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SNOWFLAKE FOR AI & ML

EASY TO USE. SECURE.

Nov 2023

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Generative AI

Machine Learning

Snowflake Copilot

Document AI

Universal Search

Snowflake Notebooks

Feature Store

Streamlit in Snowflake

Snowpark ML

Snowpark Model Registry

Snowpark Container Services

Snowflake Cortex

Snowflake Data

Security & Governance

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Snowflake for AI / ML: Platform Objectives

Democratize access to enterprise data and AI

Expand adoption beyond the AI experts. Capture value at scale with innovation that's a click or query away.

Alleviate operational burden, so you focus on development

Deliver custom applications faster by keeping data where it's secure and keeping developers focused on building.

Protect your data and models

Your data is your most valuable asset—and so are the models you fine-tune with it.

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Snowflake for AI / ML: Platform Overview

Use AI in everyday analytics within seconds

No AI expertise or integrations needed. Access via Snowsight using pre-built UIs or SQL / Python functions.

Build and deploy AI apps in as little as minutes

Accelerate delivery of innovation with scalable infrastructure and app stack primitives. Build apps in minutes or go fully custom in hours.

Keep data and models secure and governed

Robust foundation to safeguard your IP from unintended use with role-based access definitions on data, models and apps in Snowflake.

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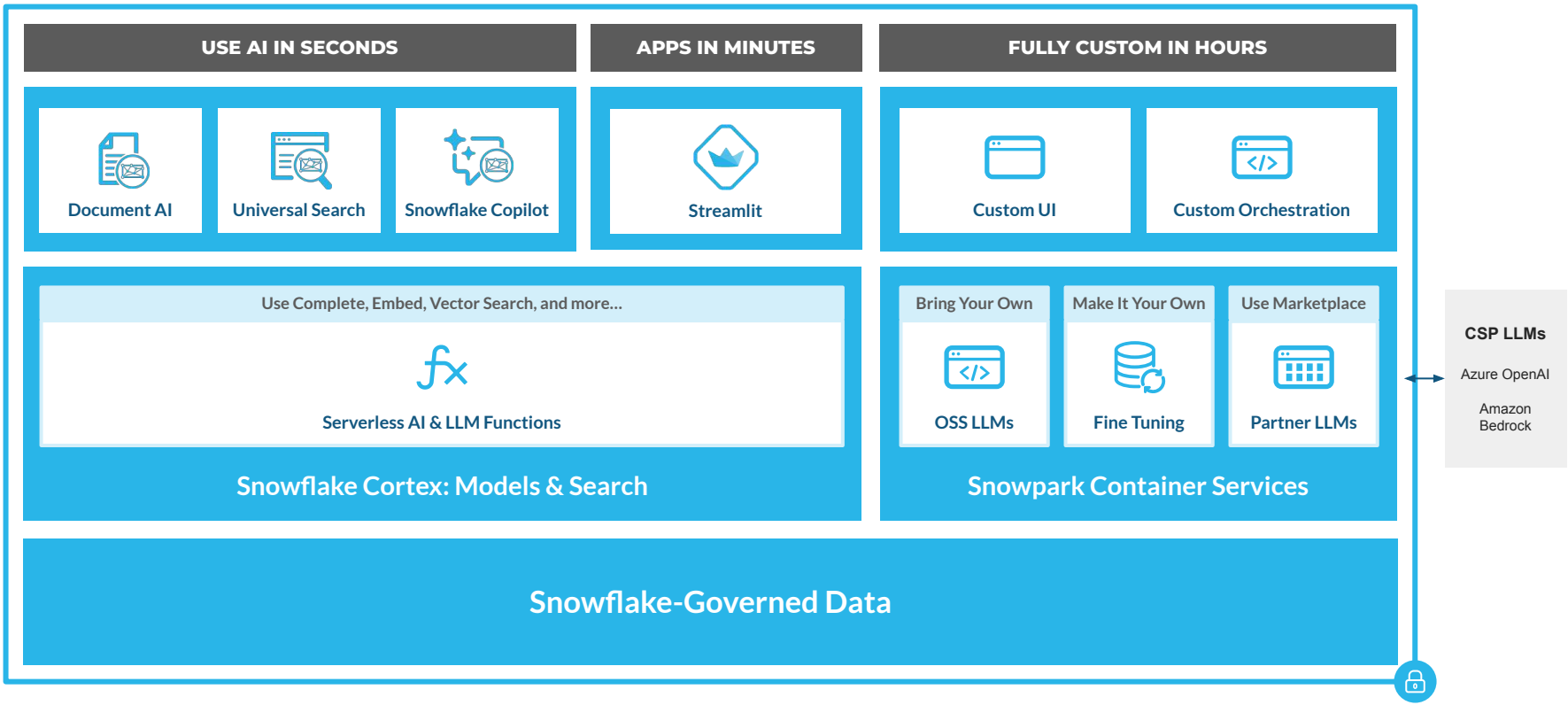
Snowflake for Gen AI & LLMs: Platform Overview



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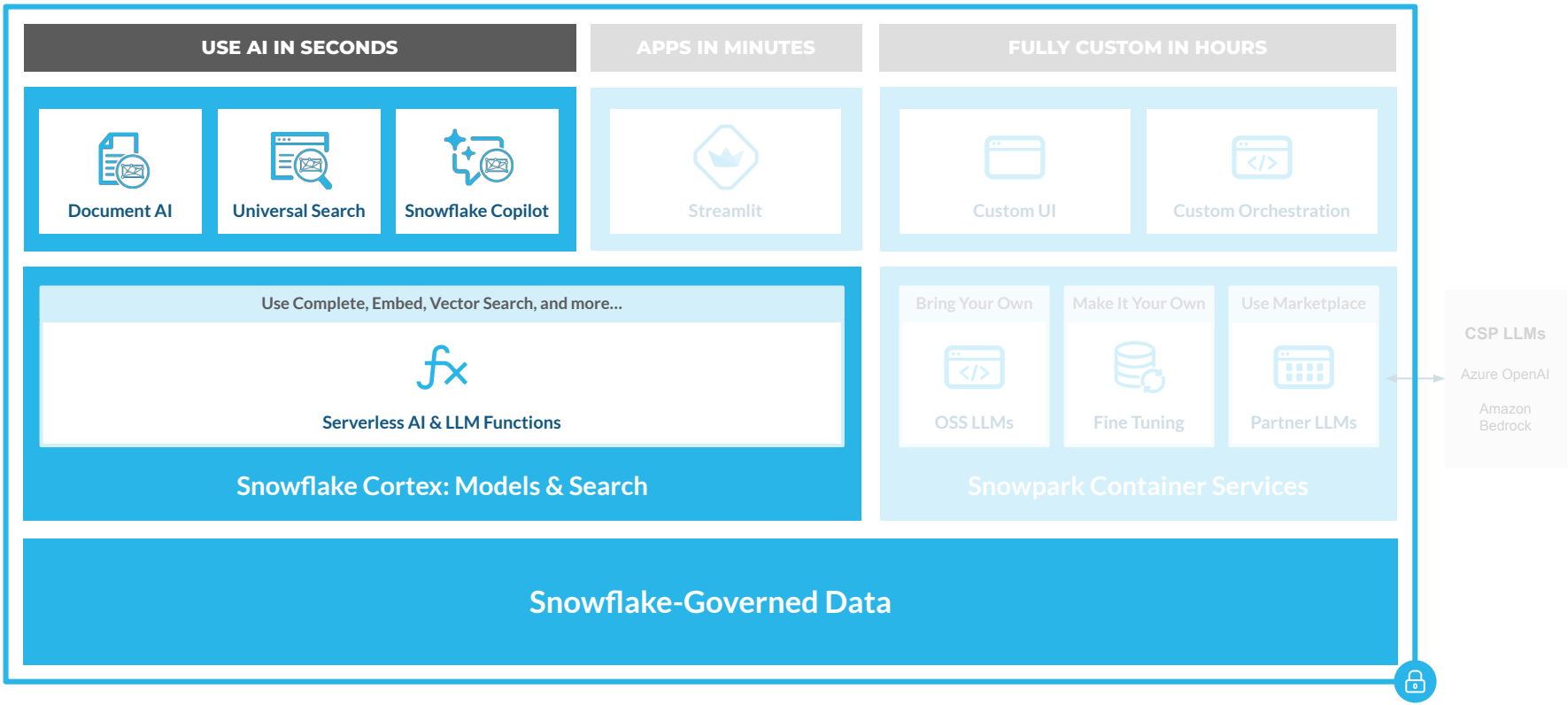
Snowflake for Gen AI & LLMs: Platform Details



