



Airflow at Salesforce

Building a fully managed workflow orchestration system

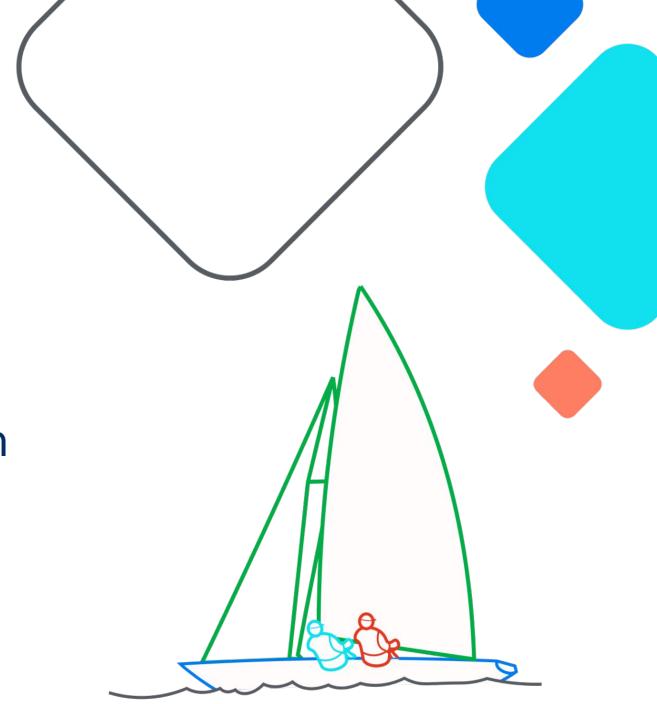
Varun Srinivas & Raj Ramalingam



Airflow at Salesforce

Building a “fully managed” workflow orchestration system

Raj Ramalingam, Varun Srinivas



 **Airflow Summit**

Let's flow together

September 19-21, 2023,
Toronto, Canada

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Outline



Understanding the Landscape

Key Architectural Components

Putting it all together
Operationalizing our Architecture

Conclusion & Takeaways



Understanding the Landscape

Why Salesforce Managed Airflow?

Trust is our #1 priority



Infrastructure As Code



Immutable Deployments



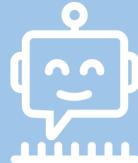
Compliance



Service Ownership



Cost to Serve



Elastic & Event
-Driven Ops



Zero Trust
Architecture



Service
Resilience





Petabyte Scale Data Lakes

Orchestration is Imperative

*One-stop turnkey destination for all of Salesforce's
Internal orchestration needs*



