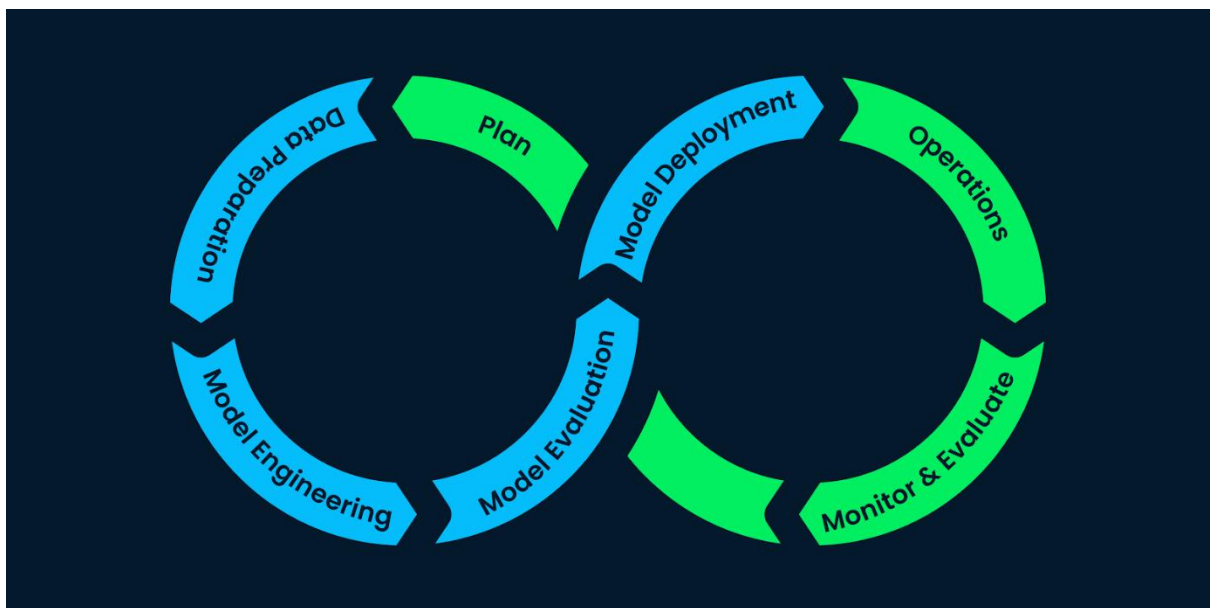


# MACHINE LEARNING MODEL DEPLOYMENT WITH IBM CLOUD WATSON STUDIO

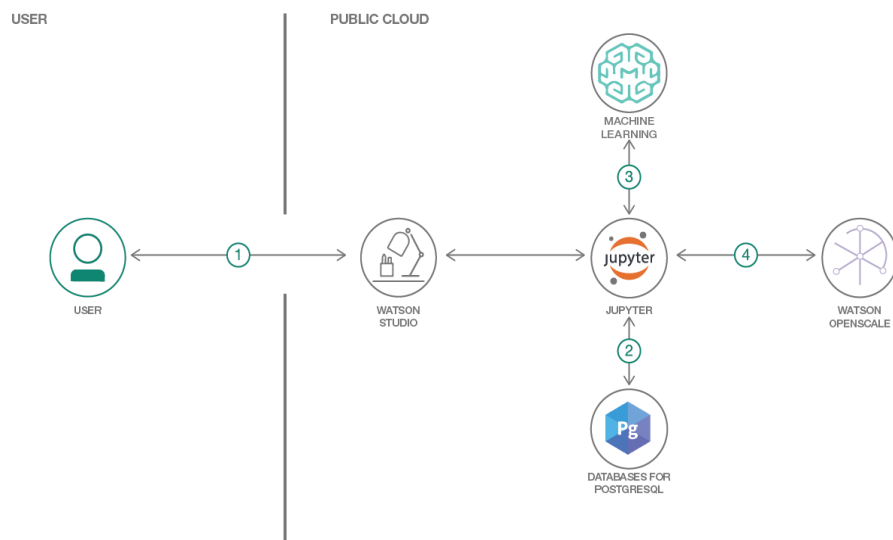
Watson Machine Learning is a service on IBM Cloud with features for training and deploying machine learning models and neural networks. Built on a scalable, open-source platform based on Kubernetes and Docker components, Watson Machine Learning enables you to build, train, deploy, and manage machine learning and deep learning models.

