Data Intelligence Platform - Data

INTRODUCTION TO DATABRICKS

Kevin Barlow
Data Analytics Practitioner

Why do organizations care about data management?

Protection and security

Confidence in data

Kinds of data

Structured

- Most common and understood
- Typical rows and columns
- **Examples:**
  - database tables
  - .csv
  - Parquet
  - Delta

id	name	occupation	location
1	Kevin	Data Scientist	California
2	Tom	Architect	Arizona
3	Sally	Lawyer	Texas
4	Tina	Surgeon	Florida
5	Joe	Engineer	New York

Kinds of data

Semi-structured

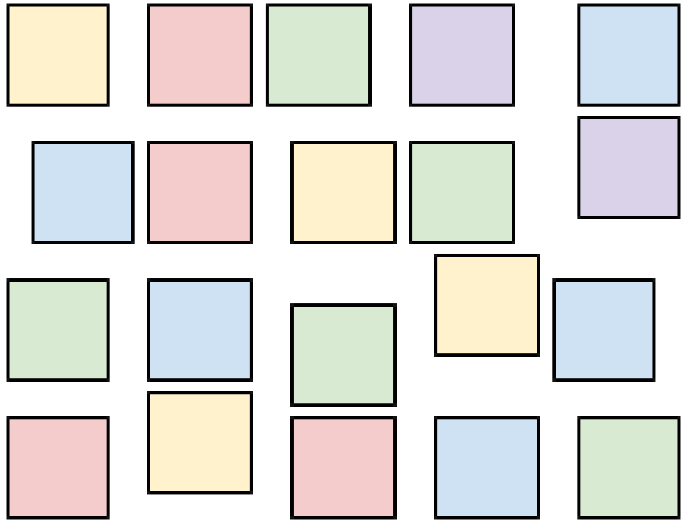
- Common with web-based devices
- Some structure, but more flexible in content
- **Examples:**
  - JSON
  - XML
  - HTML

```
{
  "people": [{
      "id": 1,
      "name": "Kevin",
      "occupation": "Data Scientist",
      "location": "California"},
    {
      "id": 2,
      "name": "Tom",
      "occupation": "Architect",
      "location": "Arizona"}]
}
```

Kinds of data

Unstructured

- Common with smart devices, cameras, etc.
- Little structure, information-rich
- **Examples:**
  - JPEG
  - PNG
  - MP4
  - PDF
  - DOC