Multi-tenant Data Platform - Simplified View



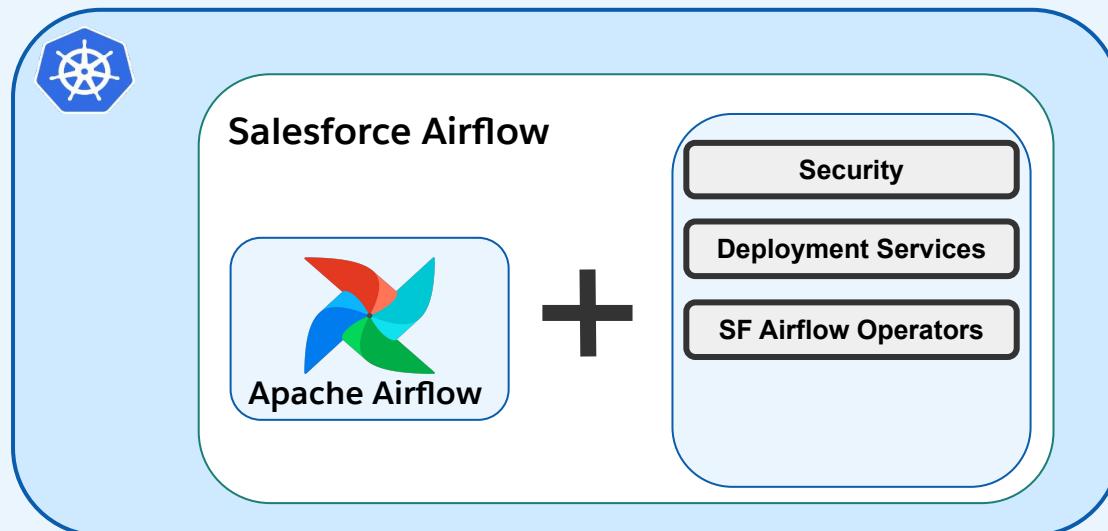
Use Cases / Tools

- ETL/ELT
- ML
- Data analytics

Data Processing Engines

- Multi-tenant
- Different AuthN/AuthZ

Salesforce Airflow



Trust / Security

- SF Operated PKI
- Secrets Management
- Service Account / Team

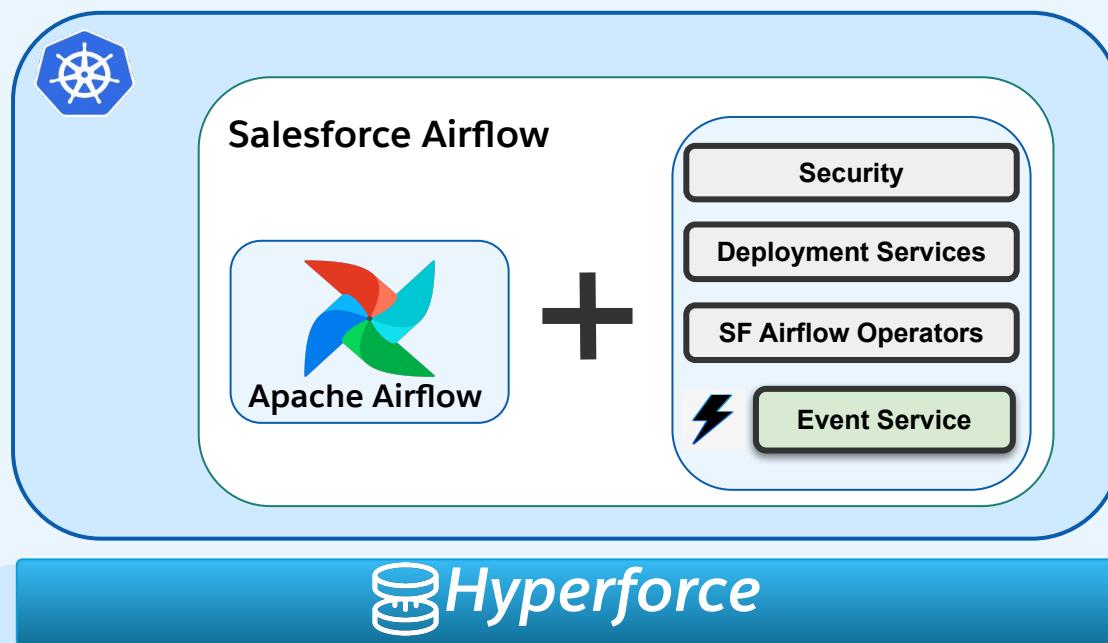
Deployment Services

- DAGs, PySpark
- Dependency management

SF Airflow Operators

- Light Abstraction over core Operators
- Distribute uniformly (Sandbox/Prod)

Salesforce Airflow



Trust / Security

- SF Operated PKI
- Secrets Management
- Service Account / Team

Deployment Services

- DAGs, PySpark
- Dependency management

Event Service

- Add on Service - Async / Remote Execution



Salesforce Airflow - Goals

- Security/Trust
- Provide Productive Environment
- “Easy” to use - No configuration
- “Easy” to onboard



