Agenda

- SageMaker Overview
- SageMaker Workshop
- Bedrock Overview
- Bedrock Demo

Amazon SageMaker Studio

A single web-based interface for end-to-end ML development

Amazon SageMaker overview

PREPARE DATA AND BUILD, TRAIN, AND DEPLOY ML MODELS FOR ANY USE CASE

PREPARE

Ground Truth: Create high quality datasets for ML

Data Wrangler: Aggregate and prepare data for ML

Processing: Built-in Python, BYO R/Spark

Feature Store: Store, catalog, search, and reuse features

Clarify: Detect bias and understand model predictions

Data scientist

ML engineer

Business analyst

BUILD

Notebooks: Fully managed Jupyter notebooks with elastic compute

Built-In Algorithms: Integrated tabular, NLP, and vision algorithms

JumpStart: UI-based discovery, training, and deployment of models, solutions, and examples

Autopilot: Automatically create ML models with full visibility

Bring Your Own: Bring your own container and algorithms

Local Mode: Test and prototype on your local machine

TRAIN AND TUNE

Fully Managed Training: Broad hardware options, easy to set up and scale

Distributed Training Libraries: High-performance training for large datasets and models

Automatic Model Tuning: Hyperparameter optimization

Managed Spot Training: Reduce training cost by up to 90%

Debugger and Profiler: Debug and profile training runs

Experiments: Track, visualize, and share model artifacts across teams

Customization Support: Integrate with popular open-source frameworks and libraries

DEPLOY AND MANAGE

Fully Managed Deployment: Ultra low-latency, high-throughput inference

Real-Time Inference: For steady traffic patterns

Serverless Inference: For intermittent traffic patterns

Asynchronous Inference: For large payloads or long processing times

Batch Transform: For offline inference on batches of large datasets

Multi-Model Endpoints: Reduce cost by hosting multiple models per instance

Multi-Container Endpoints: Reduce cost by hosting multiple containers per instance

Inference Recommender: Automatically select compute instance and configuration

Model Monitor: Maintain accuracy of deployed models

Kubernetes and Kubeflow Integration: Simplify Kubernetes-based ML

Edge Manager: Manage and monitor models on edge devices

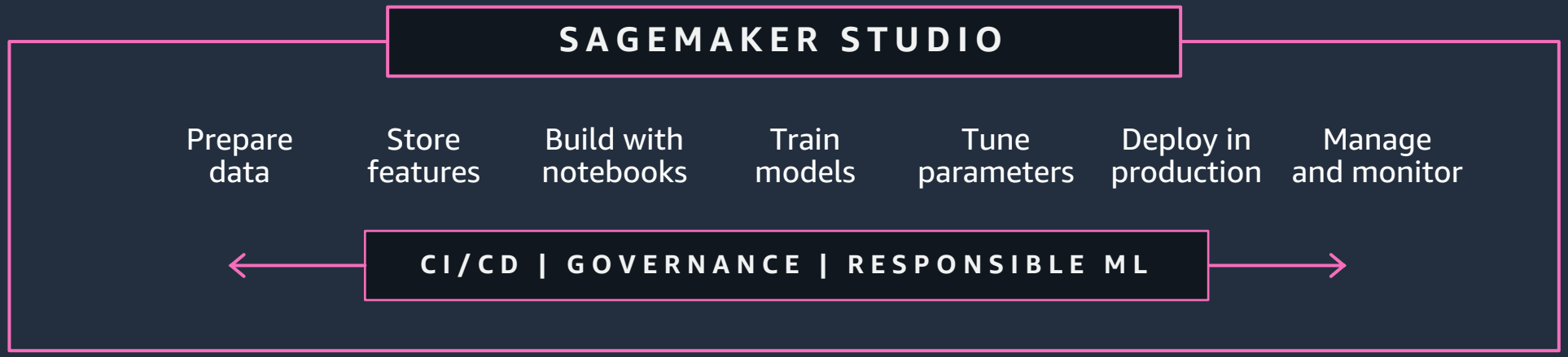
SageMaker Studio
A single web-based interface for end-to-end ML

MLOps: Pipelines | Projects | Model Registry
Workflow automation, CI/CD for ML, central model catalog

SageMaker Canvas
Generate accurate ML predictions—no code required

Amazon SageMaker Studio

BRINGS TOOLS FOR EVERY STEP OF THE ML LIFECYCLE IN ONE UNIFIED VISUAL USER INTERFACE



SageMaker Studio gets models to production faster

Unified end-to-end ML: Prepare data and build, train, deploy, and monitor your models all in one place with managed IDEs of your choice, including JupyterLab, RStudio, and Code Editor based on Visual Studio Code – Open Source.

Team collaboration: Shared spaces offer collaboration and project organization between team members with data scientists, ML engineers, and business analysts.

