



The Single Product Approach

Supporting Diverse Workloads in Snowflake

Jiaqi Yan, Principal Software Engineer

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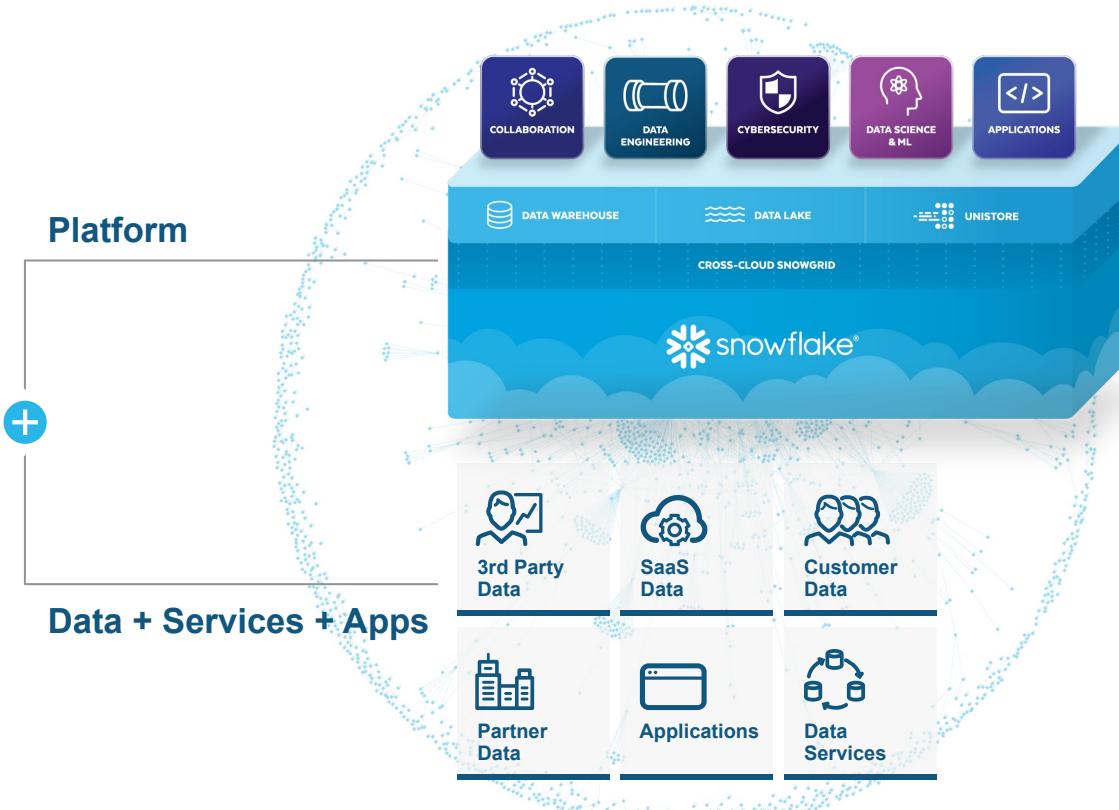


Agenda

- > Snowflake Overview
- > The Single Product Principle
- > Workload Deep Dives
- > Conclusion



Elements of the Data Cloud



The Single Product Principle

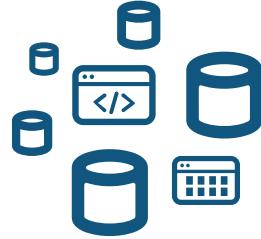
- Build a singular product, instead of multiple products
- Consistent User Interfaces and User Experience across product features
- Consistent Concepts and Syntaxes
- Consistent Globally, across all Clouds
- Unified Billing Model and Business Model
- Unified Data Governance and Security Model



Data Applications



For Enterprise Architects, Platform Teams and App Developers Challenged by



Too many
disparate systems



Slow and painful
data movement



Delayed access to data
stunting innovation

Unistore

A modern approach to working with transactional and analytical data together in a single platform