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Snowflake Cortex

What Is It

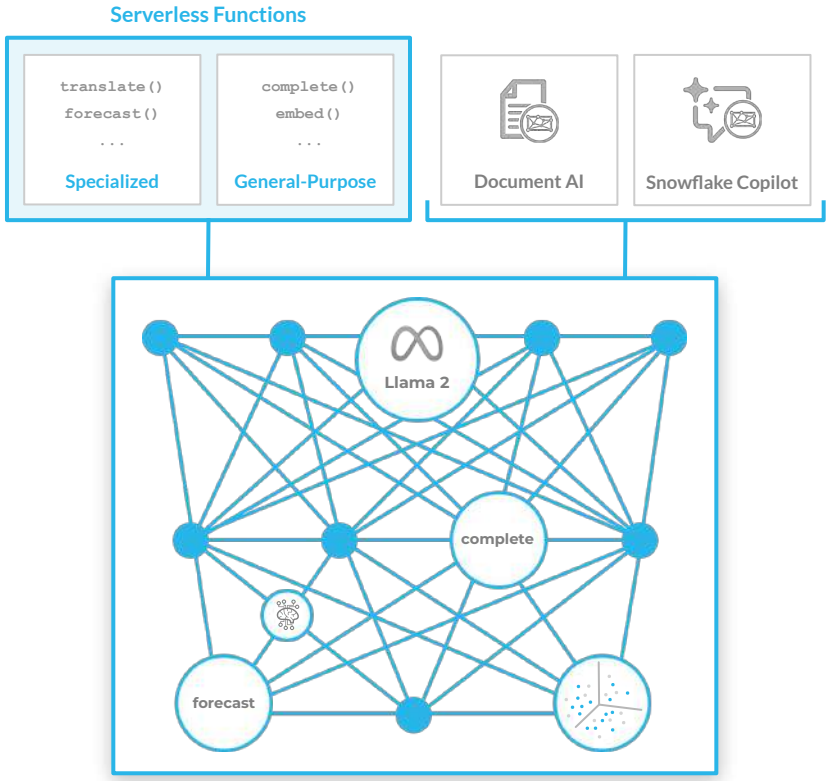
An intelligent, fully managed service that hosts and serves industry-leading AI models, LLMs and vector functions

Why Use It

Quickly and securely analyze your data and build AI applications contextualized with your enterprise data

How To Use It

Access the power of Snowflake Cortex via serverless SQL / Python functions or as part of LLM-powered experiences such as Document AI and Snowflake Copilot



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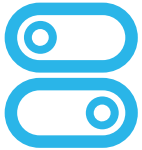
Snowflake Cortex

Puts LLMs and AI models in the hand of every user to get value securely from enterprise data

Easy To Use

Use AI in everyday analytics or build LLM applications without infrastructure management



Flexible

Access industry-leading AI models, LLMs and vector search functionality via SQL / Python functions

Cost Effective

Compute optimized for inference and search to run where your data is secure and governed

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Built On Snowflake Cortex

Document AI

Easily extract structured data from your PDFs documents

Snowflake Copilot

An LLM-powered coding assistant tailored to your data

Universal Search

Quickly search to discover everything in the Data Cloud

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Document AI

What Is It

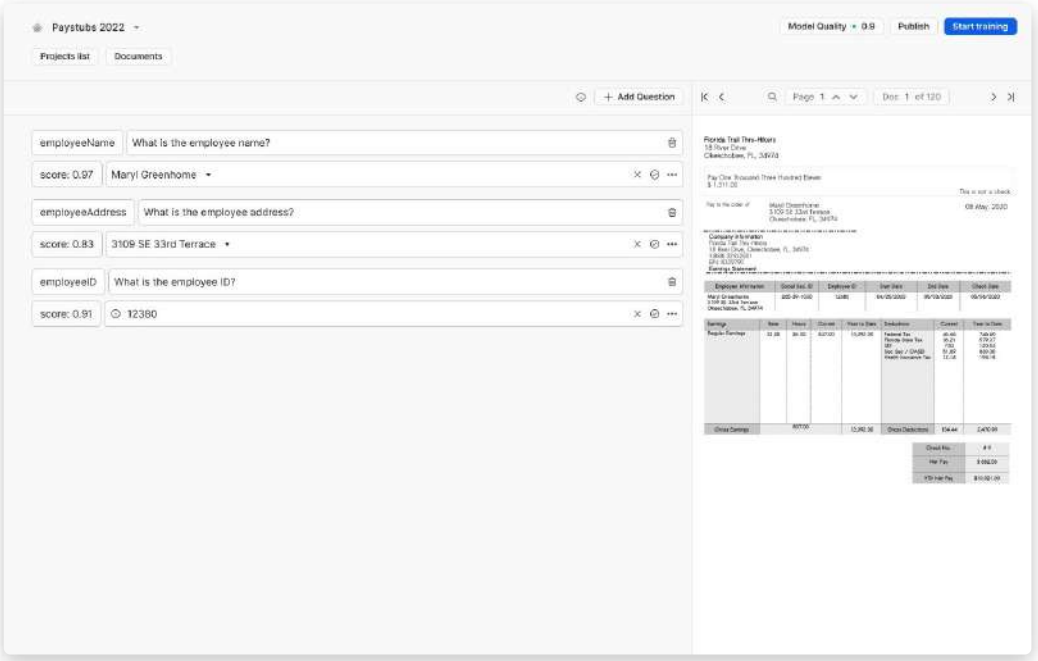
New workflow to easily extract content from PDF documents using a built-in LLM developed by Snowflake

Why Use It

Extract analytical value from documents without requiring AI expertise

How To Use It

Ask questions in natural language, automatically get answers, optionally fine-tune results, all in a no-code UI



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Universal Search

What Is It

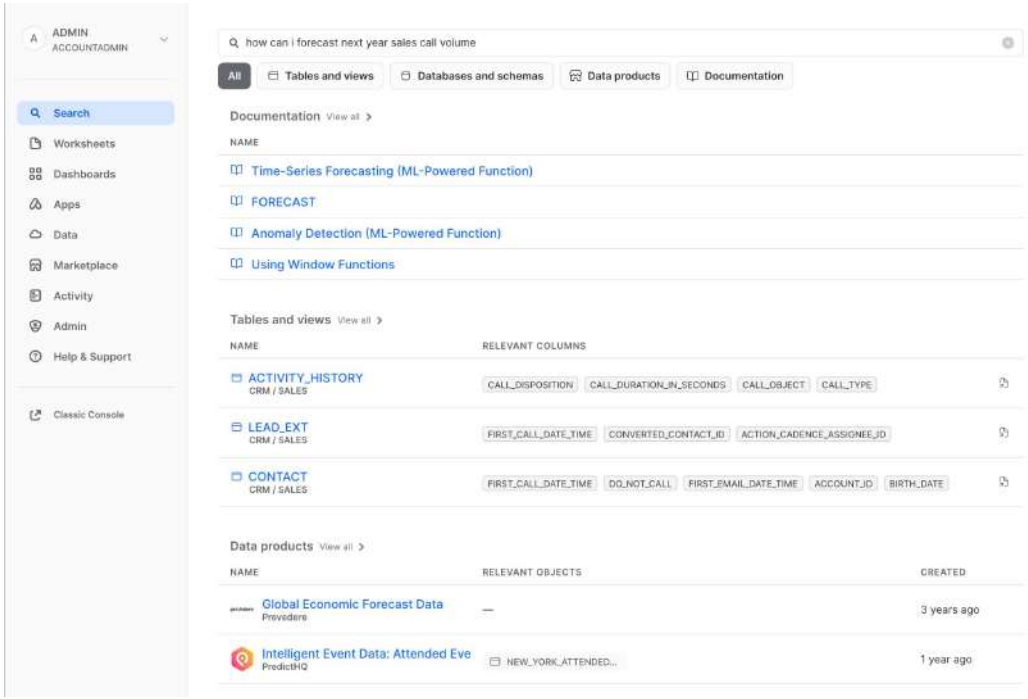
Search and discover tables, views, databases, schemas and available Marketplace listings

Why Use It

Find the data and apps you're looking for faster, across both your Snowflake account and the Marketplace, in one search

How To Use It

Available in the Snowsight UI, allowing you to search across your Snowflake objects