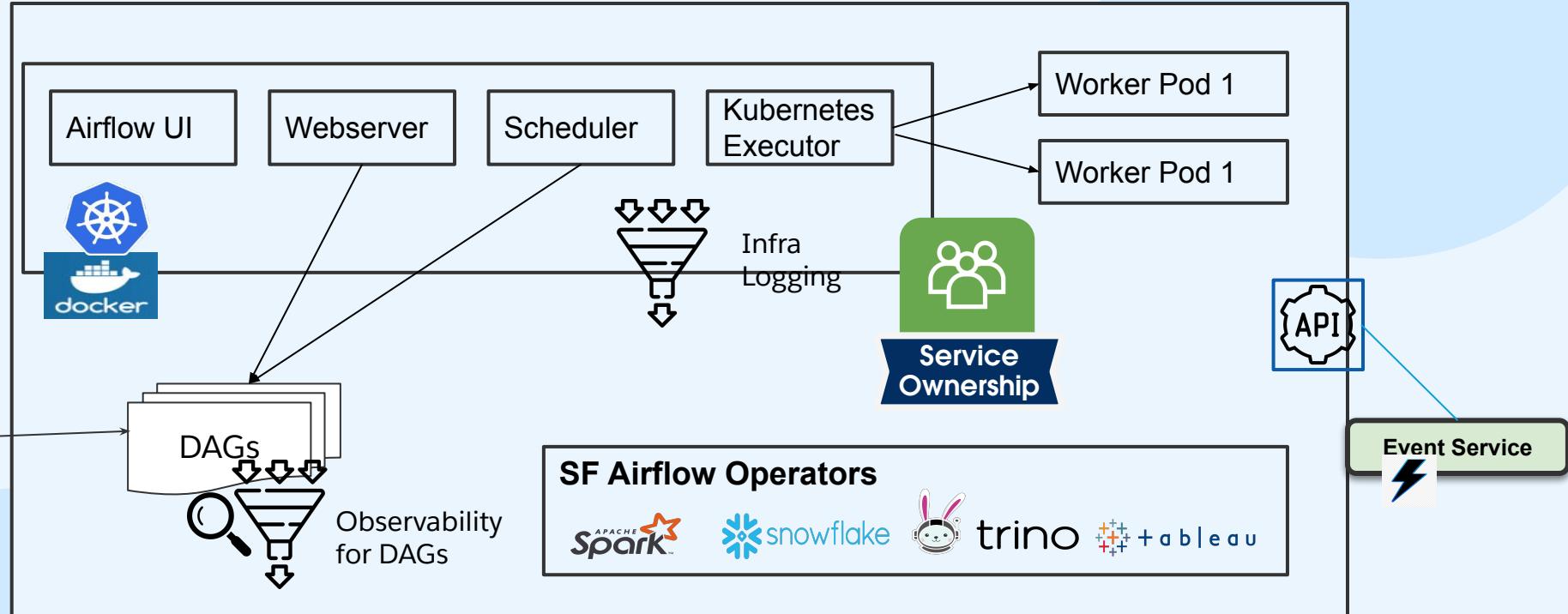
Salesforce Airflow - Key Decisions



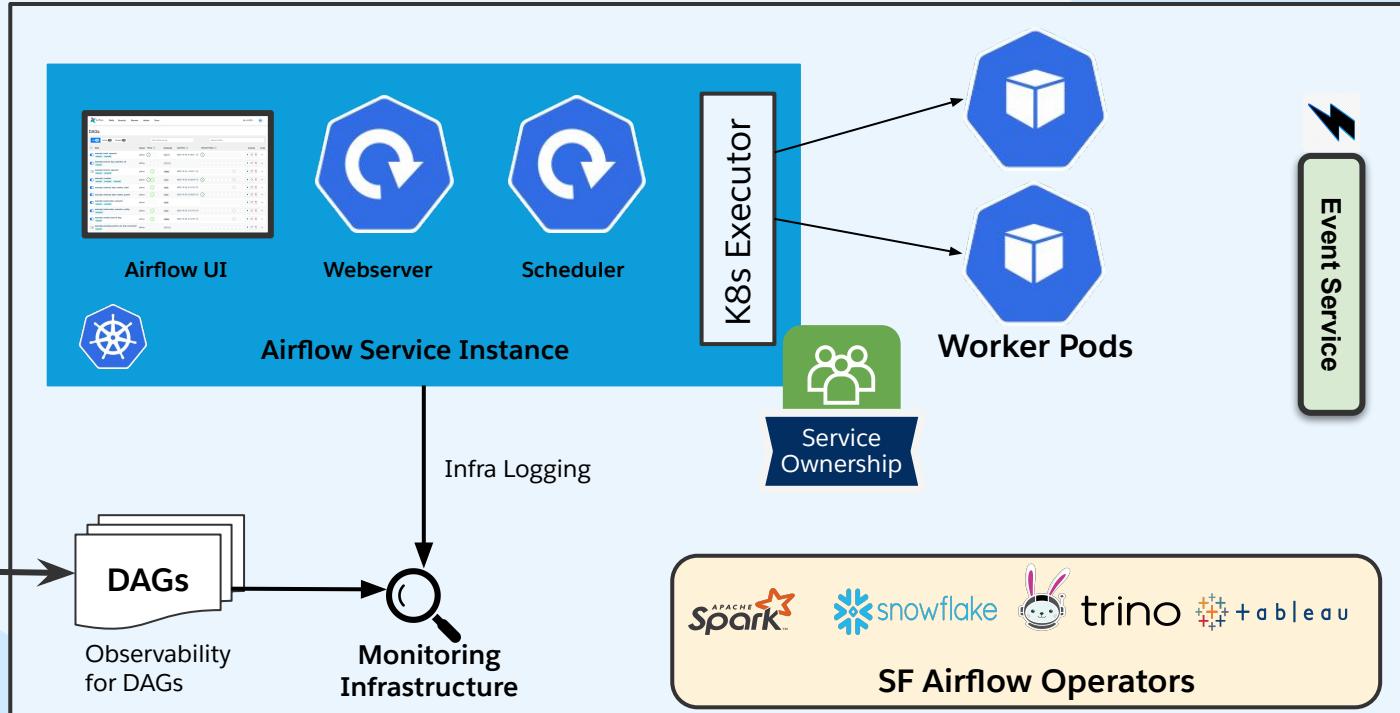
- **K8s Executors**
- **Infrastructure abstractions**
 - Standardized base images
 - Logging / Secrets
- **SLO (Service Level Ownership)**
 - SF Airflow Level
 - DAG Level
- **SF Airflow Operators**
 - Livy, Trino, Snowflake, K8 Pod Op, Event Service, Observability Plugin...
 - Easier Distribution through deployment services
- **Guard Rails - Deployment Services.**
 - DAGs/Manage Artifacts / Dependencies
- **Event Service**
 - To Avoid short/long polling for data, job completion
 - Remote Execution