Single Dataset



**Transactional
Workloads**



All in Snowflake



Hybrid Tables

New, Easy-to-Use Feature

```
CREATE HYBRID TABLE CustomerTable(  
    customer_id int primary key,  
    full_name varchar(256),  
    ...  
)
```

Excellent performance for both operational and analytical queries

Supports critical OLTP features including unique keys, indexes, & referential integrity constraints

Integrates seamlessly with existing Snowflake tables

It just works! Simple to use, while masking powerful functionality



SNOWFLAKE ARCHITECTURE

Cloud Services

Authentication and Access Control



Infrastructure Manager



Optimizer

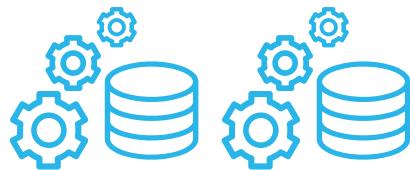


Security

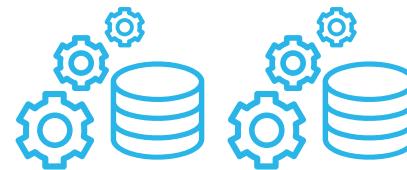


Metadata Manager

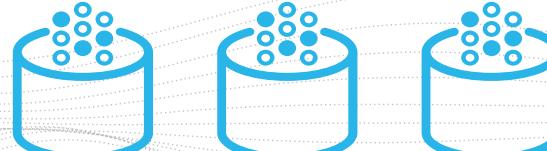
Query Processing



Virtual Warehouses



Columnar Storage



UNISTORE ARCHITECTURE

Cloud Services

Authentication and Access Control



Infrastructure Manager



Optimizer

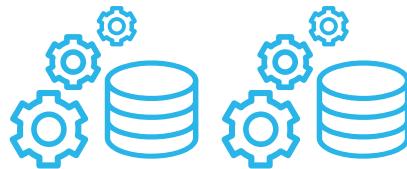


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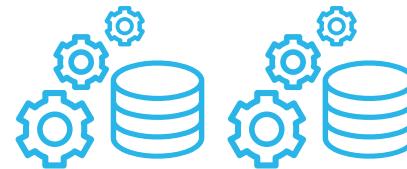


Metadata Manager

Query Processing



Virtual Warehouses



Row Storage



UNISTORE ARCHITECTURE

Cloud Services

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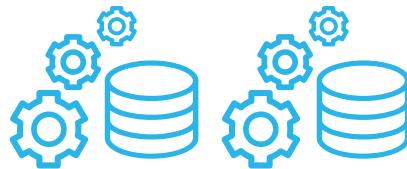


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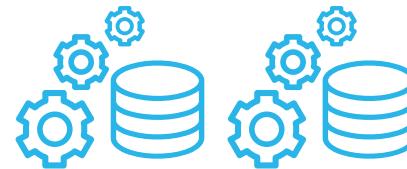