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Snowflake Copilot

What Is It

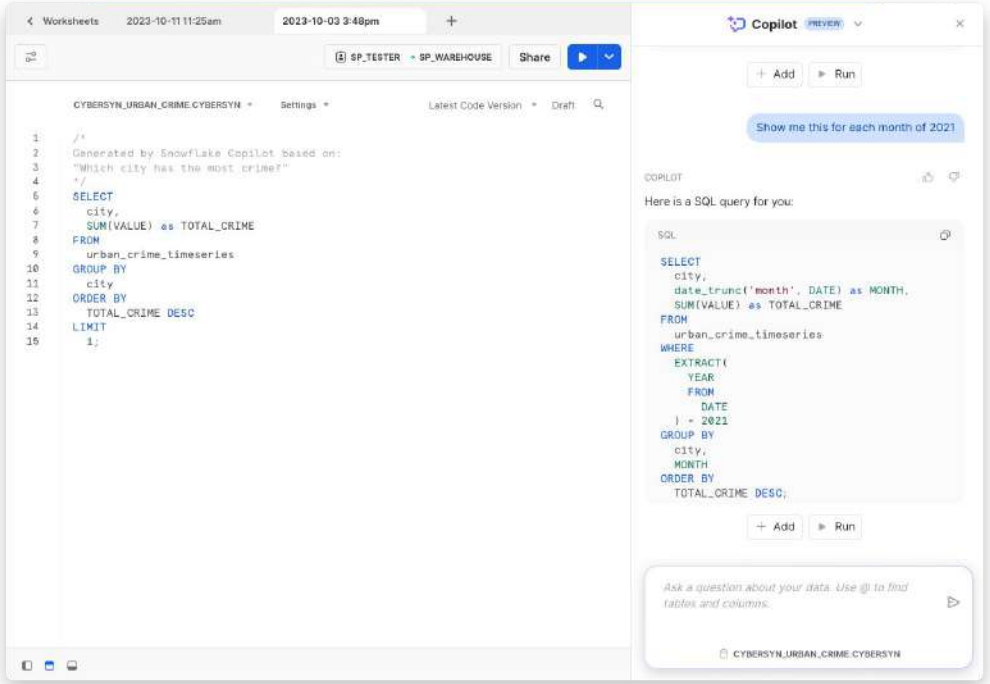
An LLM-powered assistant that brings the power of Generative AI to everyday Snowday coding tasks

Why Use It

Generates SQL from natural language, refines queries through conversation, improving user productivity

How To Use It

Available in the Snowsight UI, as a side panel where you can ask your questions in natural language



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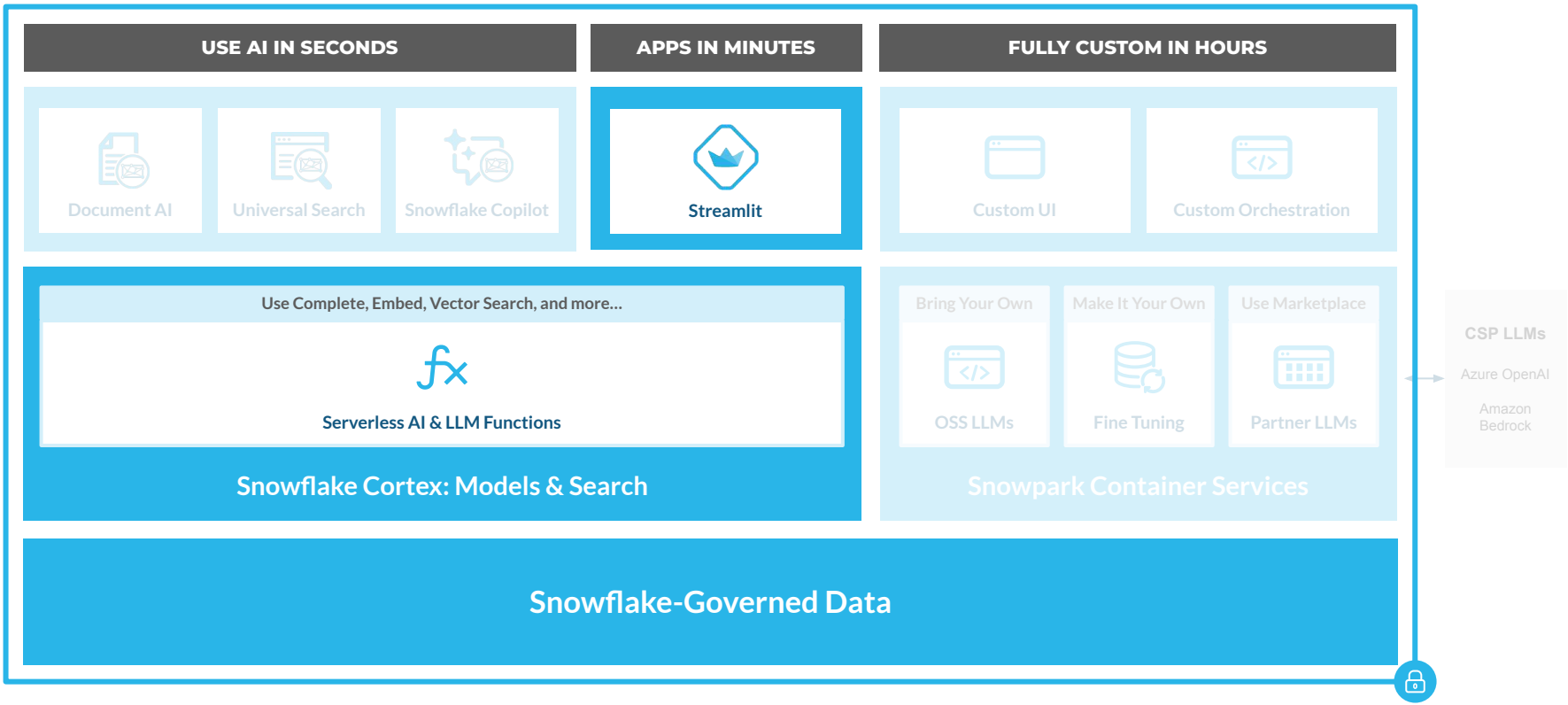
Snowflake for Gen AI & LLMs: Platform Details



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Snowflake Cortex: Specialized Functions

What Is It

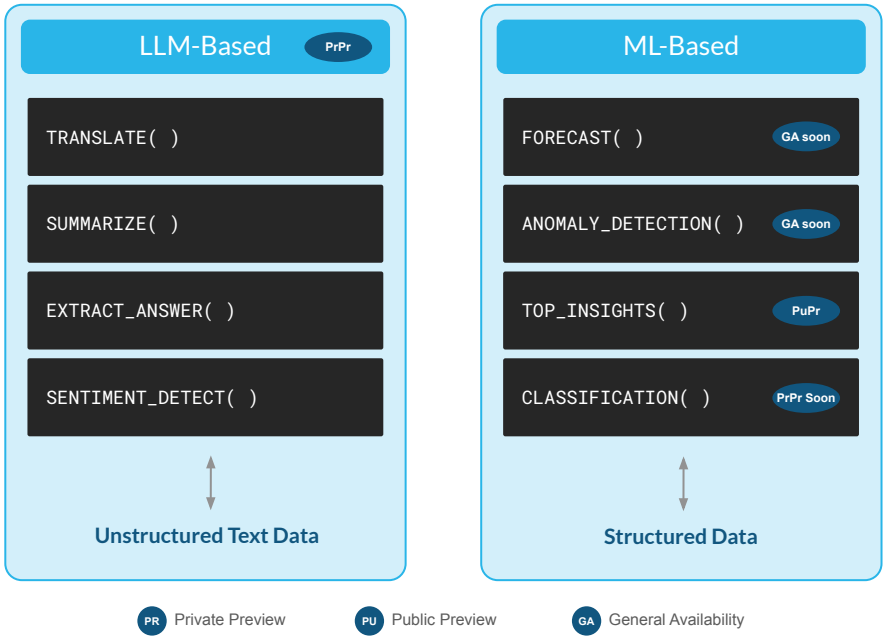
Serverless SQL / Python functions that are well-suited for unstructured text analysis and predictive analytics

Why Use It

Receive specific outputs from unstructured text data in a cost-effective way using smaller, task-tuned language models, or generate predictions and insights on your structured data

How To Use It

Use SQL / Python function in Snowsight or expose as a custom app via Streamlit



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Snowflake Cortex: General-Purpose Functions