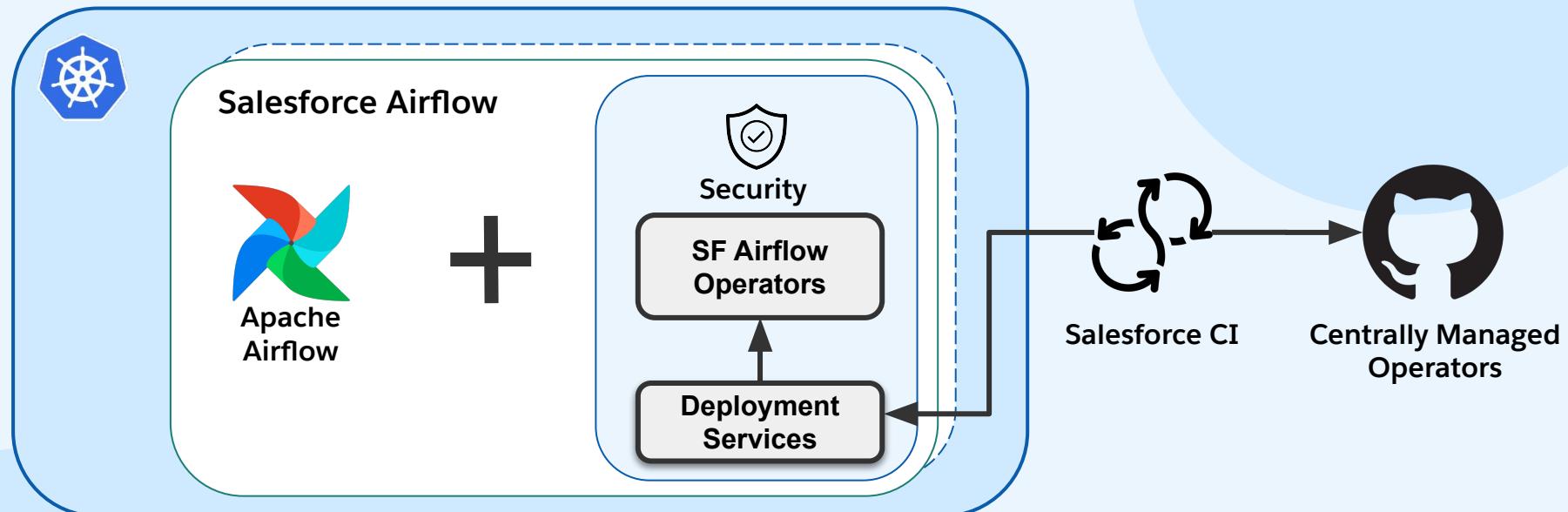
Salesforce Airflow - Decisions, Capabilities



Salesforce Airflow - Decisions, Capabilities



Salesforce Airflow - Simplified Blueprint Prod/Sandbox



Salesforce Airflow - Tenant View



Tenant A

Sandbox

Prod



Airflow
spiffe://X-509



svc_acct

Security

Deployment Services

SF Operators

- Testing DAGs can be challenging
- High fidelity between Sandbox and Prod

Tenant B

Sandbox (Optional)

Prod



Airflow
spiffe://X-509



svc_acct

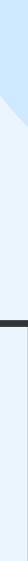
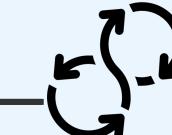
Security

Deployment Services

SF Operators

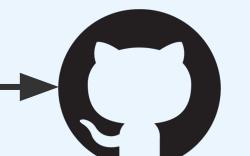


Salesforce CI



Tenant A Tenant
Repo(s)

Centrally Managed
Operators



Tenant B Tenant
Repo(s)

Salesforce Airflow - Tenant View

salesforce

Tenant A

Sandbox

Prod



Security

Deployment Services

SF Operators

- Preconfigured Productive Environment.
- Testing DAGs in Prod can be challenging
- High fidelity between Sandbox and Prod instances



Tenant A Tenant
Repo(s)

