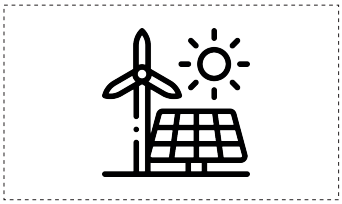
NTT DATA
Trusted Global Innovator

Success Stories

MLOps Framework Implementation



Client

Italian Renewable Energy Company

Industry

Energy

Country

Italy

AI & ML Services

TECHNOLOGIES LEVERAGED

-Seldon -Kubernetes -DVC
-Azure blob -Python

HISTORY OF TRANSFORMATION

The project originated from a long-standing relationship with the client. Over the course of more than two years, NTTDATA assisted the customer in building several machine learning algorithms linked to the energy industry that were deployed as microservices. Implementing an MLOps System to manage these algorithms was the logical extension of this relationship.

CLIENT CHALLENGE

The Italian Renewable Energy Company was seeking an MLOps System implementation to manage their existing algorithms. In order to do this, it was necessary to design an operational workflow that helps data scientists and data engineers in the development, deployment, and monitoring of ML models. The MLOps System had to fit within the client' s existing architecture and technologies.

These included Azure Kubernetes cluster and RabbitMQ as messaging bus. The System also had to be flexible enough to be integrated into any potential future Data Platforms, as well as to be cloud agnostic in case migration to the cloud becomes necessary in the future.

SOLUTION OVERVIEW

The following components were part of the solution:
• **Training:** Centralization and standardization of the training process for any existing and future ML model in a single microservice.
• **Monitoring:** Comparison of model performance on new data in the production environment.
• **Model registry:** Blob storage on the Kubernetes cluster where binary files of ML models are stored. Models are versioned and kept for reproducibility purposes.
• **Code Refactoring** of existing microservices was performed to adapt them to the new MLOps system by implementing custom Python packages.
• **Deployment:** The client's current architecture was used to deploy the MLOps System on Azure.

BUSINESS VALUE & KP

The MLOps System Implementation helped the client:
• Improve their management of ML models and Data Science pipelines.
• Automate its workflow.
• Reduce time to market, and data scientists' effort, who can now focus on testing and developing new models.
• Easily transit to different cloud providers or data platforms in the future thanks to the delivery model's modular design, which makes it possible to easily replace the underlying technologies.

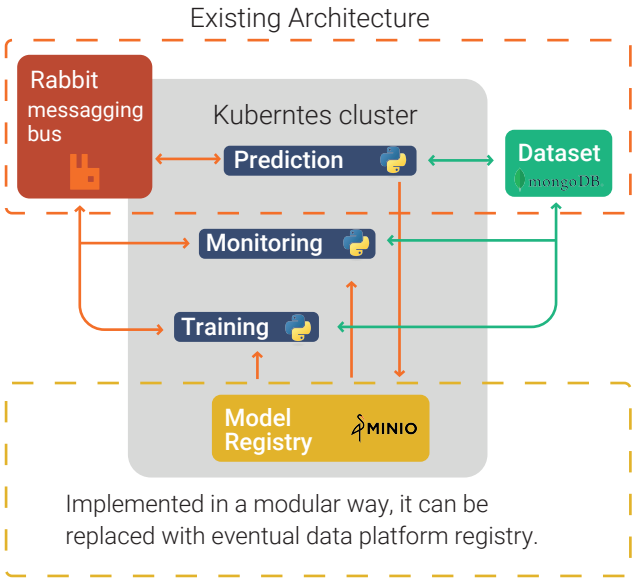
Moreover, the System proposed new open-source technologies that made it possible to:
• Centralize model artifacts, metrics, and metadata in a single location, allowing all team members to track and access the results of each experiment.
• Meet the flexibility requirement, as they can be replaced by any cloud-native storage in the future.