What Is It

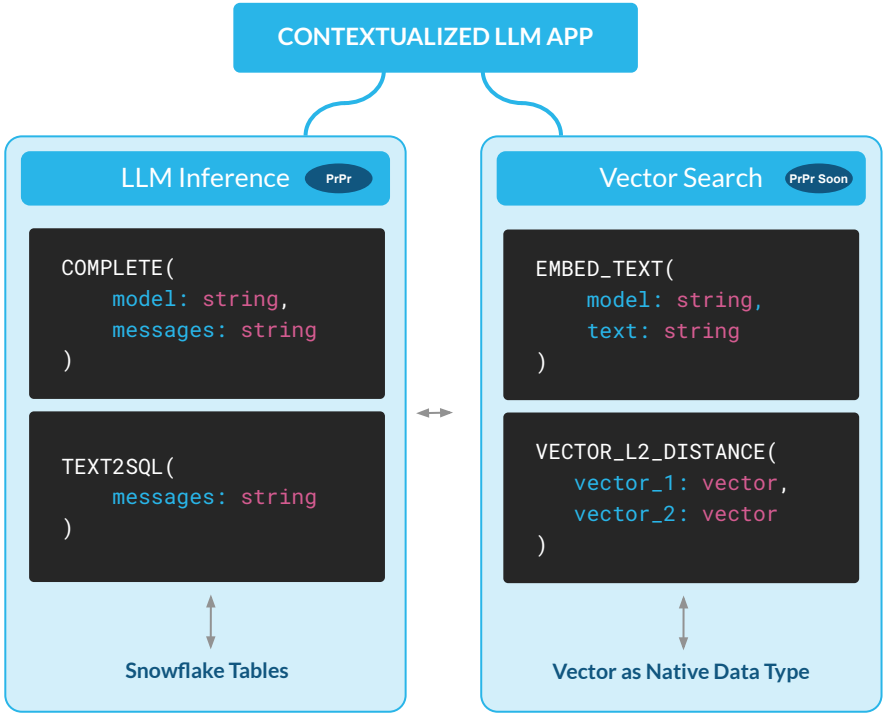
Serverless SQL / Python functions that run inference on conversational LLMs and execute vector search functionality

Why Use It

Quickly build contextually enriched applications using RAG by combining cutting-edge LLMs such as text2SQL and Llama 2 with vector embedding and similarity functions

How To Use It

Use SQL / Python function in Snowsight or expose as a custom app via Streamlit



PR Private Preview

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Root cause analysis, summarization, sentiment analysis

Accelerate development on natural language with Snowflake Native functions.

```
select "Review" , SNOWFLAKE.ML.SENTIMENT("Review")
from HOTEL_REVIEW.PUBLIC.HOTEL_REVIEWS
where "Language" = 'en'
limit 10
```

Review	SNOWFLAKE.ML.SENTIMENT("REVIEW")
Nice place. The stay was one night but everything was in good order, no issues. The room was nice and clean and the breakfast buffet was plentiful. Would recommend for couples on short stays. They also have free shuttle to Nana Sky Train.	0.8333

```
prompt = \
"""###
Summarize this transcript in less than 200 words.
Put the product name, defect and summary in JSON format.
###
"""
sql = f"select snowflake.ml.complete('llama2-70b-chat', \
(select concat('[INST]','{prompt}',transcript,'[/INST]') from call_transcripts \
where language = 'English' limit 1)) as response"
summary = session.sql(sql).to_pandas()
st.write(summary)
st.json(summary.iloc[0][0])
```

```
{
  "product" : "XtremeX helmets"
  "defect" : "broken buckles"
  "summary" :
  "Mountain Ski Adventures received a batch of XtremeX helmets with broken
  buckles. The agent apologized and offered a replacement or refund. The
  customer preferred a replacement, and the agent expedited a new shipment of
  ten helmets with functioning buckles to arrive within 3-5 business days."
}
```

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Streamlit in Snowflake

What Is It

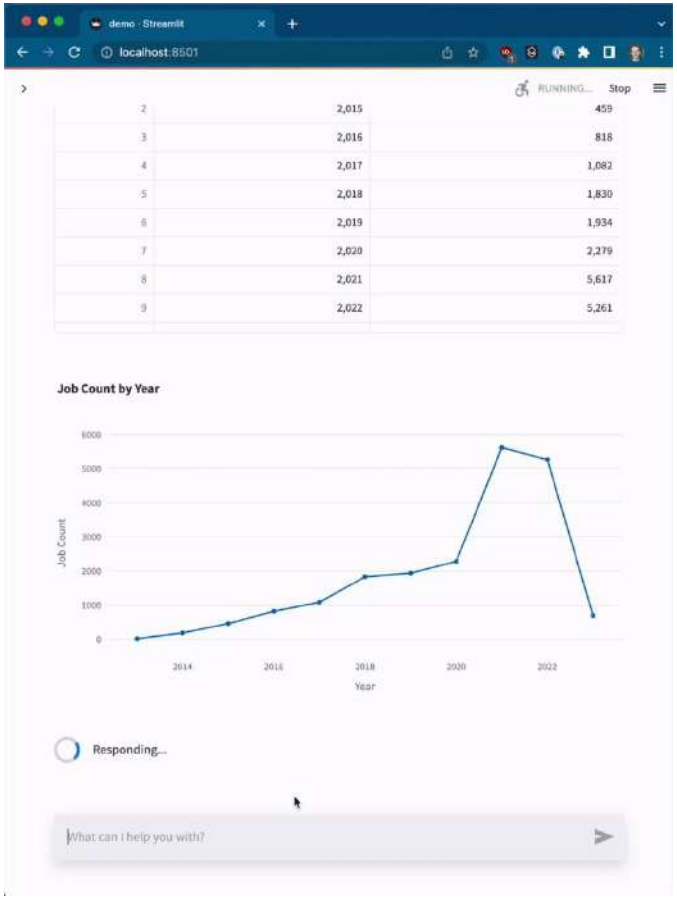
OSS Python library for app development, natively integrated in Snowflake for scalable, reliable and secure deployment

Why Use It

Turn data and AI / ML models into interactive applications that empower stakeholders to self-serve insights and gain trust in results

How To Use It

Use side-by-side code editor and preview pane to add and remove components, then share app URL with coworkers in one click



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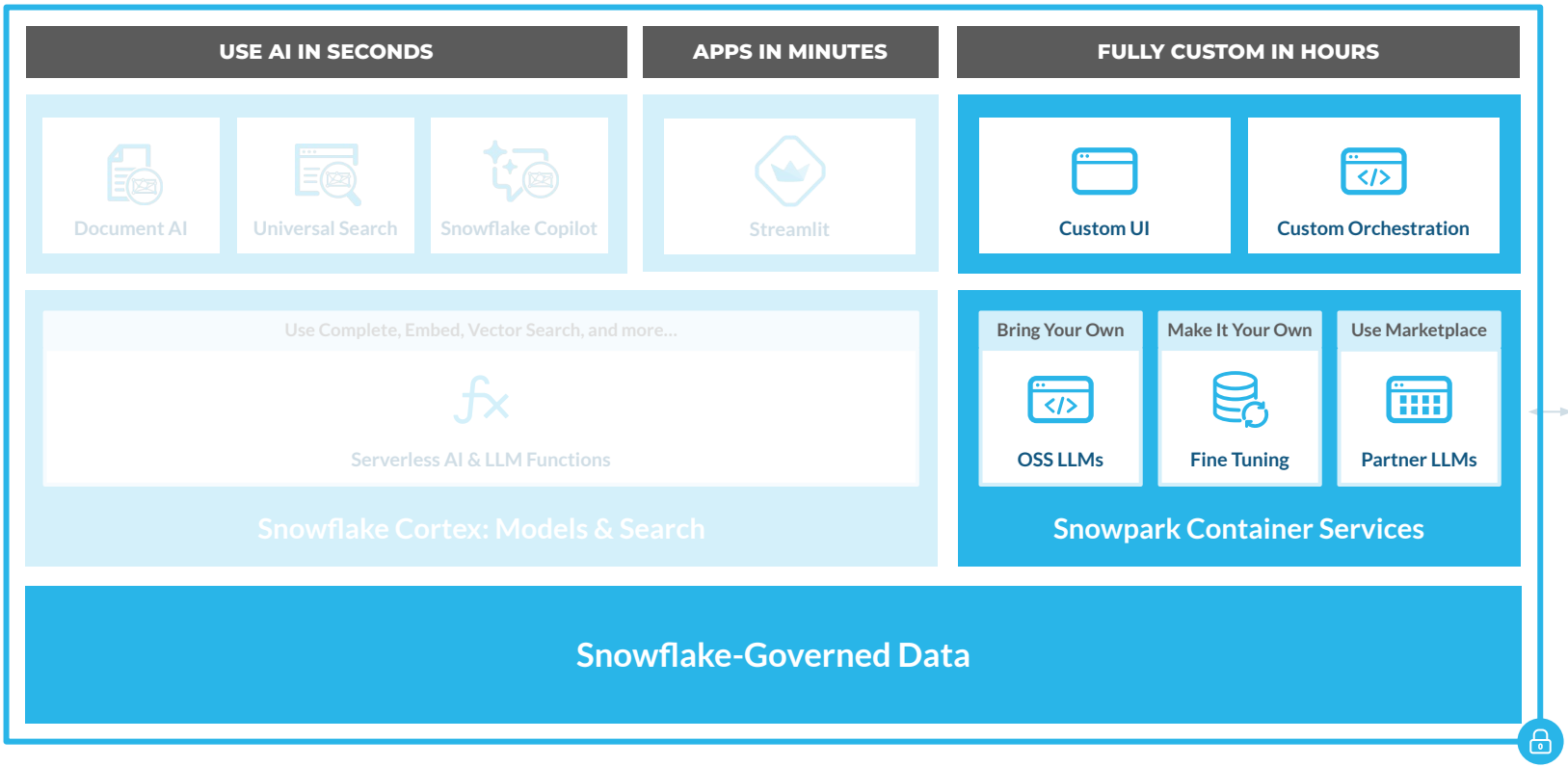
Snowflake for Gen AI & LLMs: Platform Details