Automate ML processes: MLOps tooling allows for consistency and efficiency for model deployment and monitoring.

Access to over 400 prebuilt models: Quickly spin up popular publicly available foundation models (FMs) through Amazon SageMaker JumpStart.

Easy cost management: Manage cost allocation by teams, users, and projects with automated tagging for each stage of the machine learning (ML) process.

Choice of IDEs

SAGEMAKER STUDIO OFFERS A WIDE RANGE OF FULLY MANAGED IDES FOR ML

JupyterLab

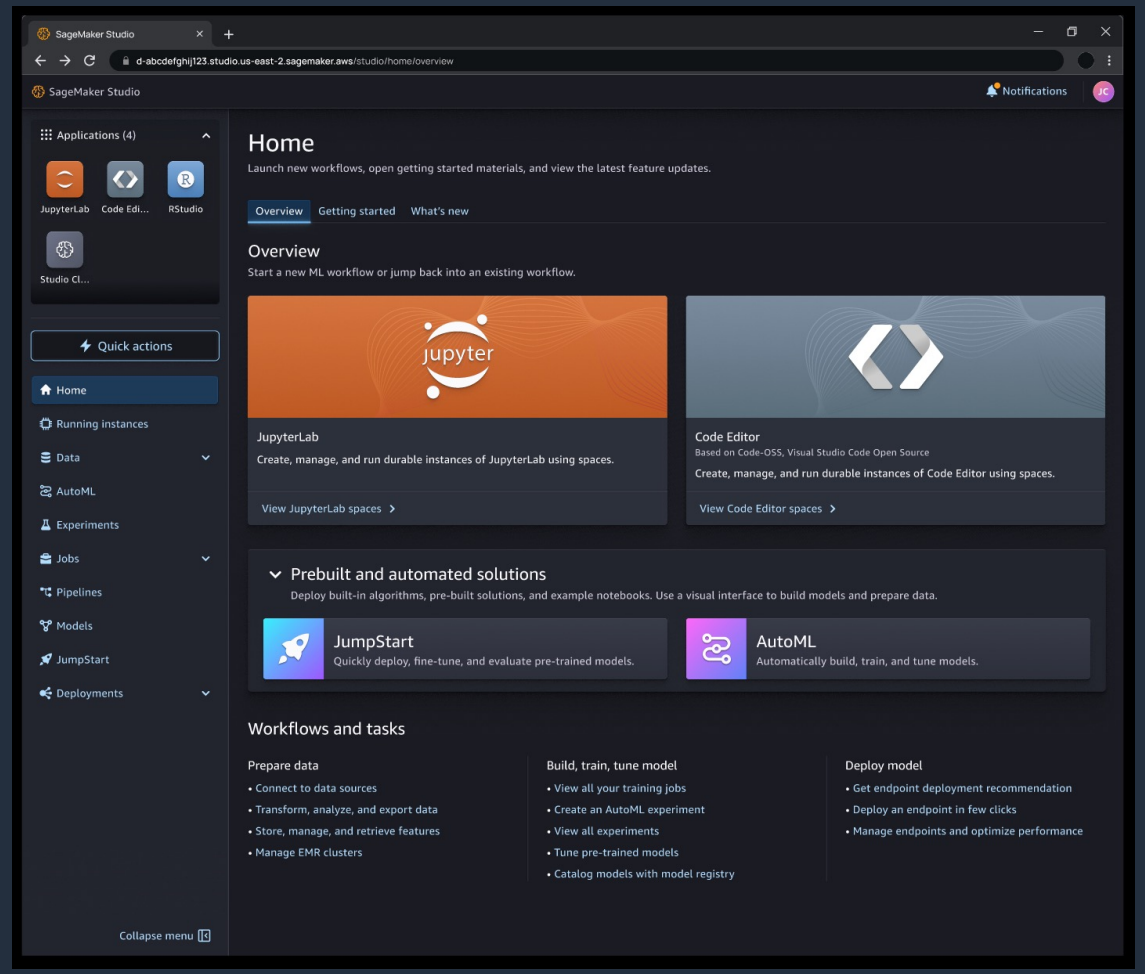
Launch fully managed JupyterLab in seconds for the interactive development environment (IDE) for notebooks, code, and data

Code Editor (based on Visual Studio – Code Open Source)

Use the lightweight and powerful code editor and boost productivity with its familiar shortcuts, terminal, debugger, and refactoring tools

RStudio

Use the fully managed IDE for R and seamlessly switch within RStudio and other IDEs for R and Python development