TECHNICAL SPECIFICATIONS

The solution provided by NTTDATA consisted in implementing an MLOps System to manage the client's existing algorithms, which were deployed as microservices in an Azure Kubernetes cluster.

The following components were included in the solution:
1- Training: This component centralizes and standardizes the training process of any existing and future ML model in a single microservice, and stores model artifacts and performance metrics in the model registry, along with additional metadata.
2- Monitoring: This component allows the comparison of model performance on new data in the production environment and triggers new training if monitoring thresholds are exceeded.
3- Model registry: Blob storage on the Kubernetes cluster where binary files of ML models are stored, with metadata about the training time and parameters set. Models are versioned and kept for reproducibility purposes.

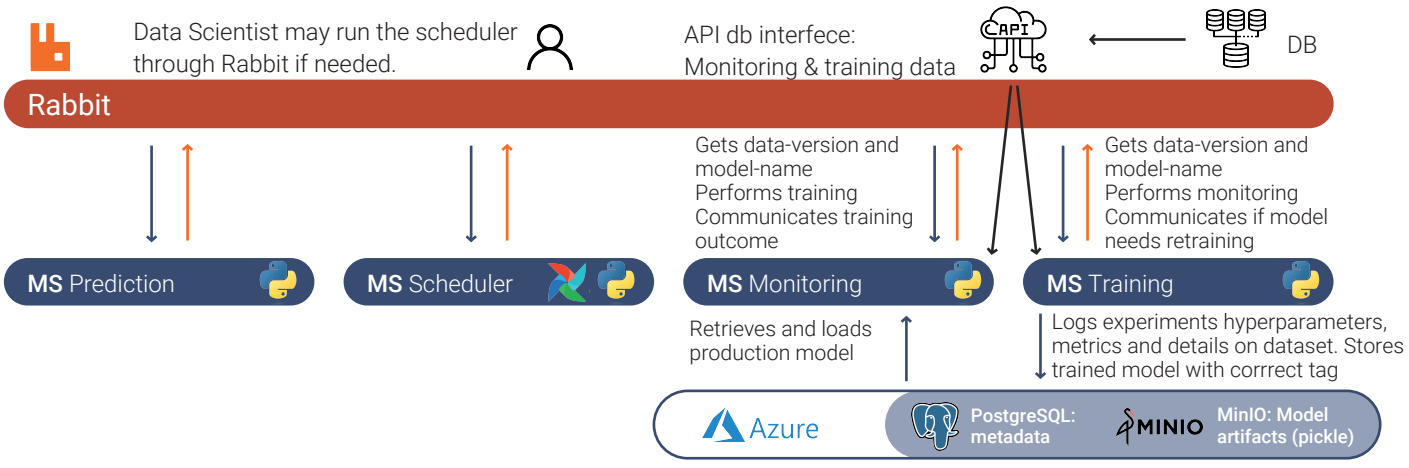
4- Code Refactoring of existing microservices was performed to adapt them to the new MLOps system. Code replication was minimized by implementing custom Python packages through Azure Artifacts that could be used by all microservices.



Delivery Model

The client's current architecture was used to deploy the MLOps System on Azure. The client's architecture was not adversely affected throughout implementation, which reduced costs and effort. Development and deployment followed standard CI/CD practices used by the client through Azure DevOps.

Implementation



"The project grew over time thanks to NTT DATA's collaboration and technical expertise, which allowed us to build an excellent relationship of trust. We, therefore, expanded our business goals and asked the provider to deliver also a state-of-the-art MLOps system to finalize the work already done by their data scientists. We are very satisfied with the results obtained, which have enabled us to bring innovation to our company through efficient management of the entire machine learning lifecycle." **- CLIENT**

NTT DATA Corporation

Toyosu Center Bldg., 3-3, Toyosu 3-chome, Koto-ku, Tokyo 135-6033, Japan
Tel: +81 3 5546 8051 Fax: +81 3 5546 2405
www.nttdata.com/jp/