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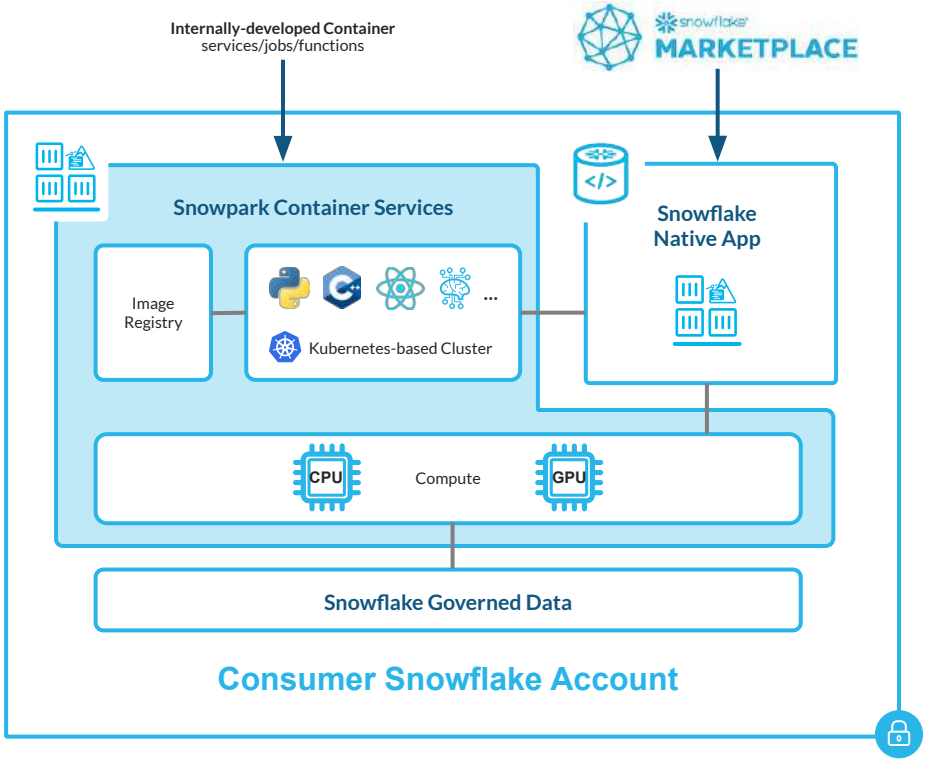
Snowpark Container Services

What is it

Additional Snowpark runtime that helps developers register and deploy container images in Snowflake

Why use it

- **Language & hardware flexibility:** Build in any programming language, package as a container image and deploy in configurable CPUs & GPUs
- **Unified services experience:** Effortlessly deploy with integrated image registry, elastic compute infrastructure and managed Kubernetes-based cluster
- **Bring sophisticated apps to the data:** Run entire containerized applications from third-party developers in your account as Snowflake Native Apps via Snowflake Marketplace



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What are the use cases ?

Data Exploration	Text to SQL, universal search, business chatbot
Customer Experience & Marketing	Customer / sales assistant chatbot, basket recommendation, sentiment analysis, identity reconciliation online news scrapping Targeting, Segmentation, Content creation
Operational Efficiency	Description generation / translation, support tickets classification, Automatic RFP response
Unstructured data extraction & Search engine / Smart EDM	Internal search engine for all documents (pdf, mail, docx, html, png, jpeg, etc.) Quality incident detection, business process monitoring, legal & regulatory compliance , product information retrieval
Risk mitigation	Anomaly detection, Fraud, bot detection , transaction anomaly

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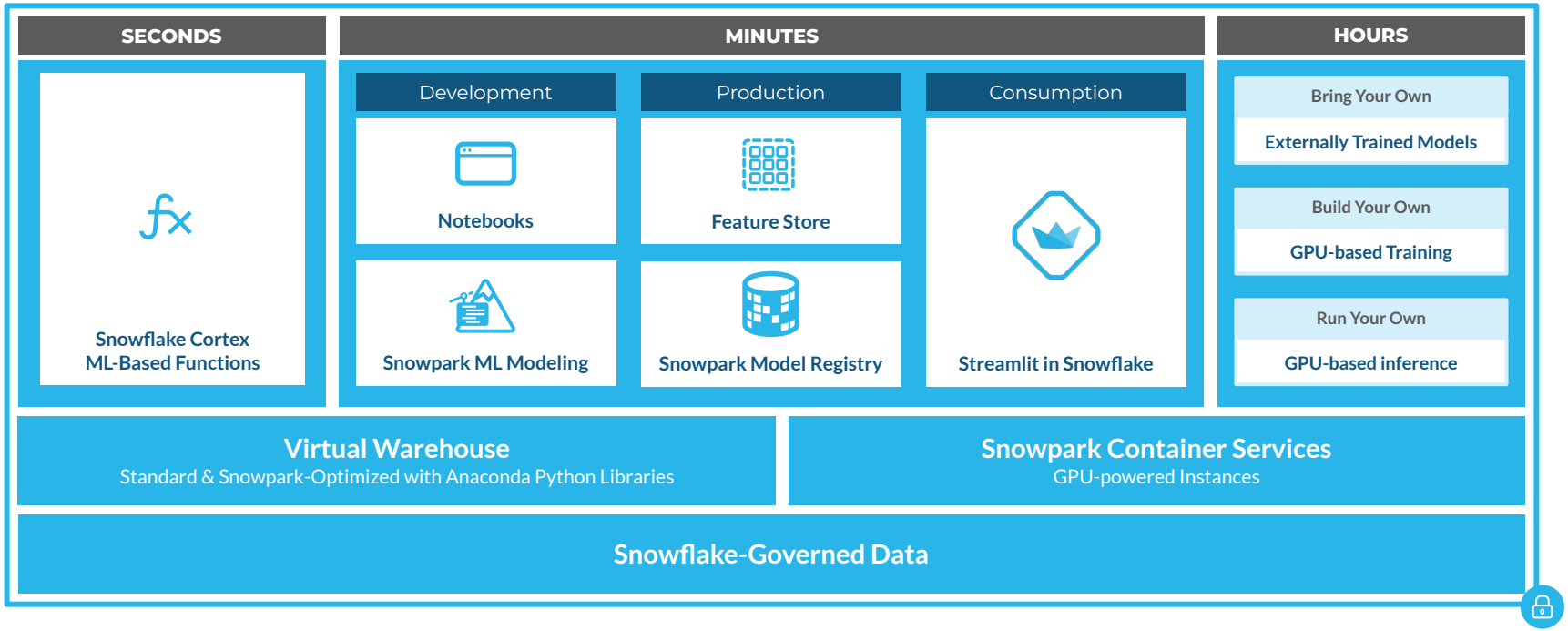
Snowflake for Machine Learning