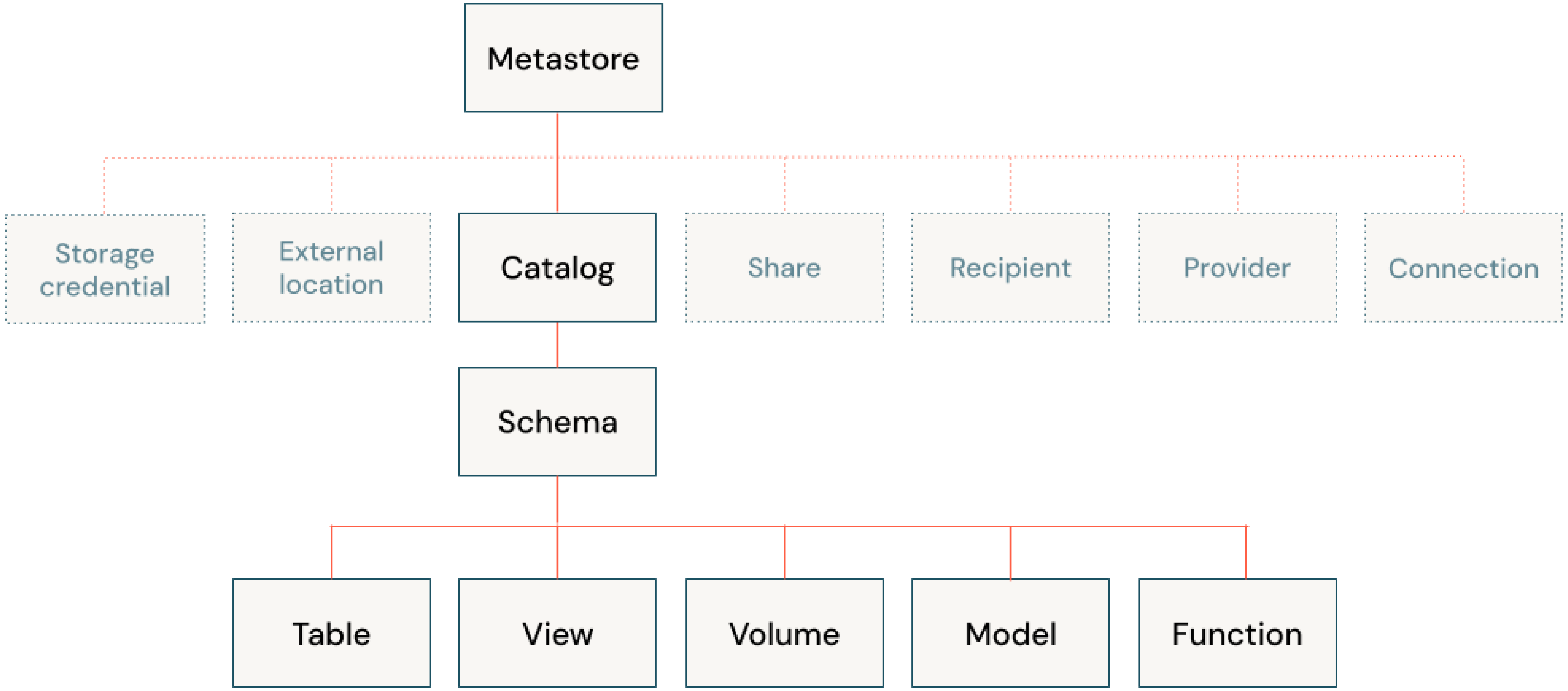


Delta

delta.io

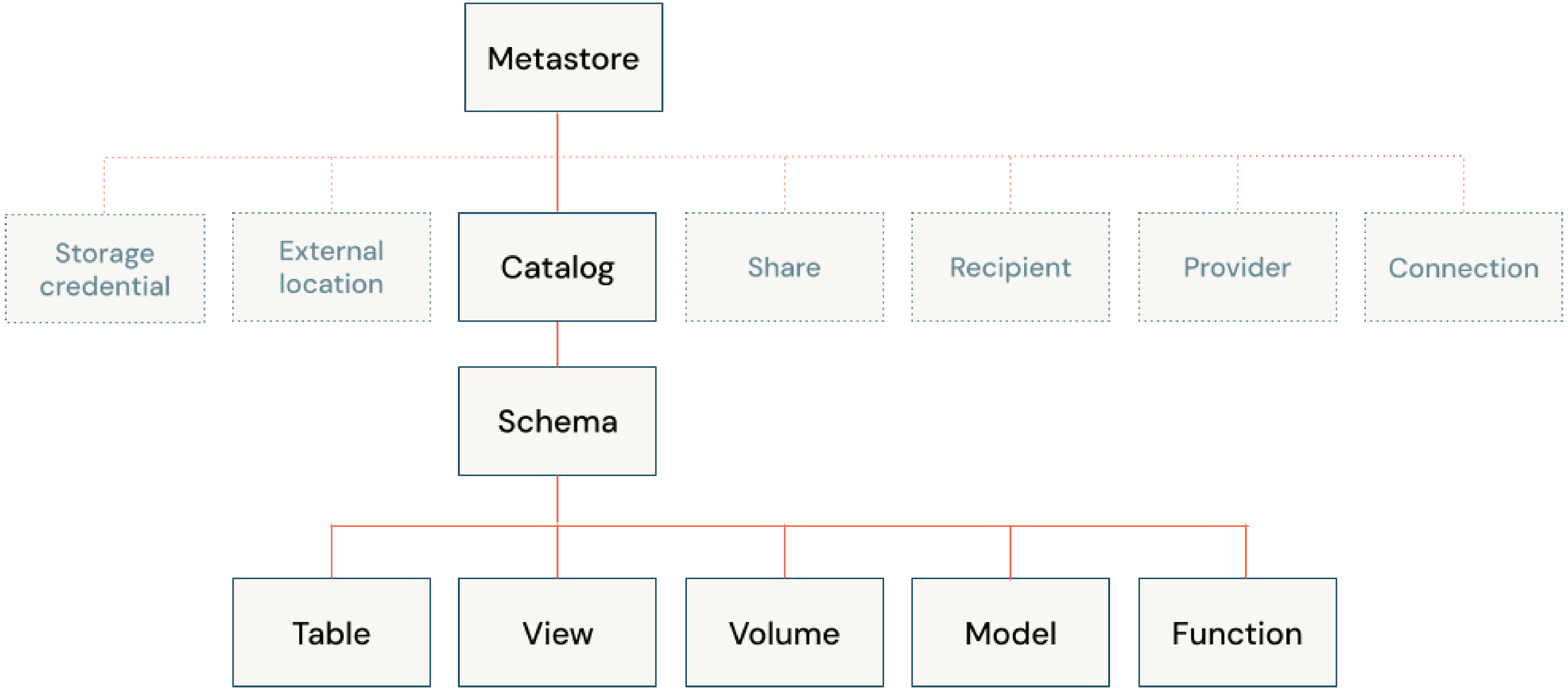
- Open-source storage format
- Collection of parquet tables
- JSON transaction log
- Fully ACID compliant
- Batch and streaming datasets

