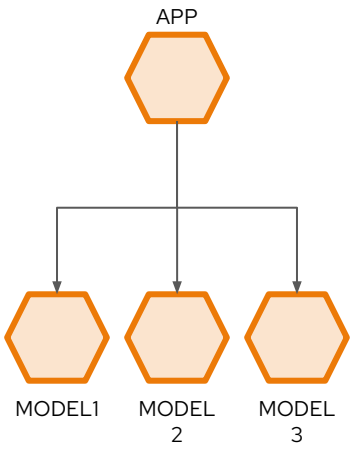
SCALE HORIZONTALLY



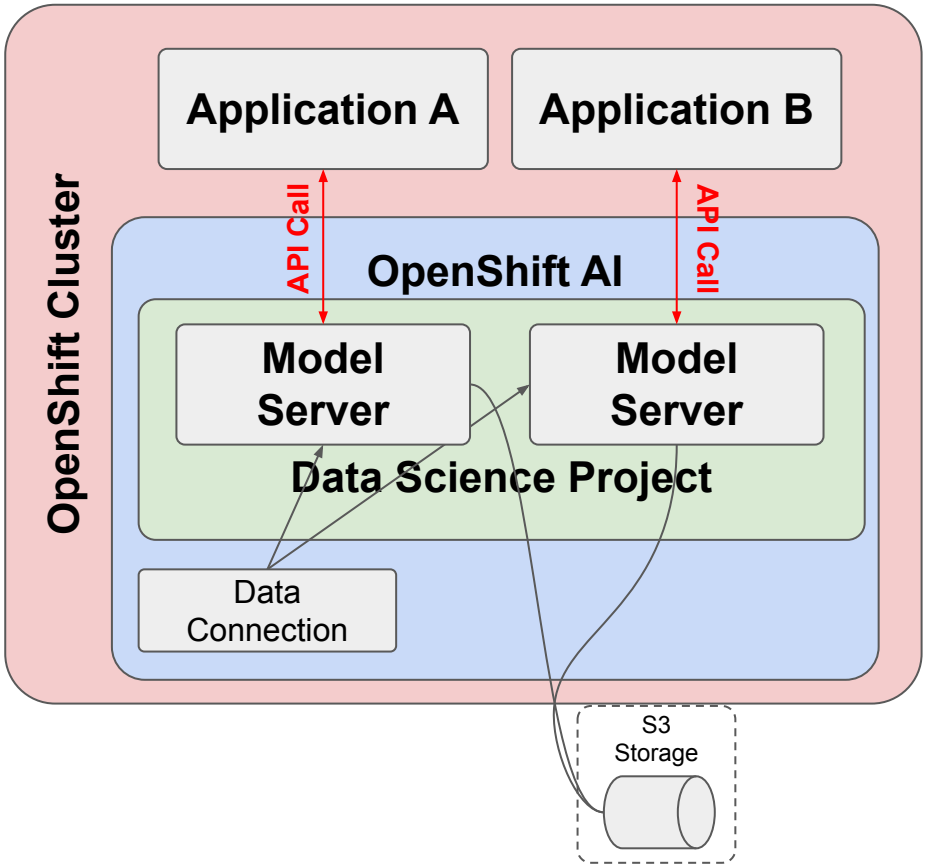
PHASED ROLLOUTS



MULTIPLE TRIALS



Model Serving



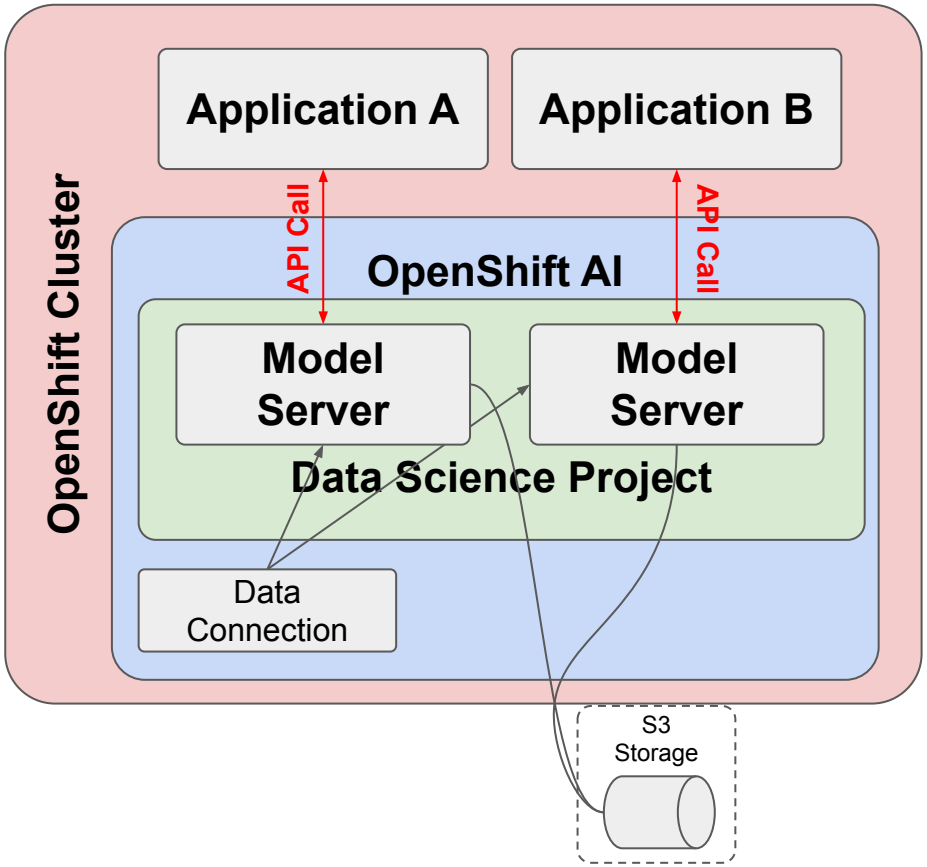
In a Data Science Project, you can deploy one or several **Model Servers**.