Securely and collaboratively build and deploy features, models and apps



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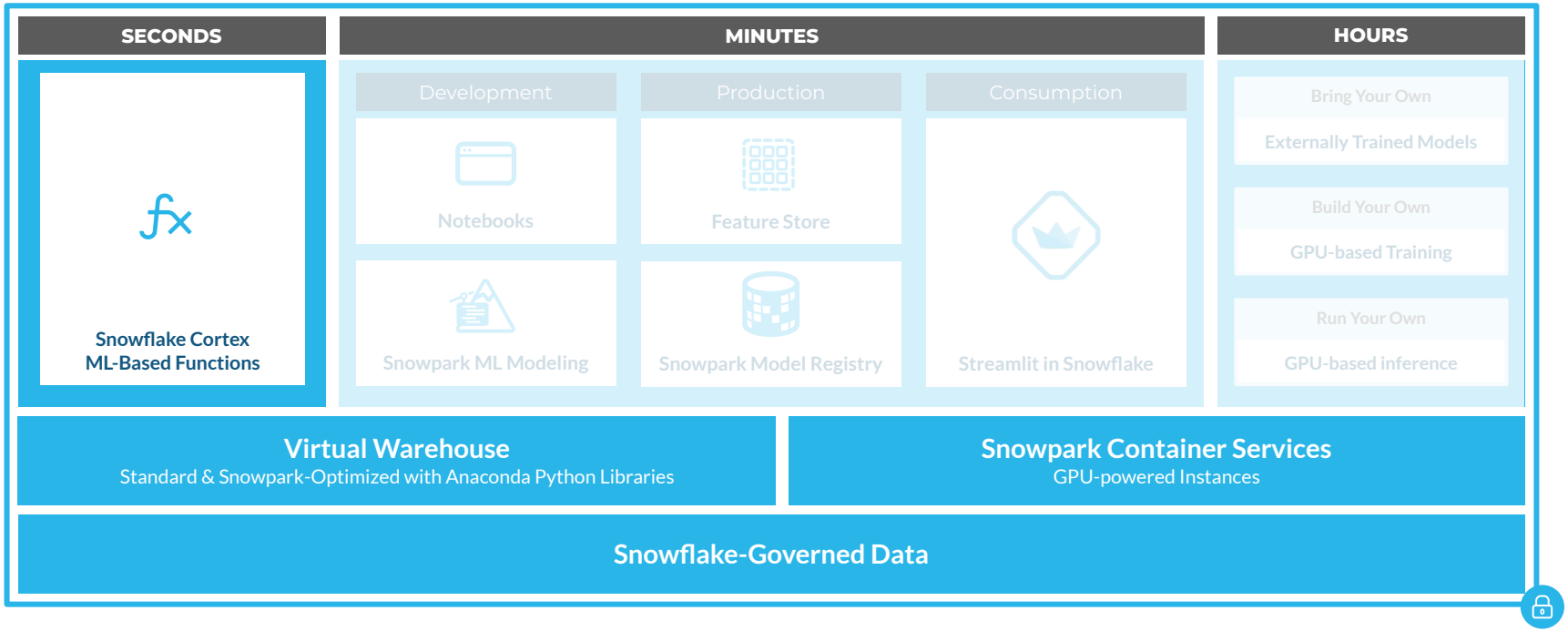
Snowflake for Machine Learning

Securely and collaboratively build and deploy features, models and apps



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SNOWFLAKE CORTEX: ML-BASED FUNCTIONS

ML accessible via SQL

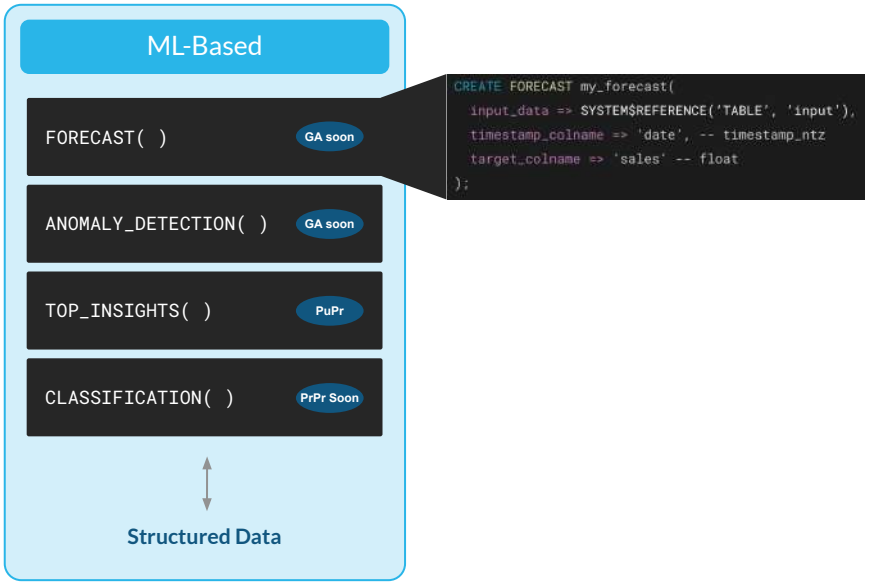
Abstract complexity of ML frameworks and algorithms for forecasting, anomaly detection & more with SQL functions

No complex infrastructure

Scale from one to millions of ML-powered insights with the elasticity and near-zero operations of Snowflake's virtual warehouse compute

Quick insights delivery

Share insights in analytics / BI tools integrated with Snowflake's consistent data governance across model inputs and outputs



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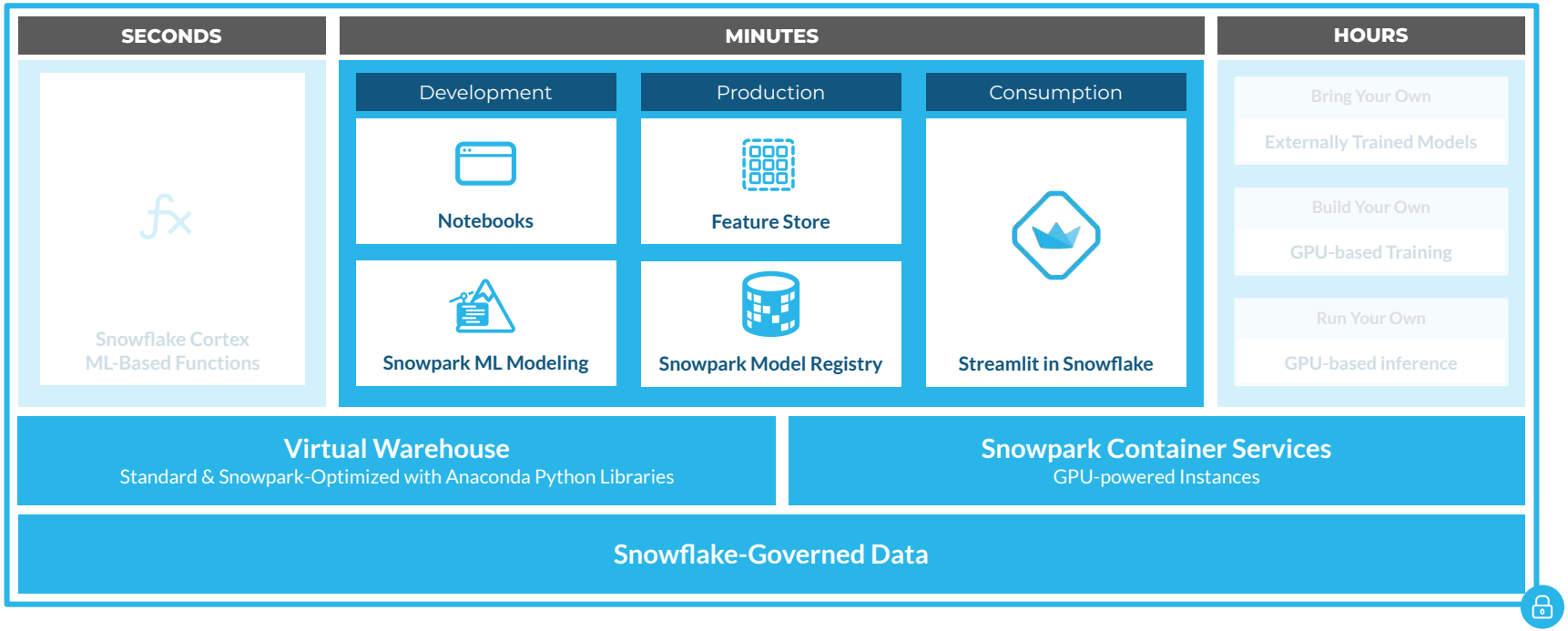

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Snowflake Notebooks

What Is It

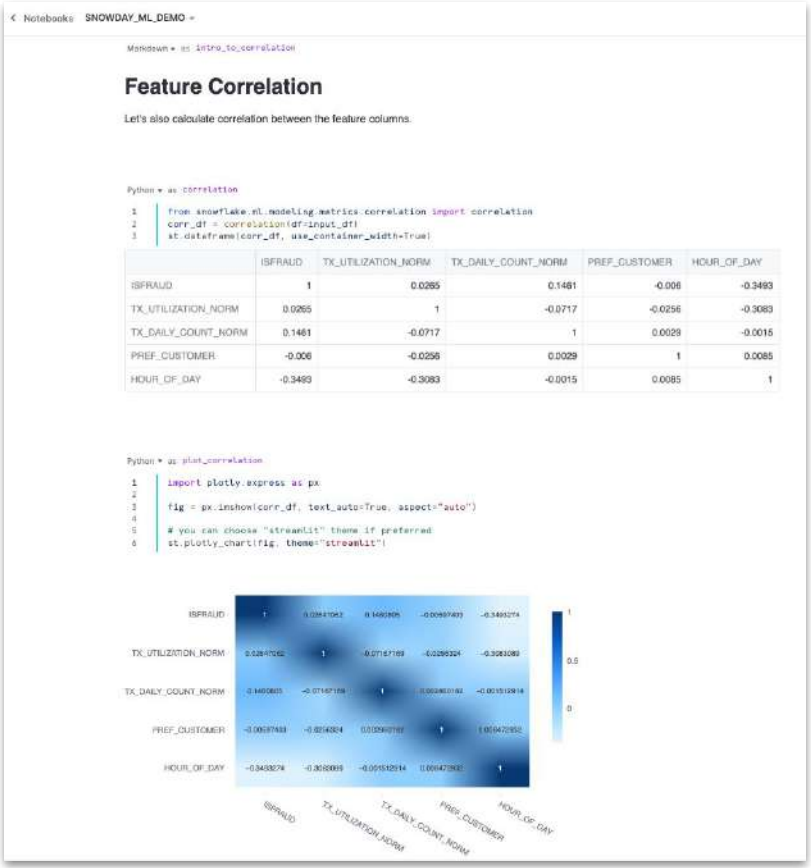
SQL, Python, and Markdown cell-based development interface in Snowsight

Why Use It

Quickly explore data with language of choice and visualize results using popular Python libraries. Leverage role-based controls to securely share work with others.