Unity Catalog



[1] https://docs.databricks.com/en/data-governance/unity-catalog/index.html#the-unity-catalog-object-model

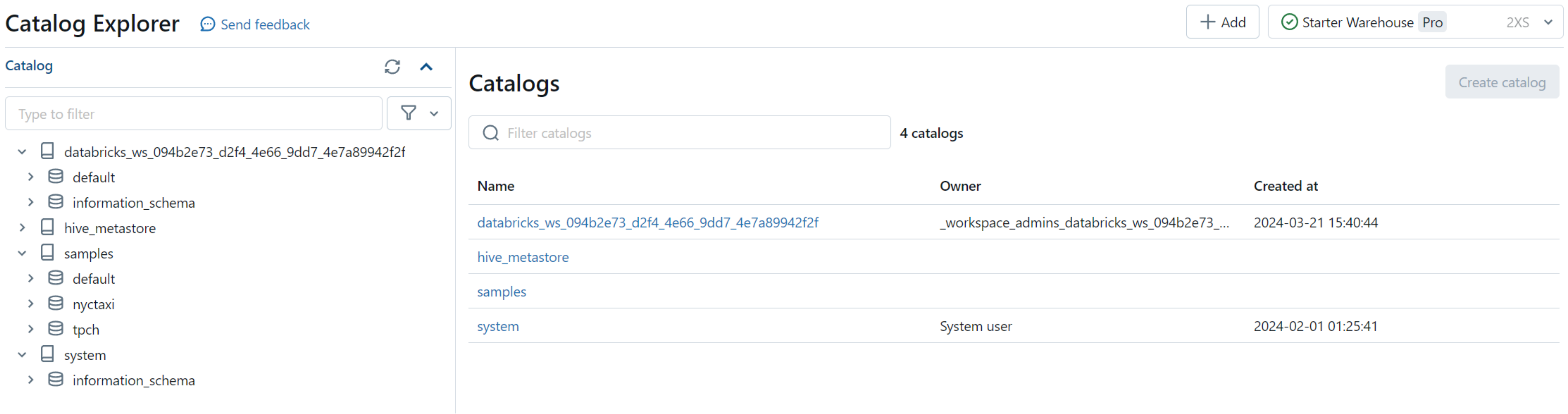
Unity Catalog



```
GRANT, SHOW, REVOKE, USE ...
```

Catalog Explorer

- Single location to explore all data assets
- UI to discover data
- Manage Unity Catalog permissions
- View data lineage and related assets



- databricks_ws_094b2e73_d2f4_4e66_9dd7_4e7a89942f2f
  - default
  - information_schema
- hive_metastore
- samples
  - default
  - nyctaxi
  - tpch
- system
  - information_schema

Catalogs

4 catalogs

Name	Owner	Created at
databricks_ws_094b2e73_d2f4_4e66_9dd7_4e7a89942f2f	_workspace_admins_databricks_ws_094b2e73_...	2024-03-21 15:40:44
hive_metastore		
samples		
system	System user	2024-02-01 01:25:41

Let's practice!

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Managing Data Catalogs

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Data Practitioner

Let's practice!

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Data Intelligence Platform - Compute

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Data Practitioner

Why do organizations care about compute?