Prepare data seamlessly in SageMaker Studio

Low-code no-code data prep

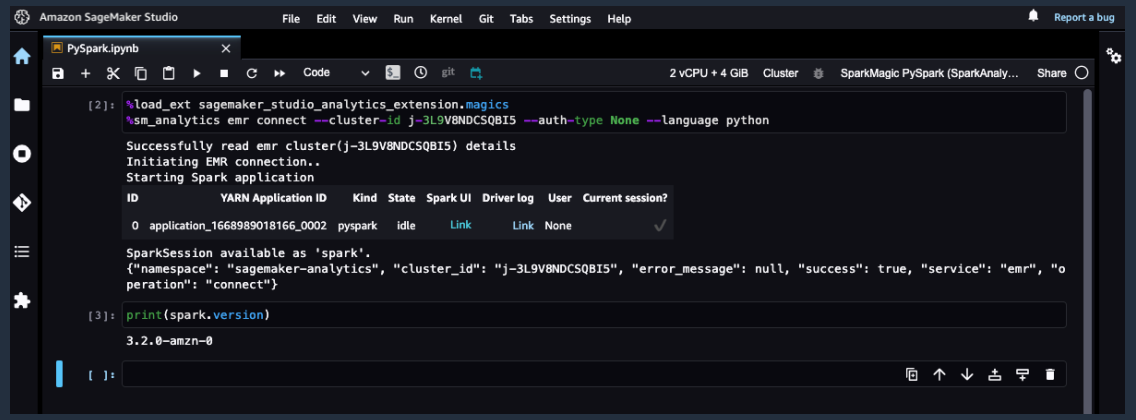
Prepare data in a few steps using little to no code with our built-in data preparation tool Amazon SageMaker Data Wrangler

Native integration for Spark analysis

Create and manage EMR clusters and rapidly build, test, and run interactive data preparation and analytics applications with serverless AWS Glue

Data bias detection

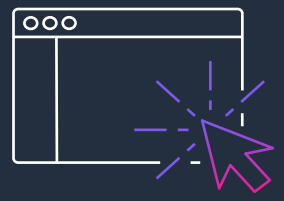
Detect and limit potential bias during data preparation, after model training, and in your deployed model using Amazon SageMaker Clarify



Generative AI and SageMaker Studio

Use

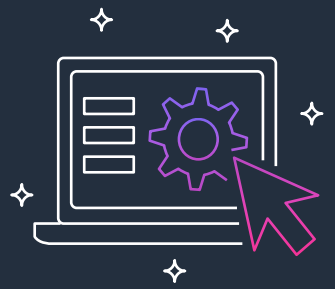
Generative AI features to increase data scientist efficiency within SageMaker Studio



Amazon CodeWhisperer and Jupyter AI extensions help data scientists generate, debug, and explain their source code, and the Amazon CodeGuru extension helps conduct security and code quality scans

Build

Large FMs for within SageMaker Studio



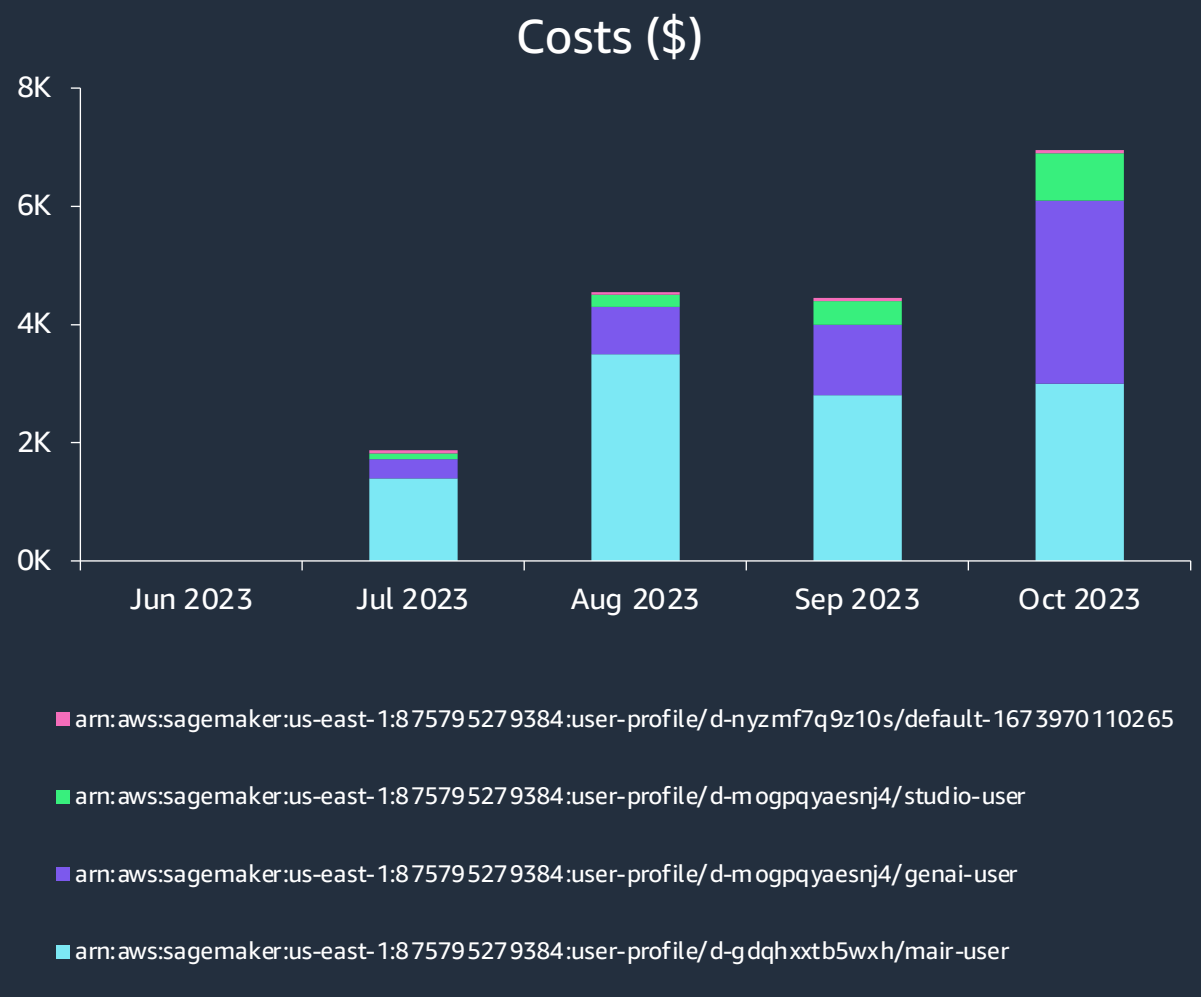
Have access to a wide range of FMs and notebooks backed by high performance compute to fine-tune large models, and have the ability to scale to distributed training directly from Studio notebooks