## INNOVATIONS:

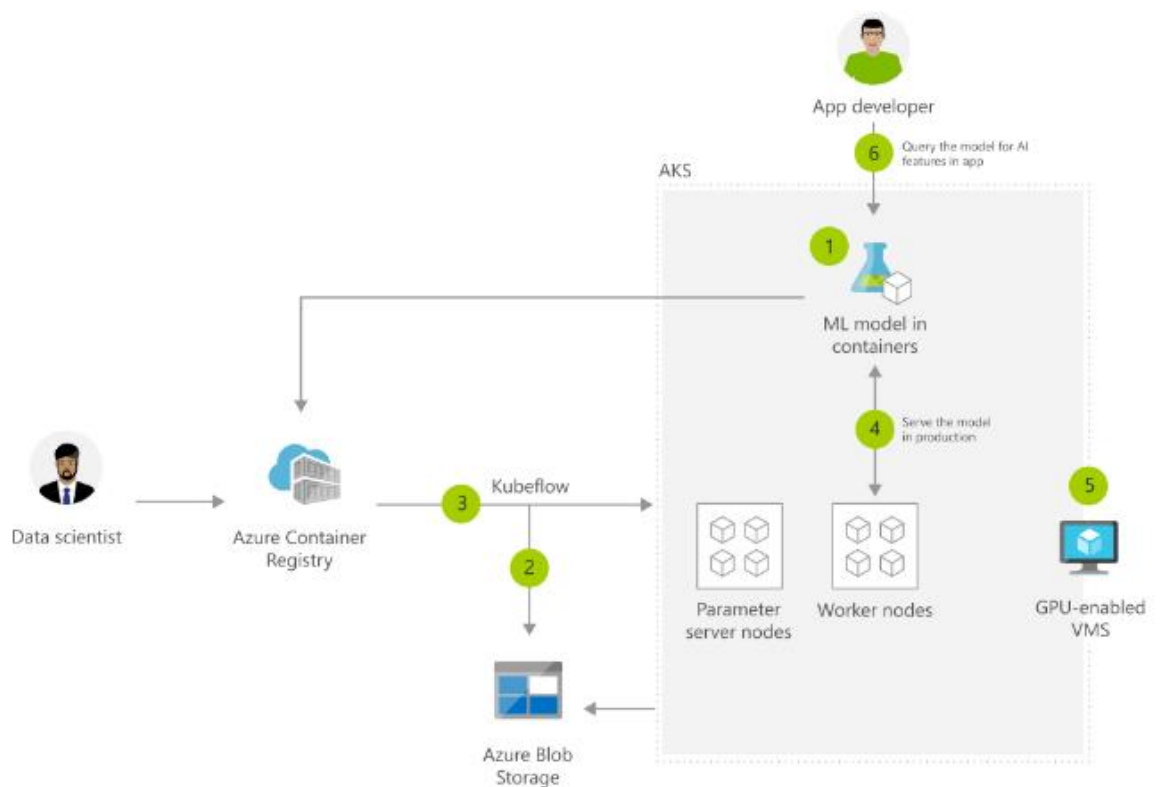
1. **End-to-End ML Lifecycle Management:** Watson Studio provides a unified platform for the entire ML lifecycle, including data preparation, model development, training, deployment, and monitoring.