Apache Spark

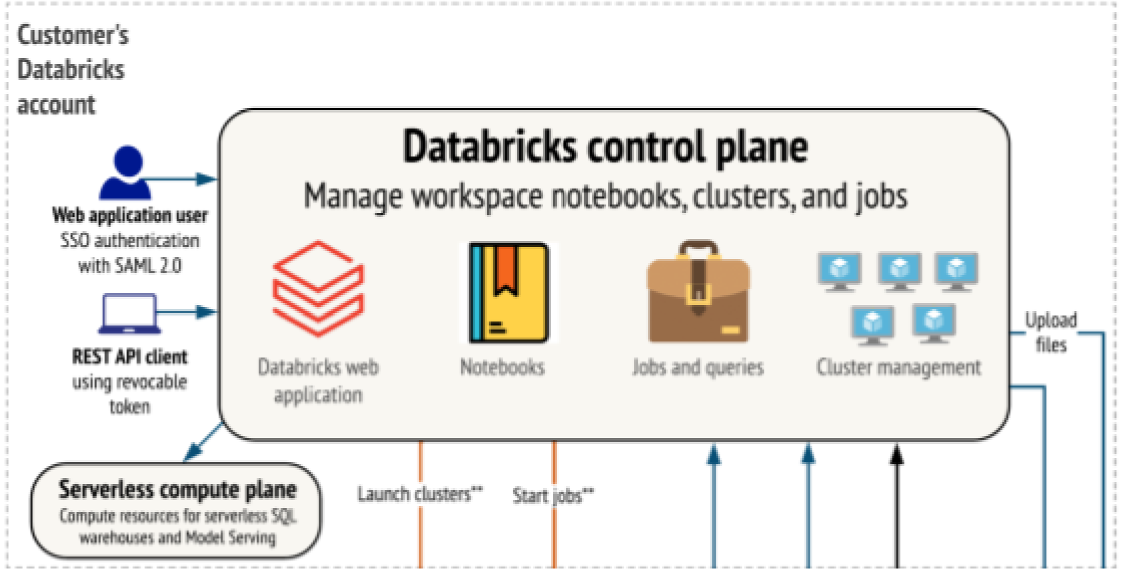
- Created by Databricks co-founders
- Open source framework
- Highly efficient distributed computing
- APIs for Python, SQL, Scala, R
- Great for all use cases:
  - data engineering to machine learning and business intelligence

Check out some of the Apache Spark courses on DataCamp!