mTLS



Kerberos



trino



Data Processing

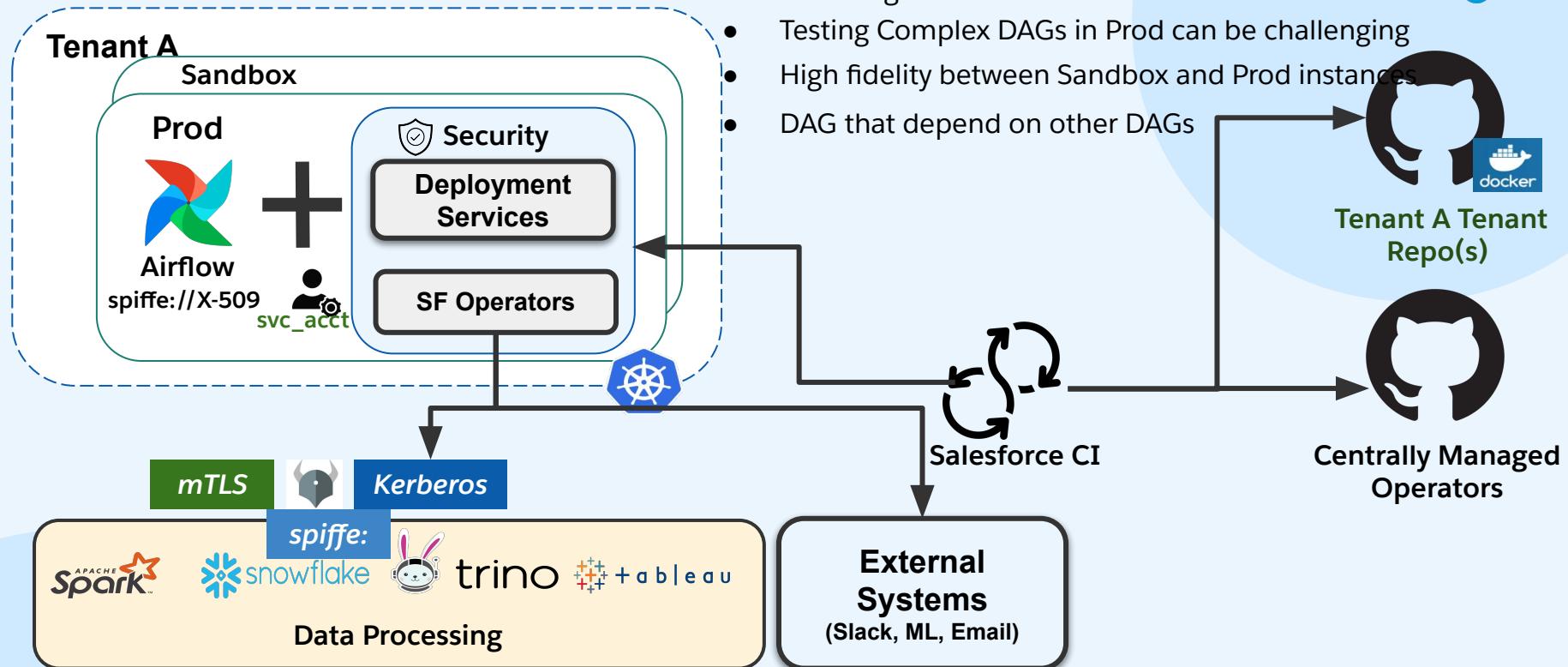
External
Systems
(Slack, ML, Email)