Metadata Manager

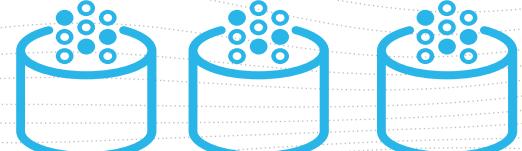
Query Processing



Virtual Warehouses



Row Storage



Columnar Storage



SINGLE PLATFORM

Change what's possible: transactional and analytical data together in one place



Transactional
Workloads



Analytics on
Transactional Data



All in Snowflake



 snowflake®



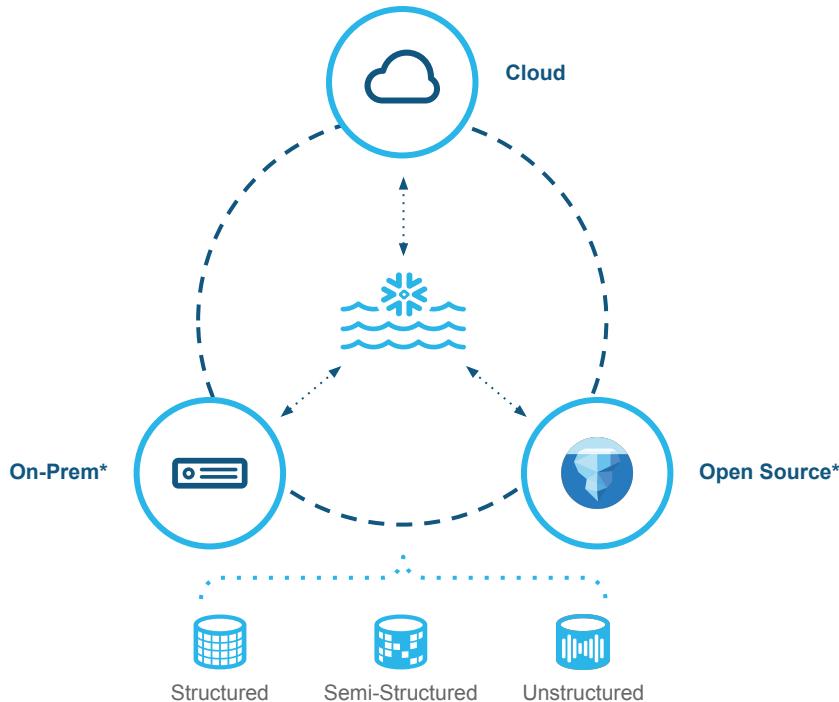
UNISTORE

Powered by a single dataset

Data Lake



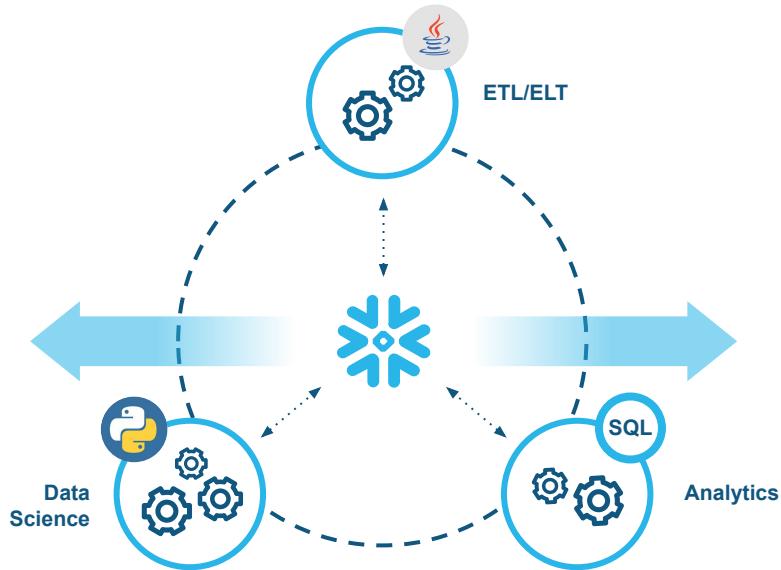
Seamlessly Bring Data Together in One Place



- > Un-siloed Access to Data**
Bring together unstructured, semi-structured, and structured data and scale on demand to near-infinite data volumes.
- > Easily Manage Data at Scale**
Automate micro-partitioning, clustering, compression, time travel, and encryption to ensure fast and efficient at any scale.
- > Flexibility & interoperability**
Adapt to changing architectural patterns, including data mesh, and seamlessly connect with data on-premises or in open table formats.



Fast Processing Engine with No Operational Overhead



> Scalable Compute

Support a virtually unlimited number of concurrent users and queries with near-unlimited, dedicated compute resources.