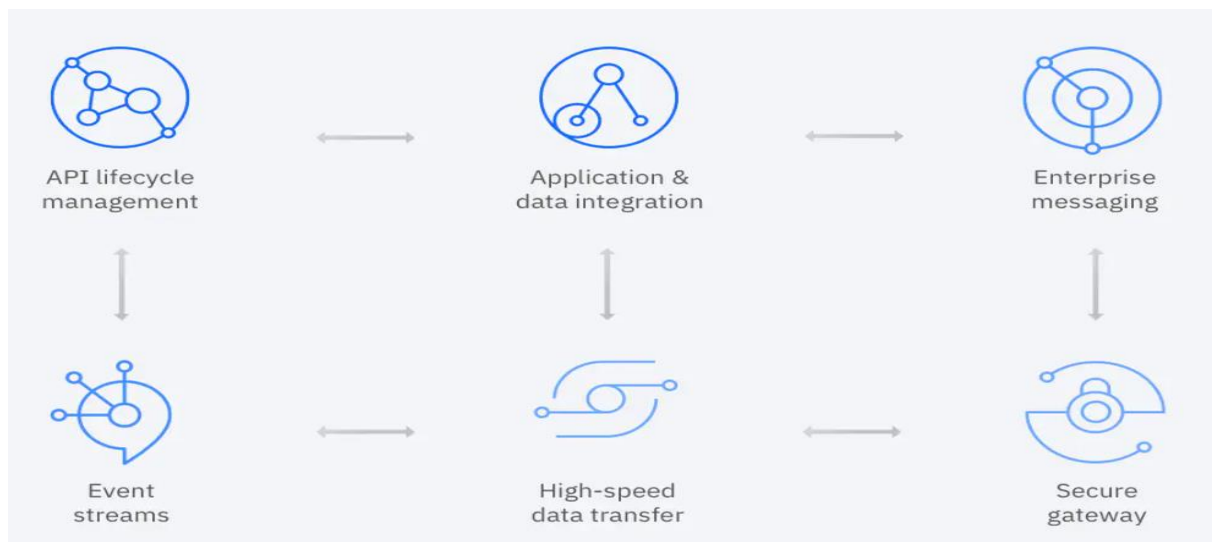
2. **Open Scale for Model Monitoring:** IBM Watson Open Scale was integrated with Watson Studio to provide model monitoring and fairness monitoring capabilities. It allows you to track the performance of deployed models in real-time, detect and mitigate bias in AI models, and explain model predictions.



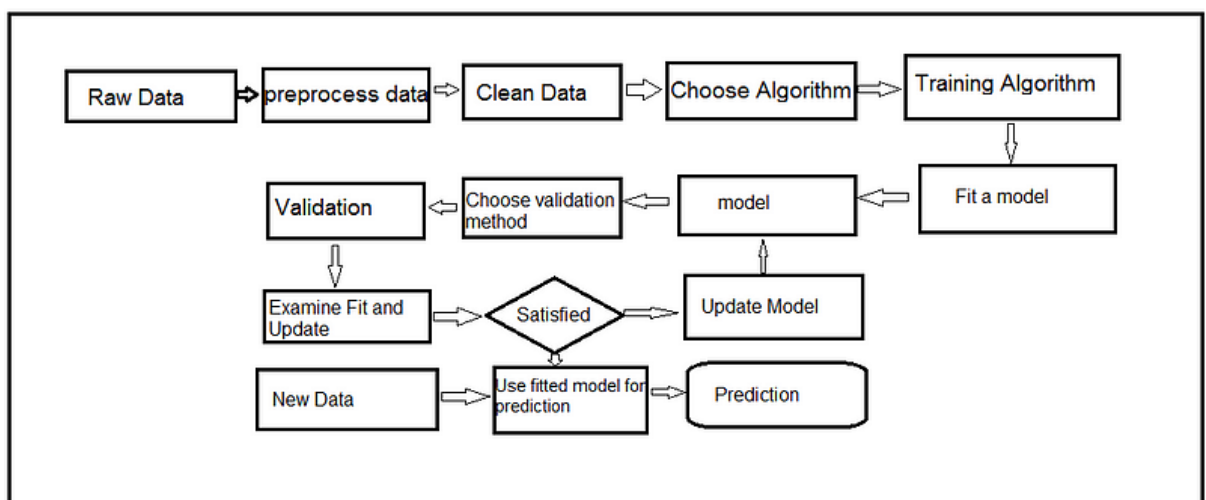
3. **Model Deployment with Kubernetes:** IBM Cloud Watson Studio supports deploying machine learning models using Kubernetes. Kubernetes provides a scalable and reliable container orchestration platform, making it easier to deploy and manage machine learning models in a production environment.