Analyze and manage costs within SageMaker Studio

With SageMaker Studio, you only pay for what you use—no licenses

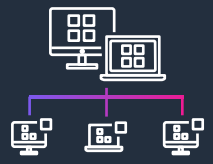
SageMaker Studio automatically tags resources by user profile, space, and domains, allowing administrators to granularly review costs attribution within Cost Explorer

Use lifecycle configurations to automatically shut down idle resources



Security on SageMaker Studio

BUILT-IN FEATURES HELP YOU GO FROM IDEA TO PRODUCTION FASTER, WITHOUT COMPROMISING SECURITY



Infrastructure and network isolation

Amazon Virtual Private Cloud (Amazon VPC) support, AWS PrivateLink support, and disabling internet access

Authentication and authorization

AWS IAM Identity Center, AWS Identity and Access Management (IAM), and IAM SourceIP restrictions

Data protection

Ensure automatic data encryption at rest and in transit with flexibility to bring your own keys

Auditability and monitoring

Track, trace, and audit all API calls, events, data access, or interactions down to the user and IP level to ensure quick remediation

Compliance certifications

ML workflows, continuous integration and continuous delivery (CI/CD), lineage tracking, and catalog

Get started with SageMaker Studio

Visit SageMaker Studio
to learn more

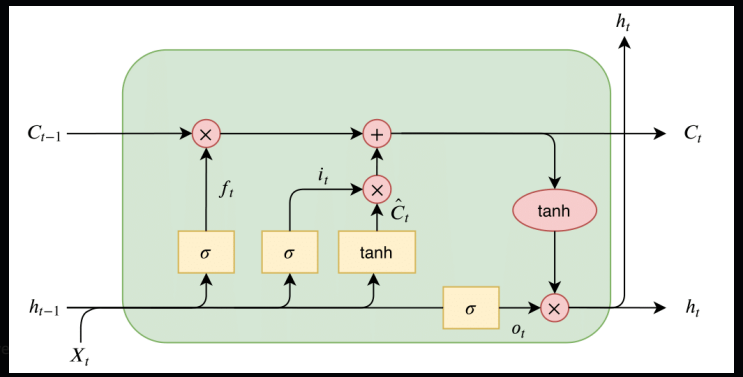
SageMaker Workshop

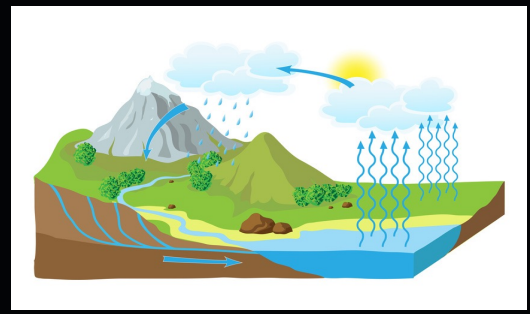
- https://d3srcxjz0b50d1.cloudfront.net

Learn SageMaker

- An overview of ML model development in SageMaker.
- Learn how to develop a simple Long-Short-Term Memory (LSTM) on SageMaker to post-process NWM data.
- Learn how to use different CPUs and GPUs.
- Learn how to use Git, Conda, and Amazon S3 buckets in our model development process.