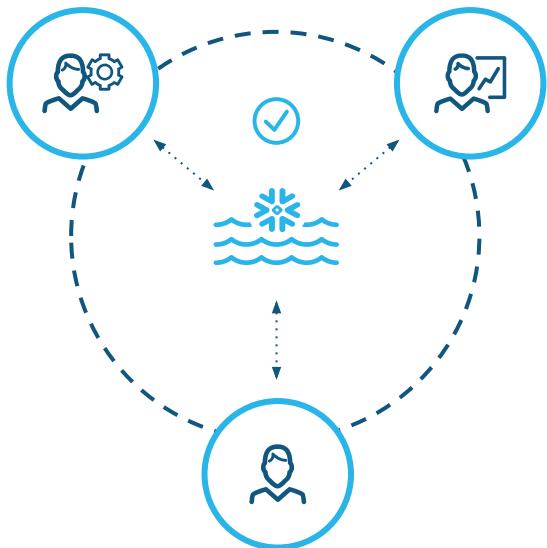
> Reliable Pipelines

Run pipelines with Snowflake's elastic processing engine for reliable performance, cost savings, and near-zero maintenance

> Language of Choice

Streamline pipeline development using SQL or customer's language of choice with Snowpark—no additional clusters, services, or copies of data to manage.

Easily Govern All Data and Enable Secure Collaboration



- > Scale Governance Efforts**
With flexible role-based policies, enforce row and column-level security dynamically, eliminating the need to manage multiple versions of the same data.
- > Confidently Protect Sensitive Data**
Track sensitive data for compliance with Object Tagging and Access History. Protect sensitive data with Dynamic Data Masking.
- > Enrich Your Data Lake**
Enable collaboration among internal and external stakeholders, and even enrich your data lake, with live, secure data sharing.

Data File Formats



Storage formats store data, in files somewhere, in a specific way.

Pros

- Easy to read and write
- Compressed for optimized storage cost
- Use with any tools & clouds
- Describes what is in the file (not CSV)

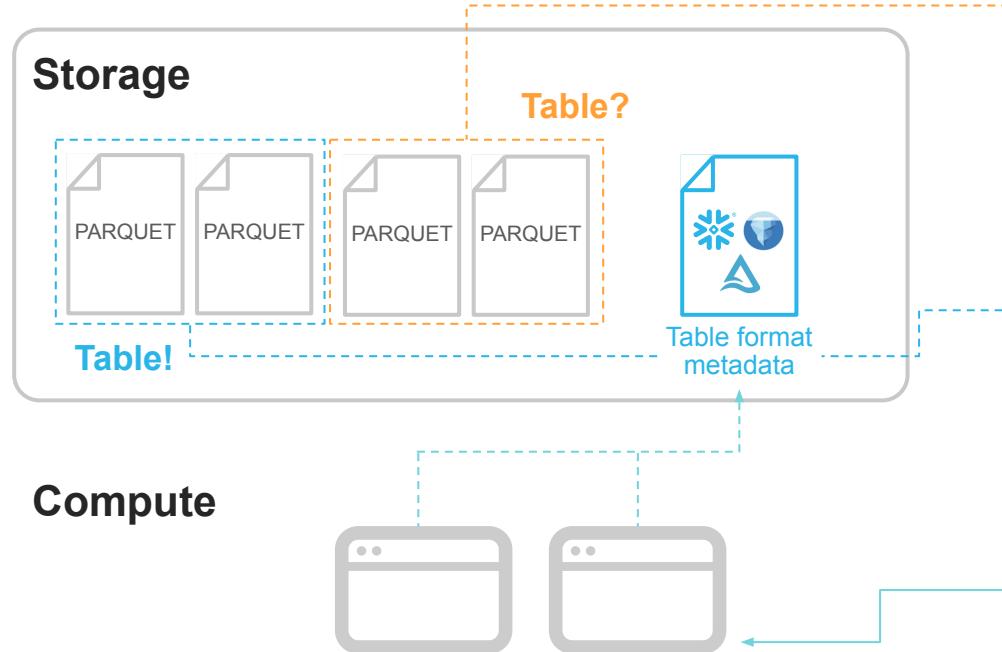
Cons

- Can be messy to manage
- Takes time to import and export into structure / tables
- Different tools may work with the files differently
- File formats **do not**:
 - Describe how the files fit together
 - Support ACID*



What are table formats?