Salesforce CI

Centrally Managed
Operators

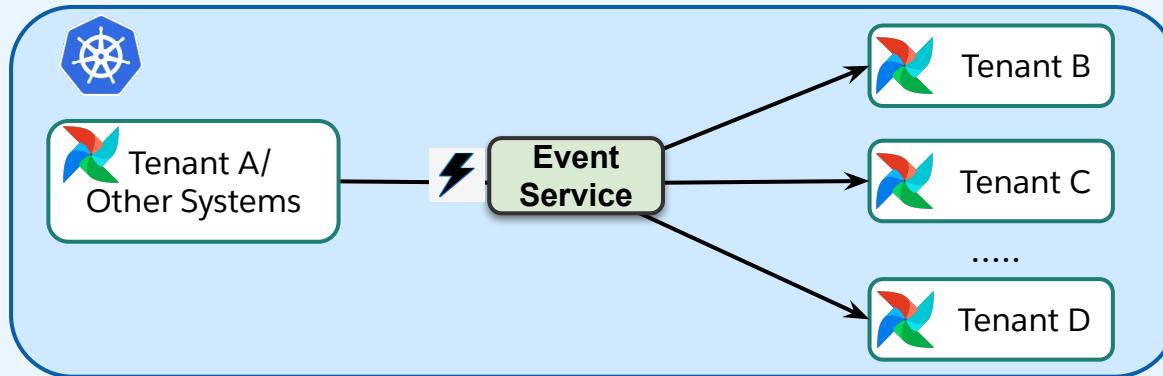
Salesforce Airflow - Tenant View



Event Service - Use Cases



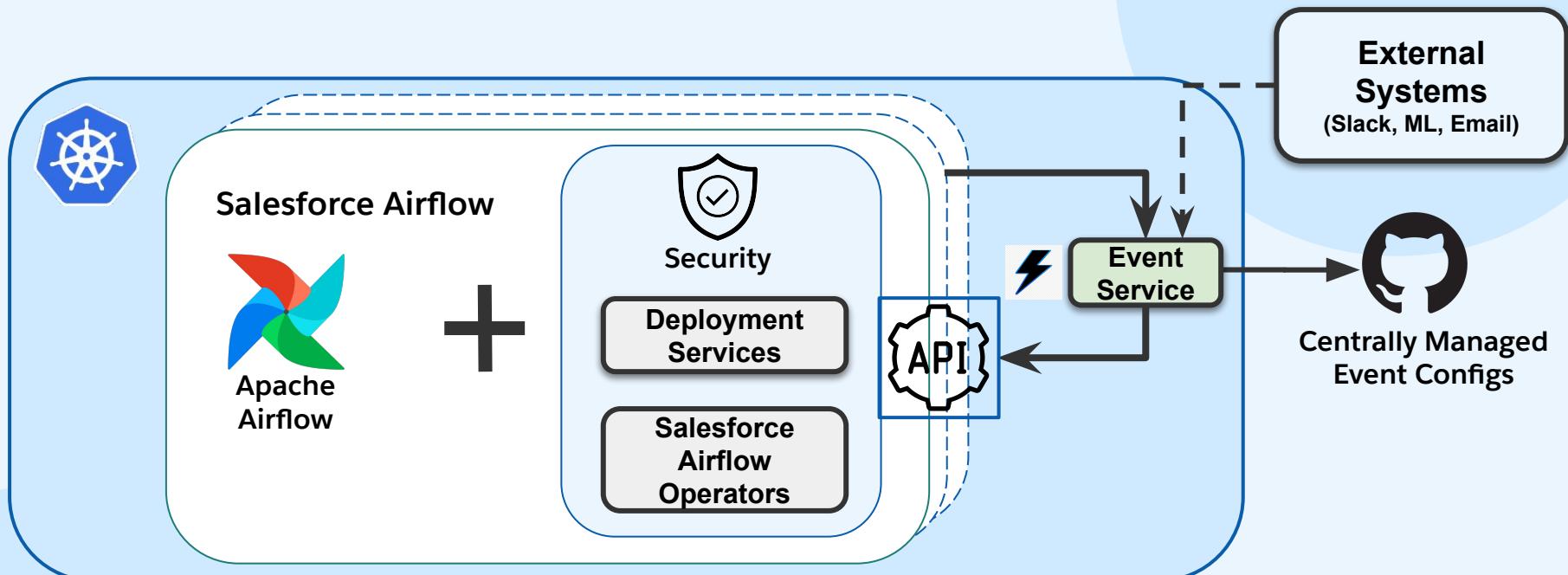
Event Based Dag Triggers across Airflow Tenant Instances.



Use cases

- Job Dependent
- Data Dependent
- Airflow Ops- Fleet wide

Airflow (*Services*) + Event (*Service*) View



Services Interaction at Run-time - Secure Access



Service authentication and authorization at every step

Zero Trust Architecture

There is no implicit trust between services

Salesforce-Operated PKI Service

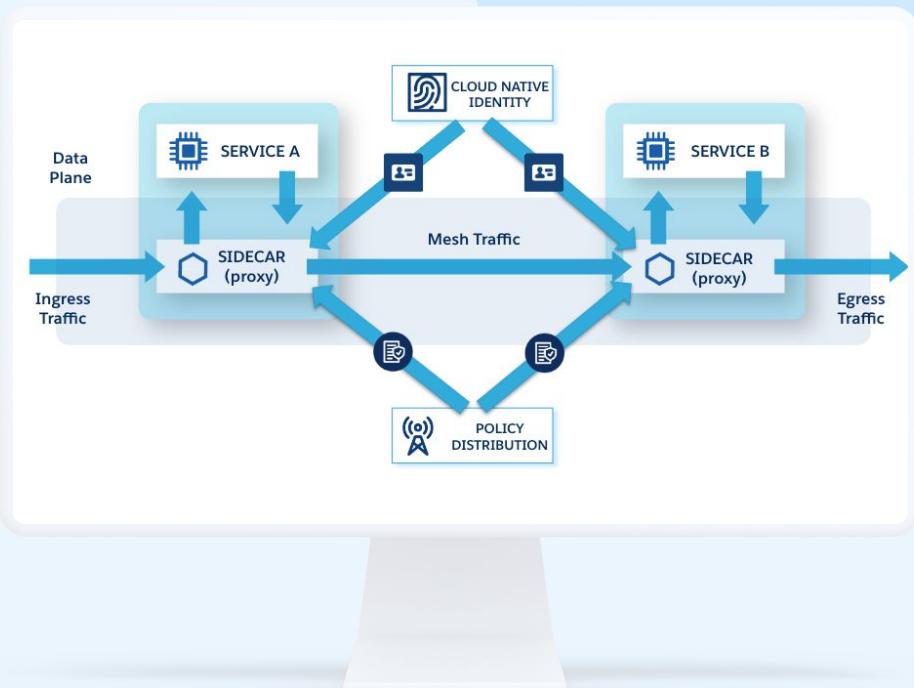
Authentication using digital certificates