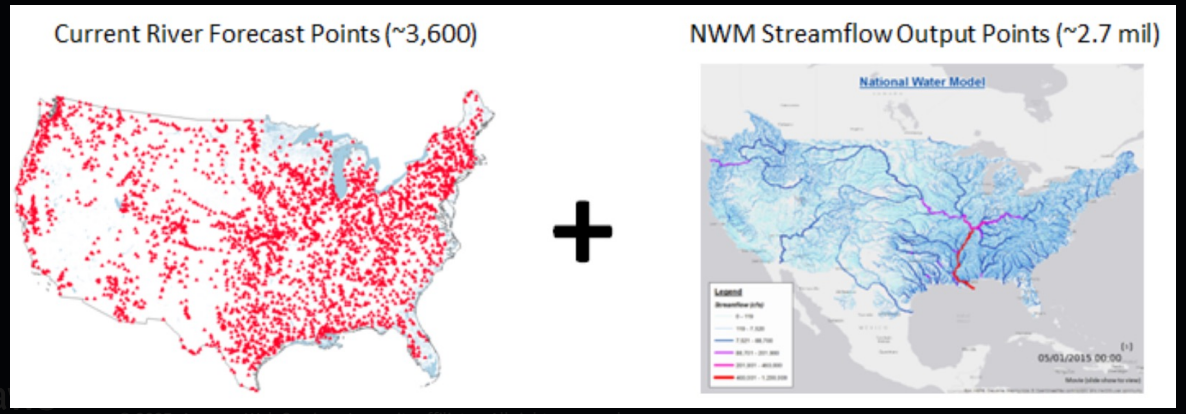
Amazon SageMaker





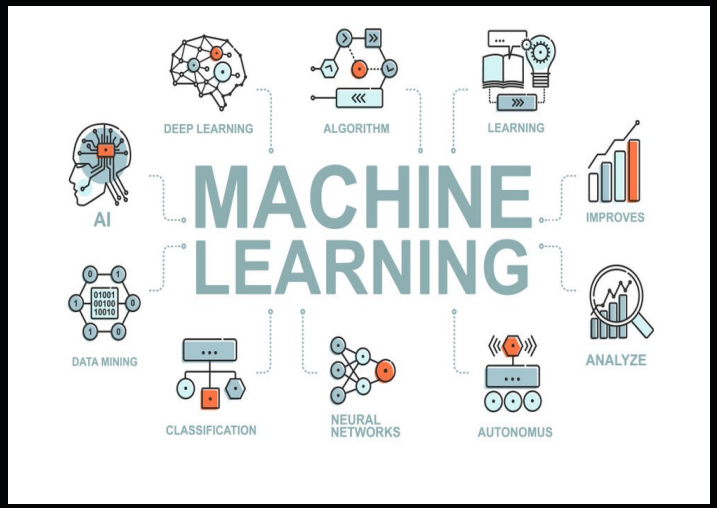
The National Water Model

- Addresses the need for a consistent, large-scale forecast.
- Created by NOAA's Office of Water Prediction.
- Developed based on WRF-Hydro.
- Provides predictions for 2.7 million reaches.