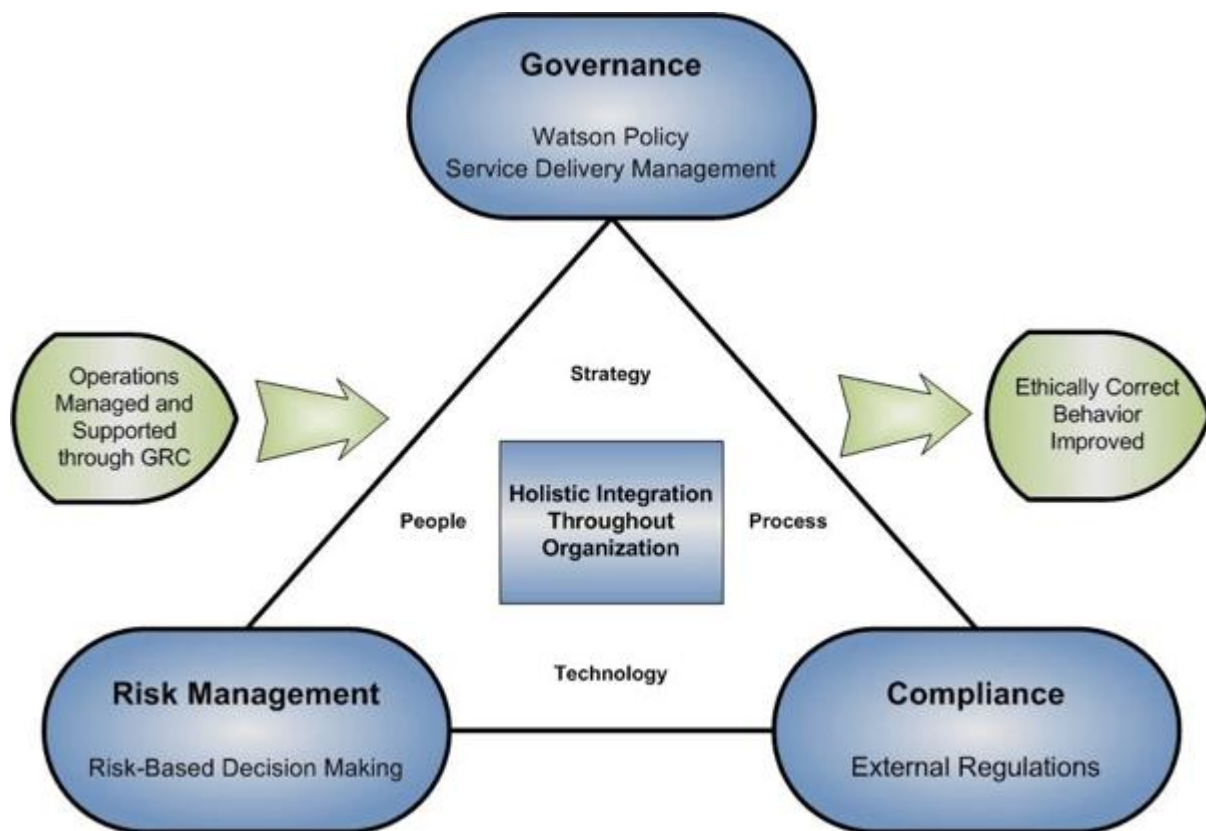
4. **Integration with IBM Cloud Pak for Data:** Watson Studio can be integrated with IBM Cloud Pak for Data, providing a comprehensive data and AI platform. This integration allows for seamless data integration, governance, and collaboration across teams working on data science and Machine learning objects.