Open Policy Agent

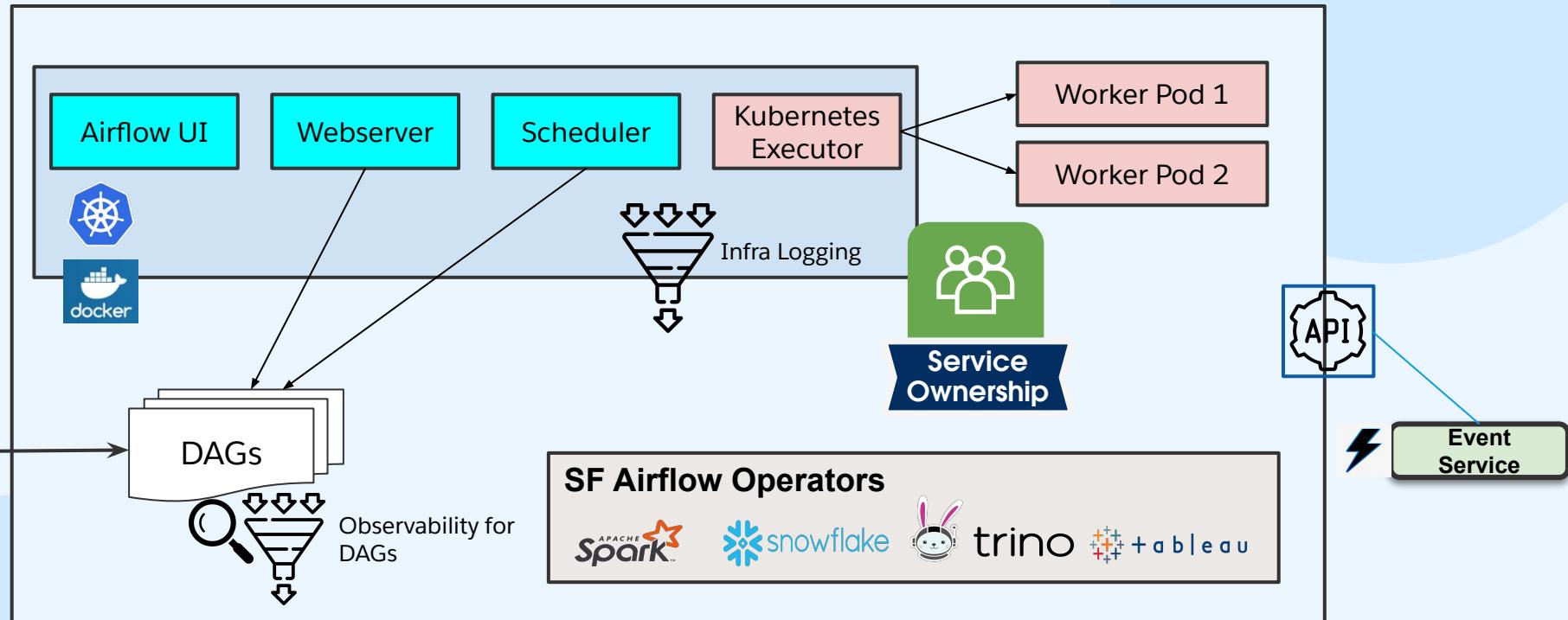
Dynamic and granular authorization

Least Privilege Access Policy

Requestors receive no more than they need

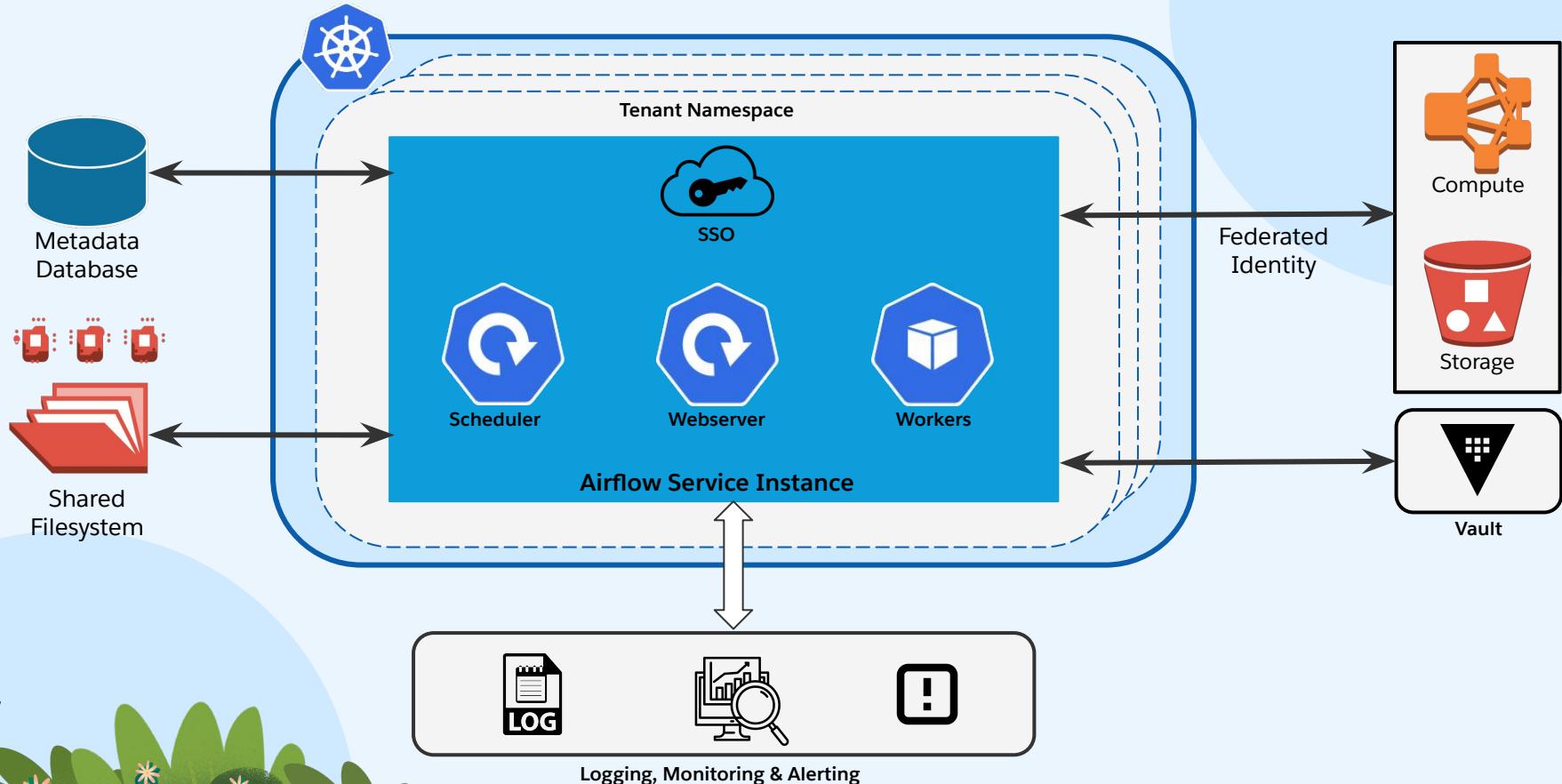