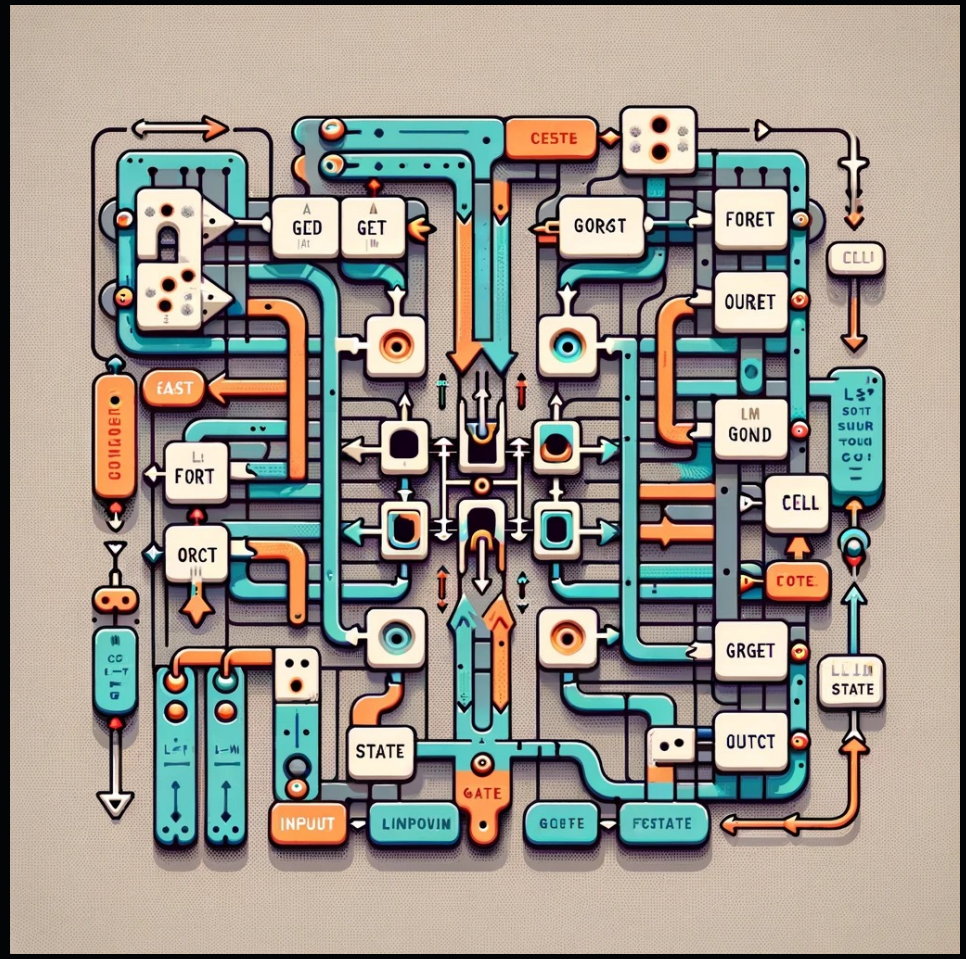
Post-processing Hydrological Predictions

- Accurate prediction of future streamflow is critical for effective water management.
- There are different ways to improve the predictions, including post-processing.
- Post-processing corrects biases by transforming model outputs based on the relationship between observations and the model.
- ML models proved to be useful in post-processing.



Extreme Gradient Boosting (XGBoost) Algorithm

- LSTMs are a Recurrent Neural Network (RNN) type that can effectively learn long-term dependencies in sequential data.
- LSTMs are good for tasks where past information and context affect current output, such as language translation, speech recognition, and time series forecasting.
- LSTM cells have three gates that regulate info flow: input, forget, and output.