Models must be stored on **Object Storage** (S3).

When a **Model Server** starts, it will read a model file and service it through an **API**.

Your application can then directly query this **API** to make an **Inference** using the served model.

Model Serving - continued

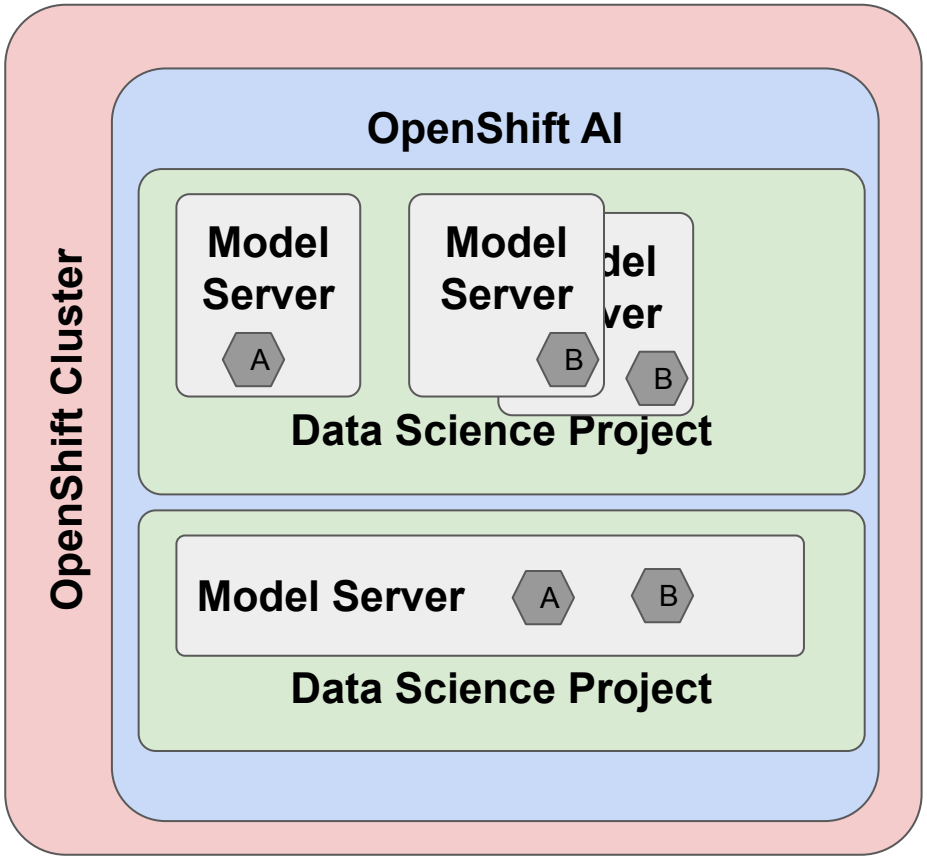


Different **types of Model Servers** are available for different needs: lots of small models (**Multi-model serving**), single larger models like Large Languages Models (**Single stack model serving**).

Different **Runtimes** are available, adapted to different types of models (LLMs, Predictive AI,...).

You can **extend** the capabilities by **importing** your own **runtime**.

Model Serving - single vs multiple



Top: Single-Model Model Serving
Each model is in its own server
You can have multiple "replicas"

Bottom: Multi-Model model Serving
Multiple Models are served by the same server.
You can also have multiple "replicas" (not depicted)

Supported Runtimes and their Frameworks

Single-model serving

- OpenVino Model Server
  - ONNX
  - OpenVino IR
  - TensorFlow
- Caikit TGIS ServingRuntime for Kserve
  - Caikit
- Text Generation Inference Server
  - PyTorch

Multi-model serving

- OpenVino Model Server
  - ONNX
  - OpenVino IR
  - TensorFlow

Use the one that fits your use case and is compatible with your format.