How To Use It

Create, edit and share your analyses and models in Snowsight



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SOON

Snowpark ML Modeling API

What Is It

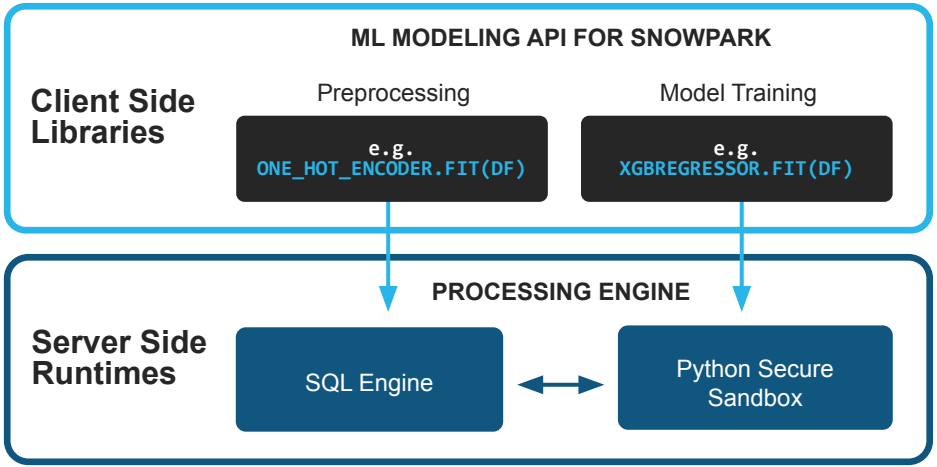
Popular frameworks for feature engineering and ML training directly in Snowpark

Why Use It

- **Preprocessing:** Improve performance and scalability with distributed execution for common scikit-learn preprocessing functions
- **Model Training:** Simplify model training for scikit-learn and xgboost models

How To Use It

Use in Snowflake Notebooks (PrPr) or work from your tool of choice by installing the Snowpark ML library from the Snowflake Conda Channel or PyPI



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Snowpark Model Registry

What Is It

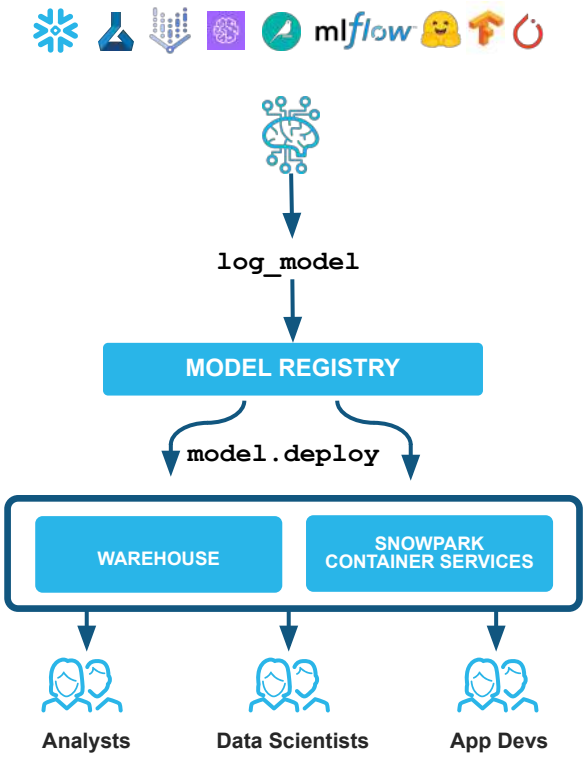
Integrated solution to manage and deploy models and their metadata natively in Snowflake

Why Use It

Scalable and secure deployment, management, and inference of ML models in Snowflake compute, including warehouses and Snowpark Container Services

How To Use It

Use in Snowflake Notebooks (PrPr) or work from your tool of choice by installing the Snowpark ML library from the Snowflake Conda Channel or PyPI



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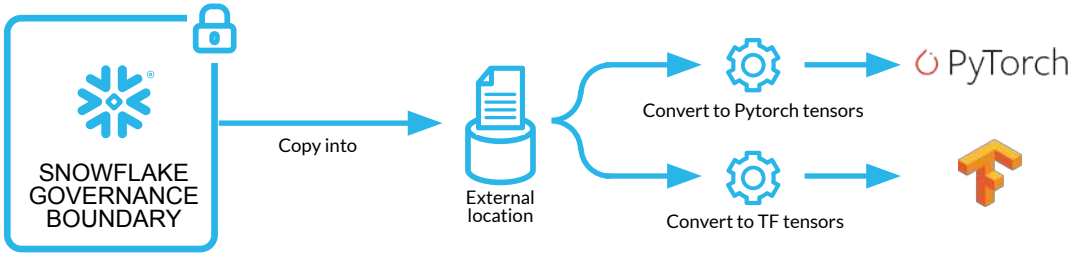
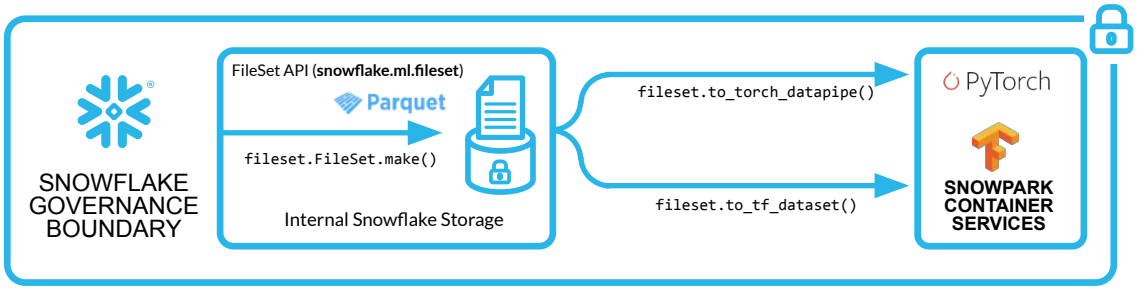
Snowpark ML FileSet



- ✗ Unmanaged data egress
- ✗ Additional post-processing needed
- ✗ Need external compute for GPU training/inference



- ✓ Full governance over extracted data
- ✓ No post-processing needed
- ✓ Train/deploy Pytorch/TF models on Snowpark Container Services w/GPUs.