Amazon Bedrock

Build and scale generative AI applications with foundation models

Building generative AI applications is challenging

Accessing multiple FMs and newer versions

Customizing FMs is complicated

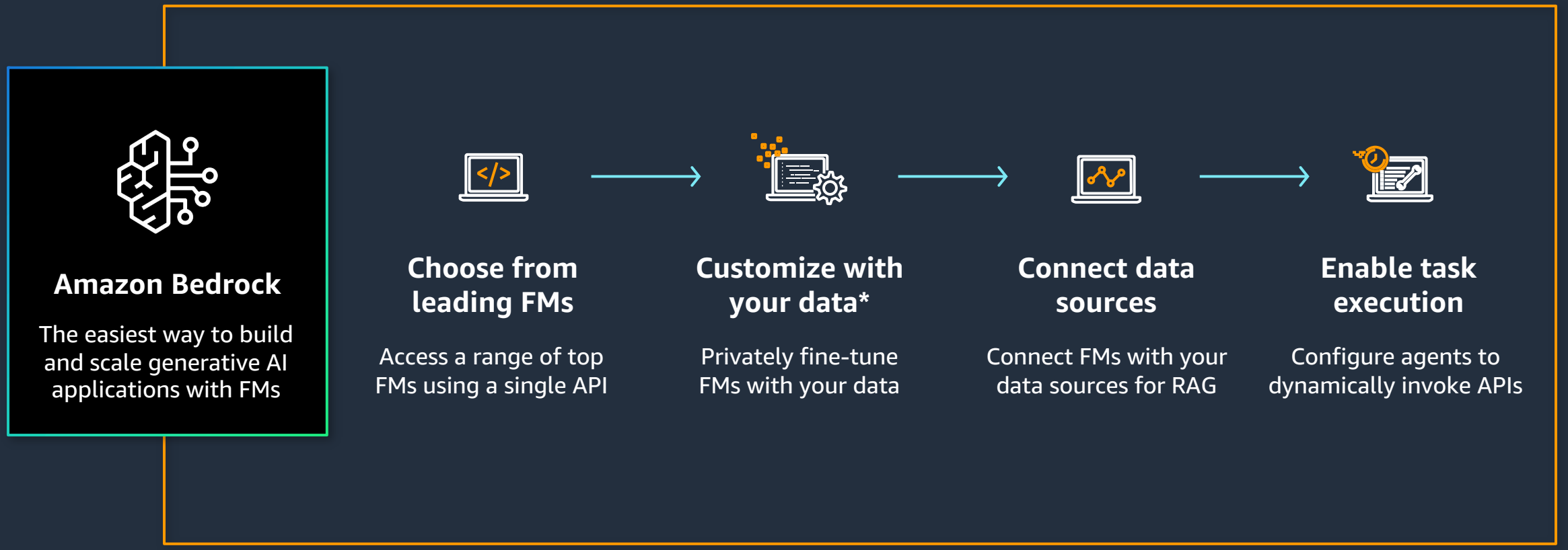
Maintaining data privacy and security

Getting FMs to execute tasks

Connecting to data sources

Managing infrastructure can be challenging

How it works



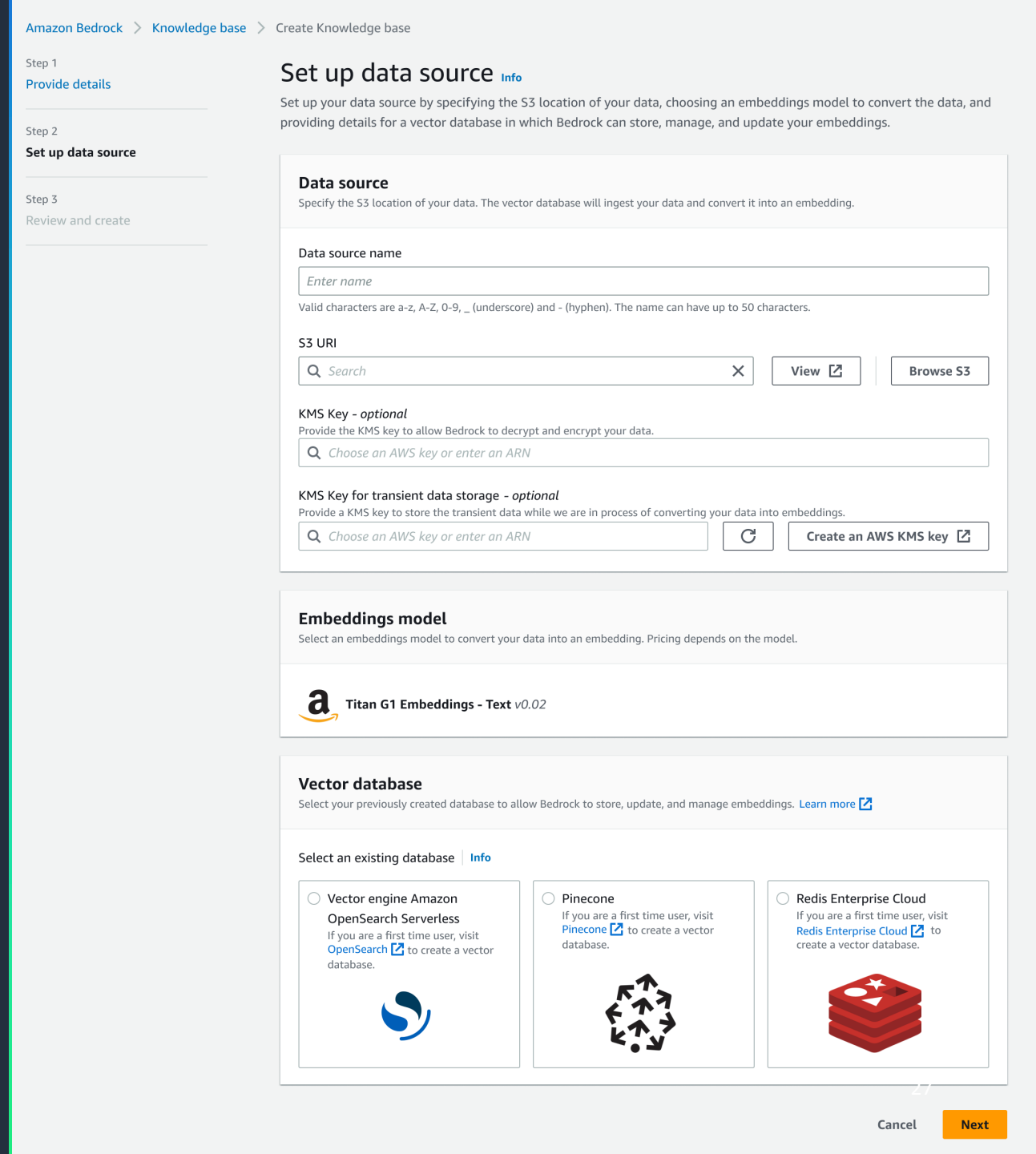
* Your data is not used for service improvements and is not shared with third-party model providers.