Provide data warehouse capabilities to files



The Challenges

Tools need to know which files correspond to which tables.

Users want good performance, and to know how tables change over time.

Table Formats Help

Table formats define the schema and metadata of a table along with the list of files inside of a table.

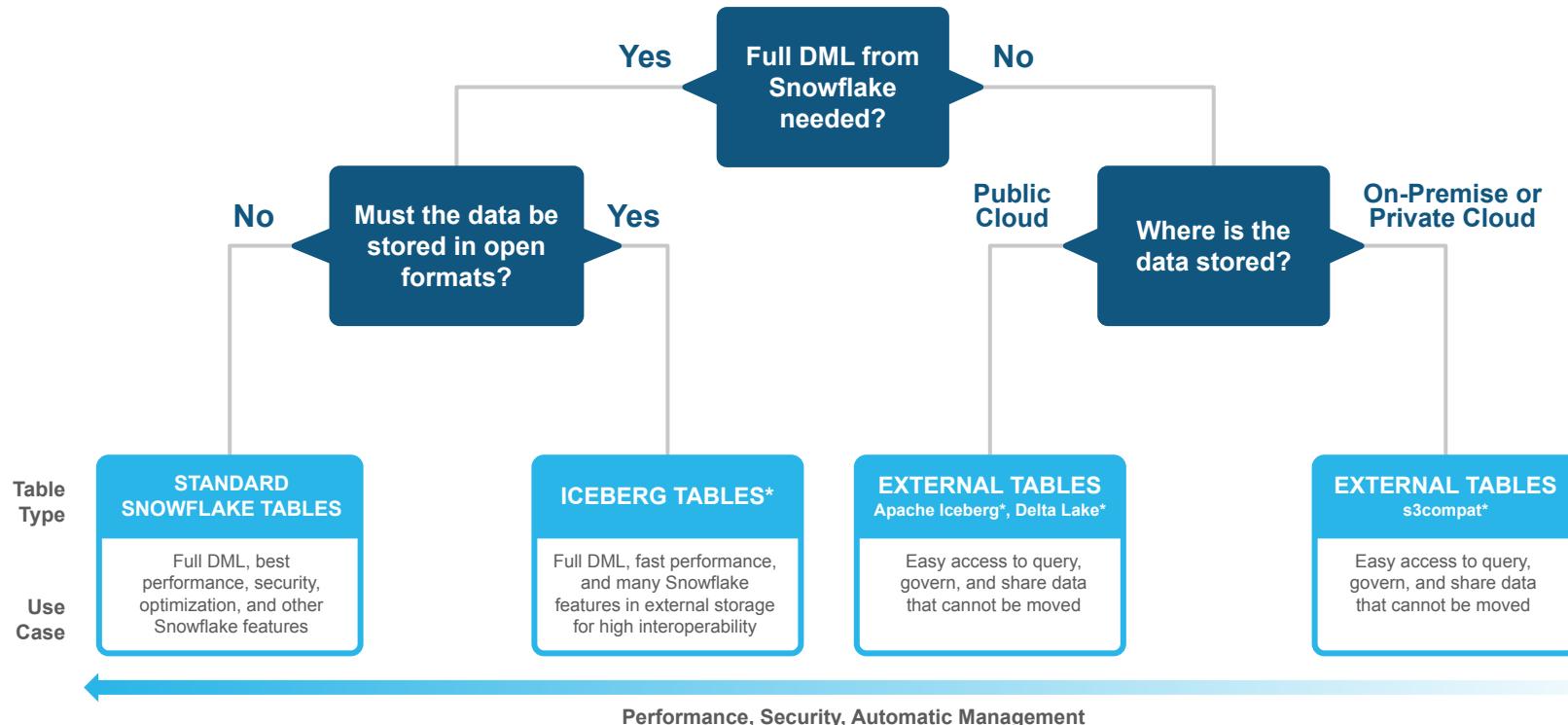
Unlocks Use

Multiple tools get ACID-compliant transactions for DML operations on tables inside of cloud object storage along with time travel and schema evolution.