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Snowflake Feature Store

What Is It

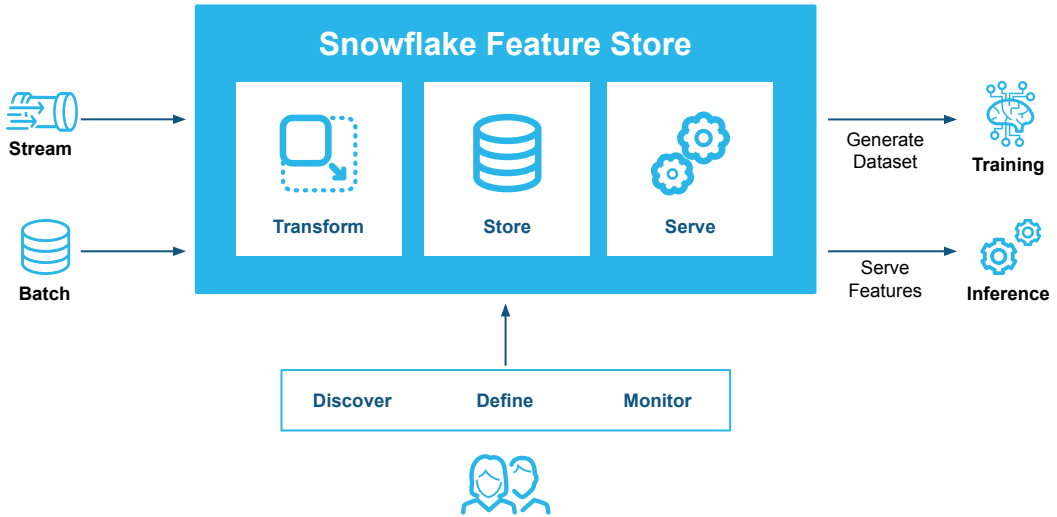
Integrated solution to create, store, manage, and serve ML features for model training and inference in Snowflake

Why Use It

Maintains a single source of truth and automates feature updates continuously for consistent downstream pipelines

How To Use It

Python APIs accessible via Snowpark ML library, and SQL interfaces for defining, managing and retrieving features



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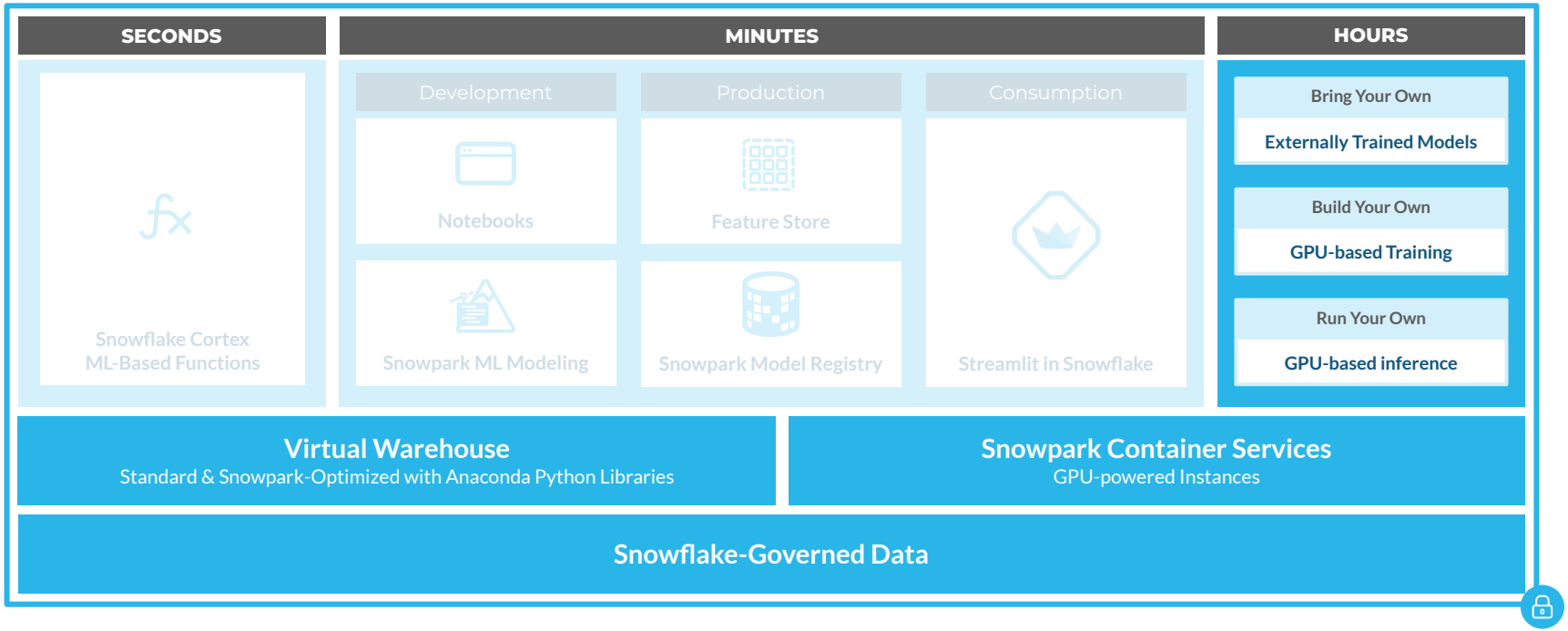
Snowflake for Machine Learning

Securely and collaboratively build and deploy features, models and apps



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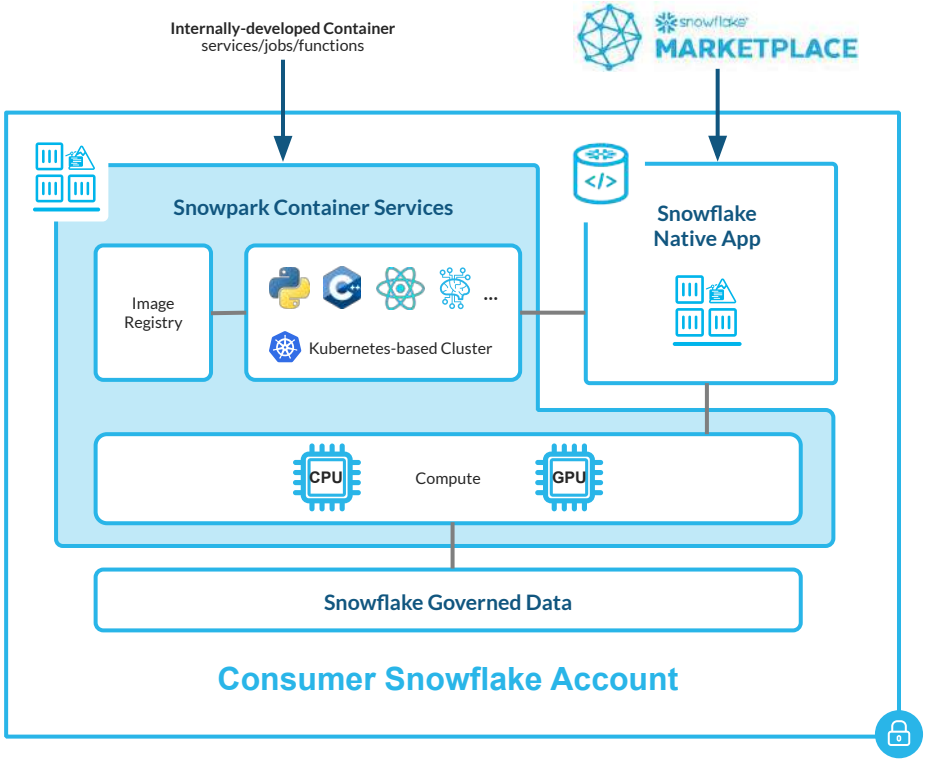
Snowpark Container Services

What is it

Additional Snowpark runtime that helps developers register and deploy container images in Snowflake

Why use it

- **Language & hardware flexibility:** Build in any programming language, package as a container image and deploy in configurable CPUs & GPUs
- **Unified services experience:** Effortlessly deploy with integrated image registry, elastic compute infrastructure and managed Kubernetes-based cluster
- **Bring sophisticated apps to the data:** Run entire containerized applications from third-party developers in your account as Snowflake Native Apps via Snowflake Marketplace



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Workloads Supported

AI/ML WORKLOADS

Train and execute inference for large scale models using GPUs with any language including Python and R

LLMs

Run open source LLMs, and third-party LLMs tuned to your data.

OPTIMIZED PROCESSING

Run C/C++ workloads and web APIs that process large amounts of data

APPLICATIONS

Run any component of an app from APIs to UIs

& more

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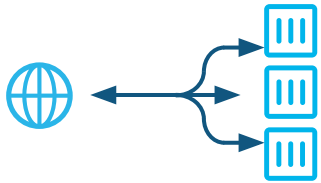
Usage Options

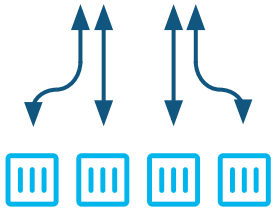
SERVICES

```
CREATE SERVICE
my_service
```



SERVICE FUNCTIONS

```
SELECT
Inference (pdf)
FROM calls
```



JOBS

```
EXECUTE SERVICE
training_on_gpu
compute_pool=gpu
```

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Creating Services, Jobs, and Service Functions with Snowpark Container Services

```
CREATE COMPUTE POOL my_cpl
      MIN_NODES = 1
      MAX_NODES = 3
      INSTANCE_FAMILY = GPU

CREATE SERVICE [ IF NOT EXISTS ] inference point
      MIN_INSTANCES = 1
      MAX_INSTANCES = 3
      COMPUTE_POOL = my_cpl
      SPEC = @my_service_stage/path/to/inference_point.yaml
```

Define compute pool size and instance type

Choose and define execution as service, function or job

Point to spec file with service definition

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