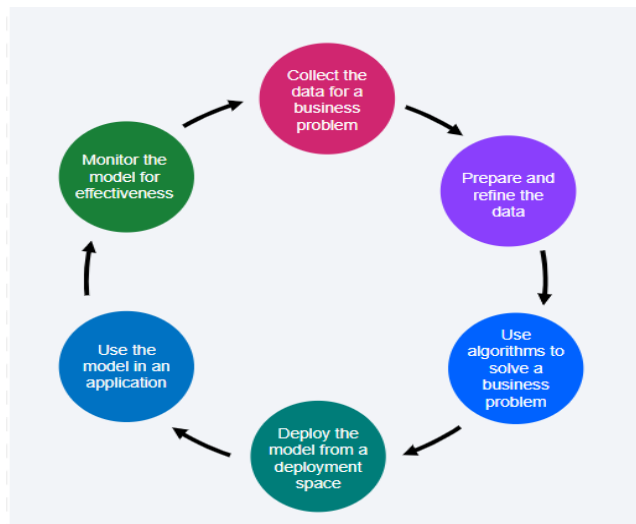
5. **Model Deployment on IBM Cloud Functions (Serverless):** IBM Cloud Watson Studio offers serverless deployment options through IBM Cloud Functions. This serverless approach allows you to deploy models as functions that can be triggered by events, making it suitable for real-time, event-driven applications.



6. **Security and Compliance:** IBM Cloud Watson Studio emphasizes security and compliance. It provides features for data encryption, access control, and audit logging to ensure that your machine learning deployments meet regulatory requirements and industry standards.



7. **Model Explainability:** The platform incorporates model explainability tools to help data scientists and stakeholders understand the factors contributing to model predictions, enhancing transparency and trust in AI systems.



Deploying a machine learning model with IBM Cloud Watson Studio involves several steps:

### Step 1: Prepare Your Model

Before deploying your machine learning model, you need to ensure that it's trained, tested, and ready for deployment. This includes:

- Data Preparation: Make sure your training data is clean, preprocessed, and in a format suitable for model deployment.
- Model Training: Train your machine learning model using the data and algorithms of your choice.

### Step 2: Save and Package Your Model

Once your model is trained and evaluated, you need to save it in a format that can be easily deployed. Common formats include:

- Serialized Model: Save your model in a serialized format, such as a Python pickle file (.pkl) or a serialized model format like ONNX.
- Docker Container: If you want to containerize your model, package it in a Docker container. This is useful for deploying on Kubernetes or other container orchestration platforms.

### Step 3: Set Up an IBM Cloud Watson Studio Project

- Log in to your IBM Cloud account.
- Create a new project in IBM Watson Studio. Choose the appropriate project type (e.g., Data Science, Model Management) based on your requirements.

#### Step 4: Add Your Model to the Project

Upload your saved model files (serialized model or Docker container) to the project's assets.

#### Step 5: Create a Deployment Space

In IBM Watson Studio, create a deployment space to manage and deploy your machine learning models. A deployment space is a container for organizing your model deployments.

#### Step 6: Deploy Your Model

- In the deployment space, create a deployment of your model.
- Choose the runtime environment for your model, which can be Python, R, or other supported languages.
- Configure the deployment settings, such as CPU and memory allocation.
- Specify any required environment variables or deployment parameters.

#### Step 7: Monitor and Manage Your Model

IBM Cloud Watson Studio provides monitoring and management capabilities for deployed models. You can track metrics, monitor for drift, and set up alerts for model performance issues.

#### Step 8: Security and Compliance

- Ensure that your deployed model is secure. Implement access controls, encryption, and authentication mechanisms.

- Consider compliance requirements, especially if your model deals with sensitive data, and implement necessary safeguards.

By introducing Watson Studio, IBM cloud organizations to harness the full potential of machine learning while addressing the challenges of deploying, monitoring, and governing ML models effectively and efficiently. This innovation paves the way for faster, more reliable, and more scalable, driving better business outcomes.

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