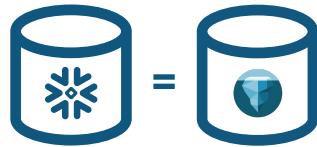
Snowflake Table Types

For analytical workloads



Iceberg Tables in Snowflake

New table type in Snowflake that combines the Snowflake platform with Apache Iceberg



1st CLASS TABLE

Iceberg tables offer the same management, DML, and CRUD as internal tables with similar performance



FULL PLATFORM

Snowflake platform features just work (encryption, replication, governance, compaction, marketplace, clustering etc.)

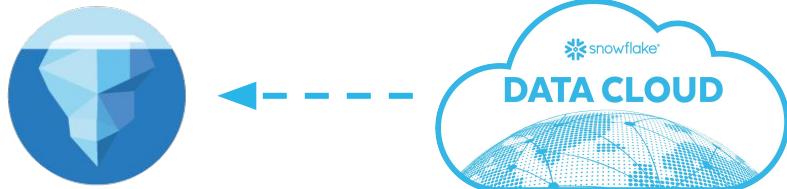


INTEROPERABLE

Iceberg tables use Iceberg metadata and Parquet file data inside of customer storage buckets

External Tables For Apache Iceberg

Easily query Iceberg tables with
Snowflake External Tables



Snowflake can query data in place,
without moving the table data or
existing metadata

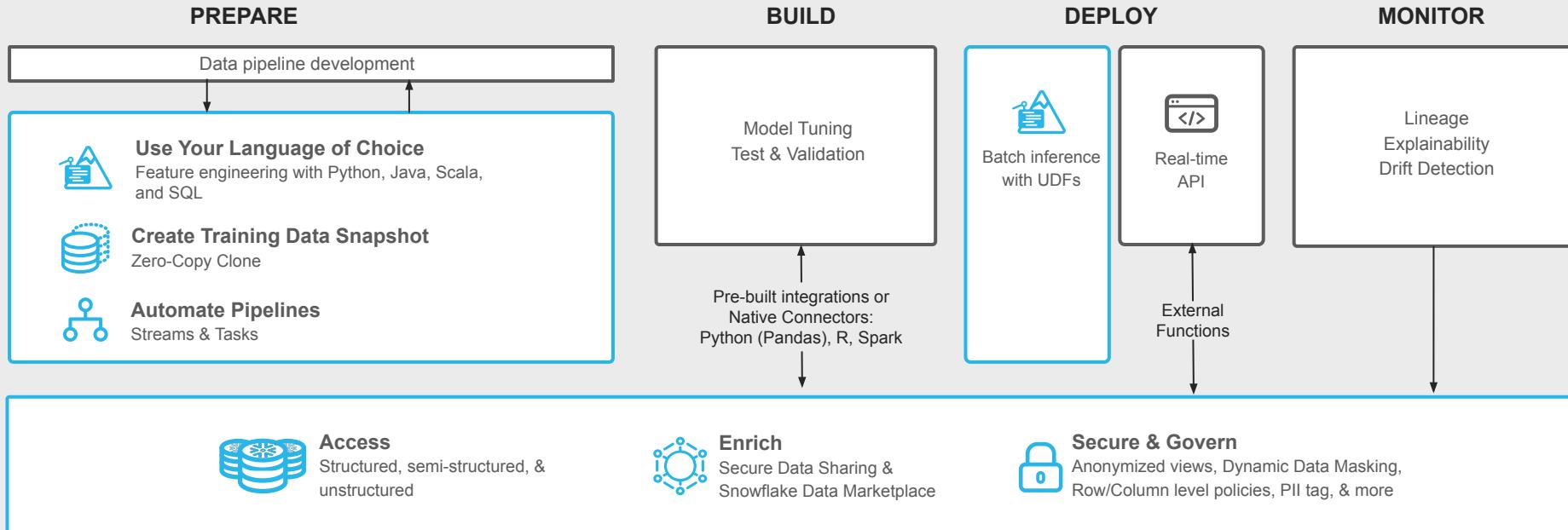
Enables easy access to tables
with data in customer-supplied
storage buckets