Knowledge base for retrieval augmented generation (RAG)

Connect FMs to data sources including vector engine for Amazon OpenSearch Serverless, Pinecone, and Redis Enterprise Cloud

Enable automatic data source detection

Provide citations



Amazon Bedrock supports leading foundation models

amazon

Amazon Titan

Text summarization, generation, classification, open-ended Q&A, information extraction, embeddings, and search

AI21labs

Jurassic-2

Multilingual LLMs for text generation in Spanish, French, German, Portuguese, Italian, and Dutch

ANTHROP\C

Claude 2

LLM for conversations, question answering, and workflow automation based on research into training honest and responsible AI systems

cohere

Command

Text-generation model for business applications and embeddings model for search, clustering, or classification in 100+ languages

Meta

Llama 2 *(coming soon)*

Fine-tuned models ideal for dialogue use cases and language tasks

stability.ai

Stable Diffusion

Generation of unique, realistic, high-quality images, art, logos, and designs

aws

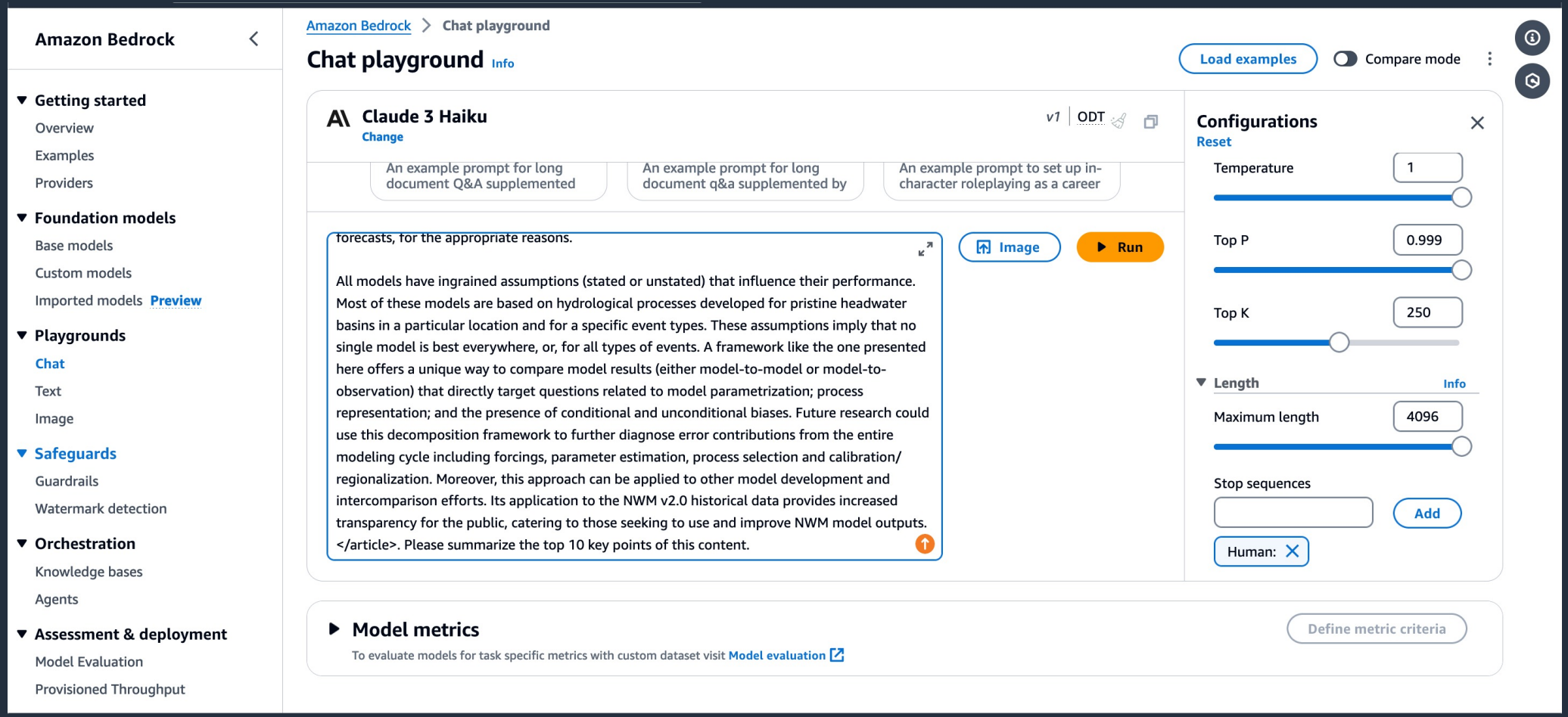
Security and privacy

Private connectivity between Amazon Bedrock and your Amazon Virtual Private Cloud (Amazon VPC)

Your data is encrypted in transit and at rest

Support for standards, including GDPR compliance and HIPAA eligibility

Bedrock Demo



Thank you!