Cluster Types

Classic

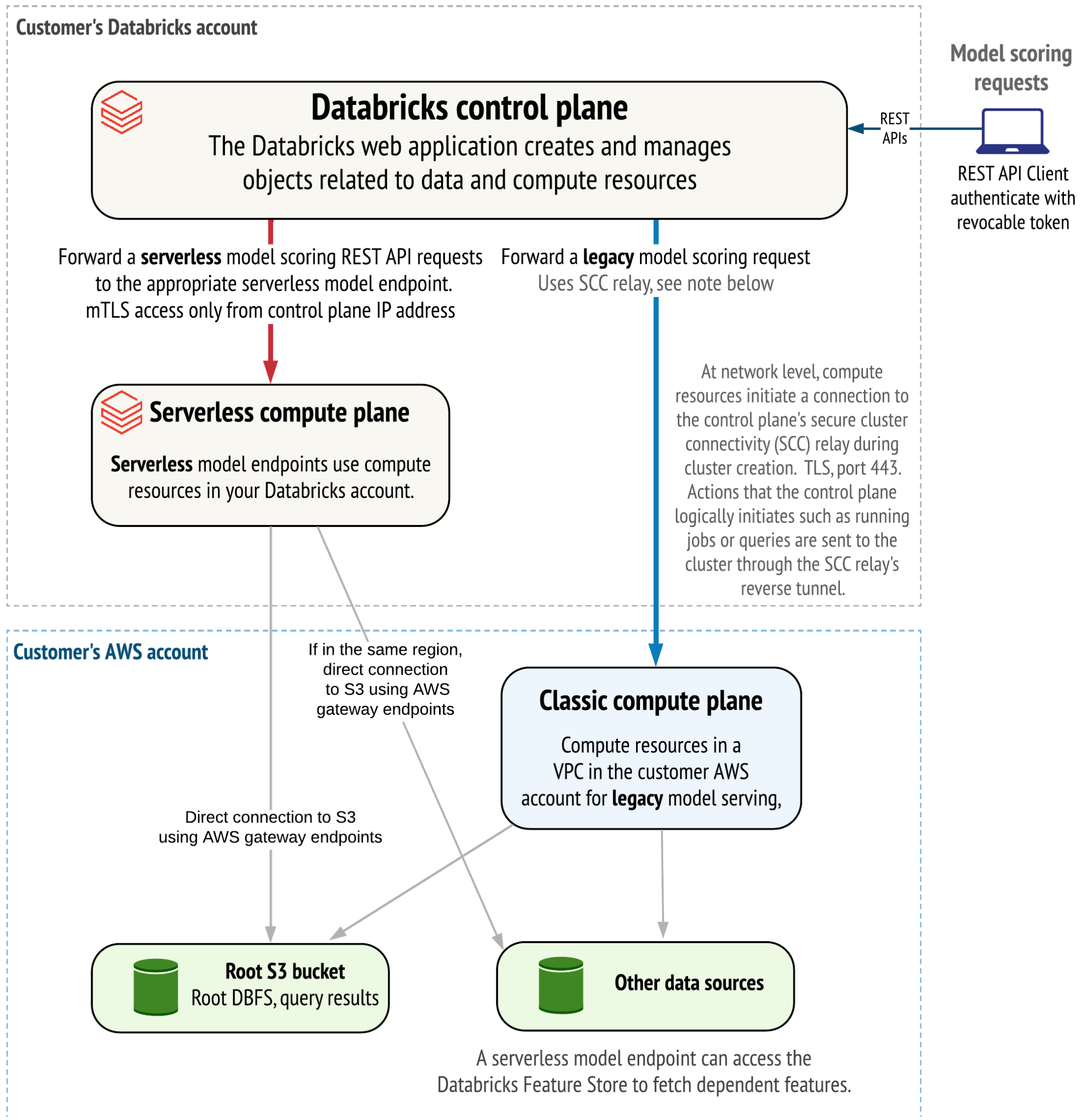
- Compute resources (virtual machines) are created in the Compute Plane
- Databricks provides configuration to your cloud
- *Pros*: compute and security in your environment, leverage pre-existing compute pools, etc.
- *Cons*: slow startup time


Customer's Databricks account
Databricks control plane
Manage workspace notebooks, clusters, and jobs
Web application user
SSO authentication with SAML 2.0
REST API client
using revocable token
Databricks web application
Notebooks
Jobs and queries
Cluster management
Upload files
Serverless compute plane
Compute resources for serverless SQL warehouses and Model Serving
Launch clusters**
Start jobs**

Cluster Types

Serverless

- Compute resources (virtual machines) are created in the Control Plane
- Databricks provides access to your users
- *Pros*: Fast startup time, the latest and greatest feature, the fastest performance, Databricks improves performance over time
- *Cons(?)*: compute not in your environment



Compare classic and serverless compute planes for Model Serving

Customer's Databricks account
Model scoring requests
REST APIs
REST API Client authenticate with revocable token
Customer's AWS account

Databricks control plane
The Databricks web application creates and manages objects related to data and compute resources

Forward a **serverless** model scoring REST API requests to the appropriate serverless model endpoint. mTLS access only from control plane IP address

Forward a **legacy** model scoring request
Uses SCC relay, see note below

Serverless compute plane
Serverless model endpoints use compute resources in your Databricks account.

At network level, compute resources initiate a connection to the control plane's secure cluster connectivity (SCC) relay during cluster creation. TLS, port 443. Actions that the control plane logically initiates such as running jobs or queries are sent to the cluster through the SCC relay's reverse tunnel.

If in the same region, direct connection to S3 using AWS gateway endpoints

Classic compute plane
Compute resources in a VPC in the customer AWS account for **legacy** model serving,

Direct connection to S3 using AWS gateway endpoints

Root S3 bucket
Root DBFS, query results

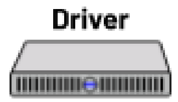
Other data sources

A serverless model endpoint can access the Databricks Feature Store to fetch dependent features.