Utilizes Iceberg metadata for efficient
pruning to improve performance

Data Science



MACHINE LEARNING WITH SNOWFLAKE



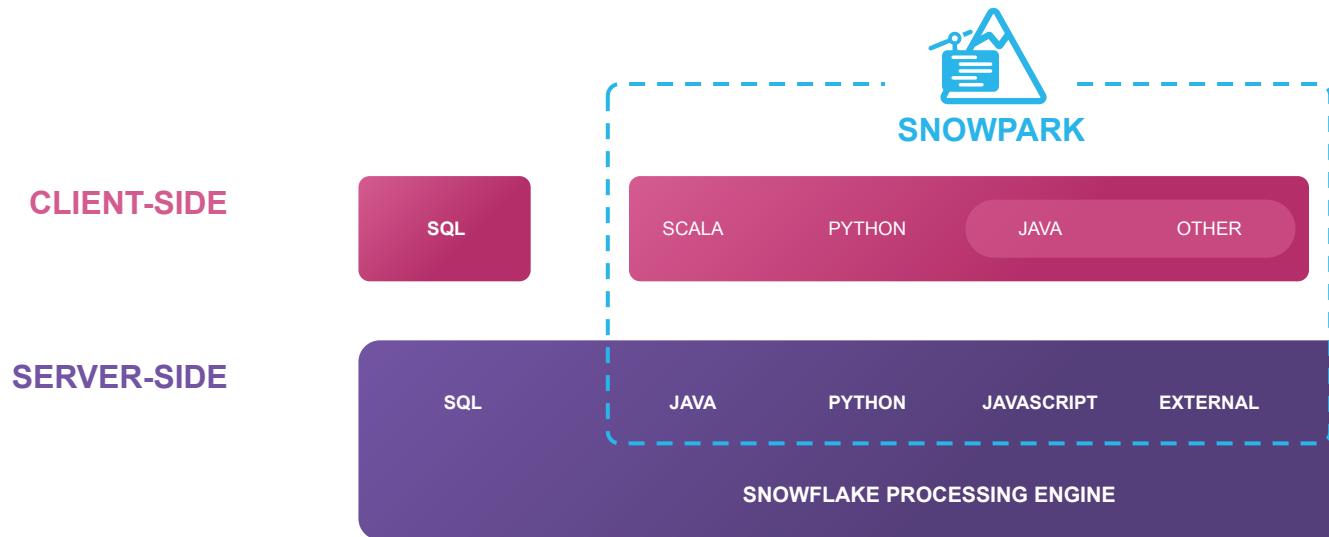
ML tool of choice:



& more



CODE THE SAME WAY, EXECUTE FASTER WITH SNOWPARK



SNOWPARK FOR PYTHON



Familiar programming constructs

Use familiar syntax with DataFrame abstraction



Rich ecosystem

Easy access to hundreds of packages with automated dependency management



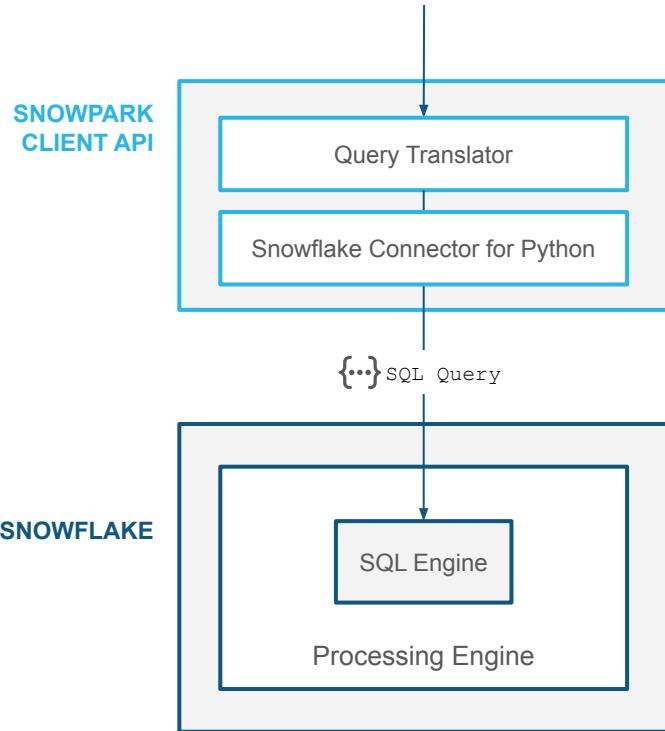
Secure processing

Build with confidence in a highly secure, sandboxed environment



DataFrame API Query

```
df.filter(df.state == 'WA')  
    .avg(df.amount)
```

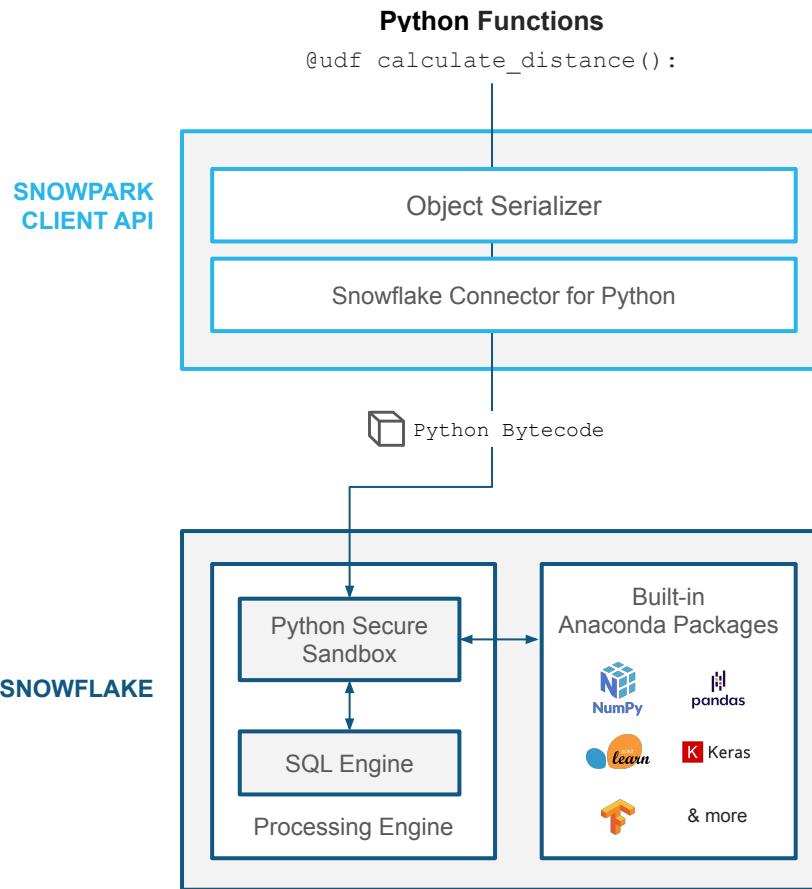


DataFrame API

- **Query Snowflake data with Python**
- **Familiar DataFrame API**
- **100% push-down to Snowflake**
- **Native Snowflake performance and scale**



Python Functions



- Bring custom Python code to Snowflake as User Defined Functions (UDFs)
- Code is serialized and pushed down to run in a secure sandboxed environment
- Seamlessly access third-party packages with Anaconda integration



Conclusions



Single Product Benefits

- Customer Benefits
 - Reduce complexity and customer cognitive load
 - Minimizes learning curve and onboarding time
 - Seamless moving and sharing Data globally across Clouds
 - Directly benefits from all future innovations from Snowflake
- Snowflake Benefits
 - Effectively scale and support more diverse use cases and workloads



THANK YOU



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