Single-node vs. Multi-node

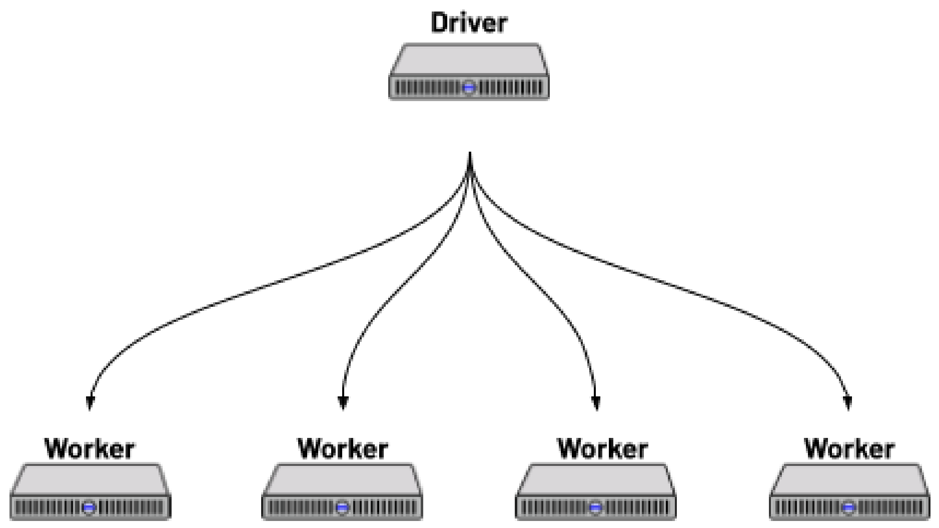
Single-node

- Cluster with just a Driver Node
- Can still run Spark
- Can also run single-node frameworks (i.e., pandas)
- Great for smaller datasets



Multi-node

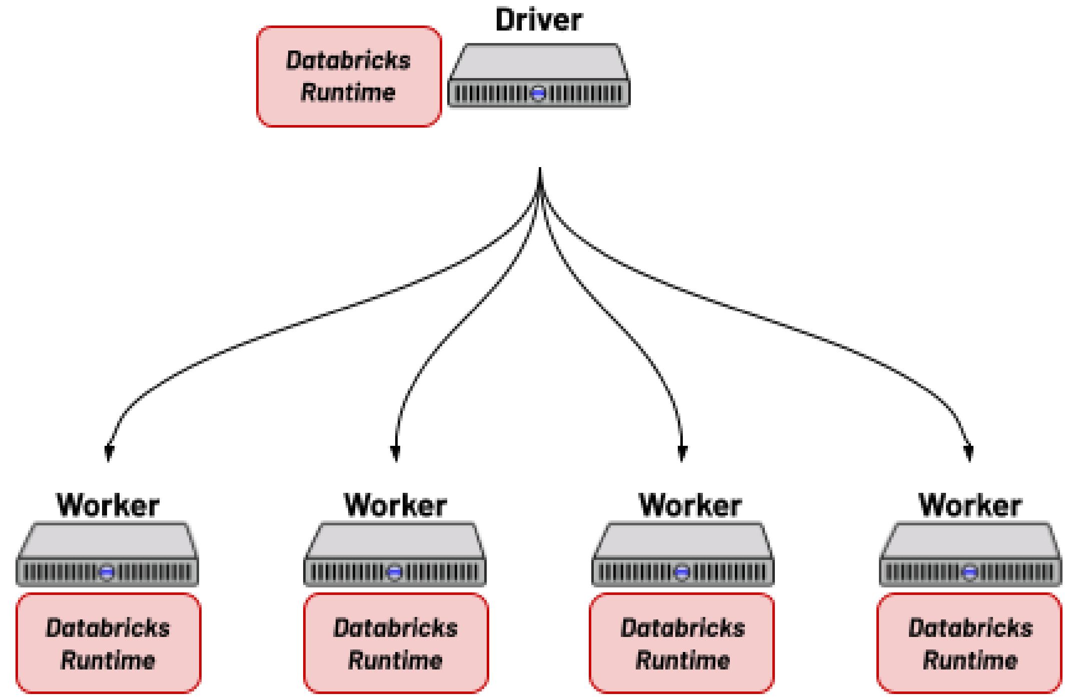
- Cluster with a Driver Node and one or more Worker Nodes
- Spark can distribute work across multiple nodes
- Great for larger datasets



Databricks Runtime

- Installed on every Databricks cluster
  - Optimized version of Apache Spark
  - Photon for faster SQL queries
  - Common libraries (e.g., pandas, dplyr, sci-kit learn)
  - Logic to connect with Databricks services

General recommendation: Use the most recent Long Term Support (LTS) version of the Runtime



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