SF Airflow Summary - Decisions, Capabilities

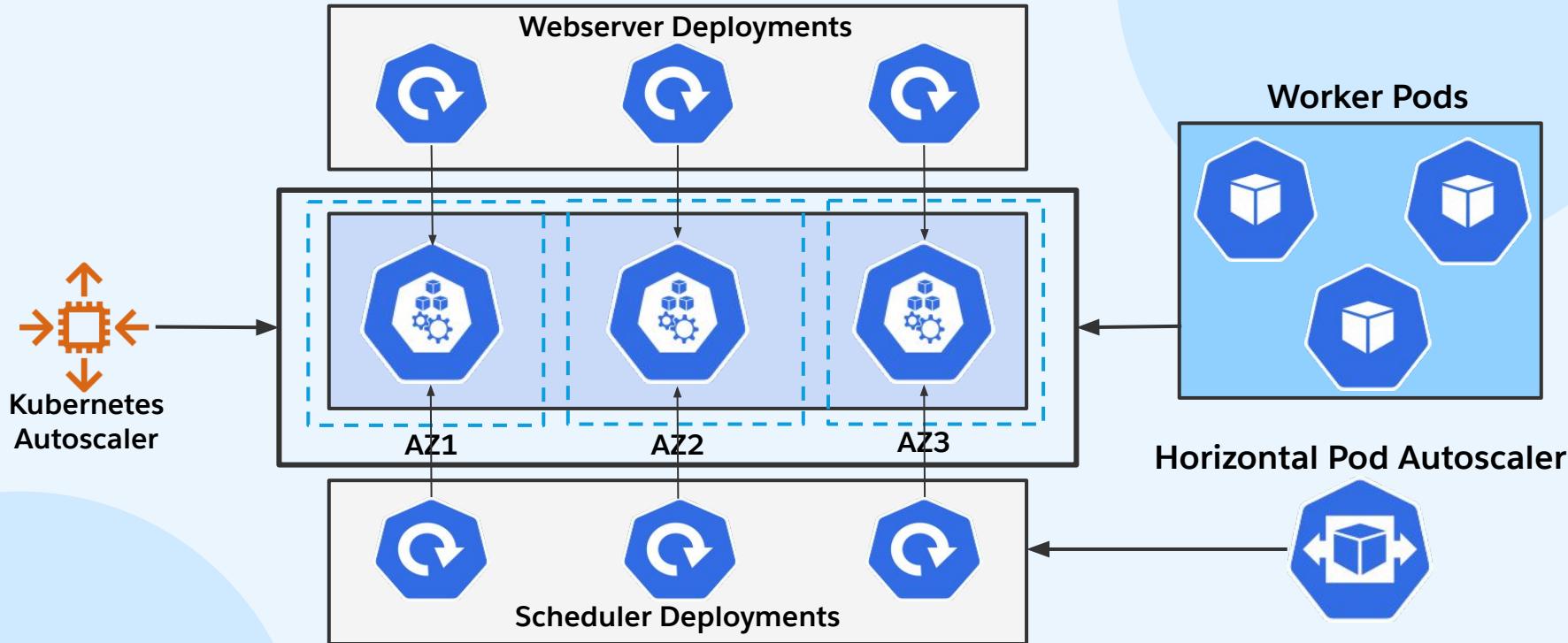


Key Architectural Components

High Level Architecture



Availability, Scaling & Resiliency



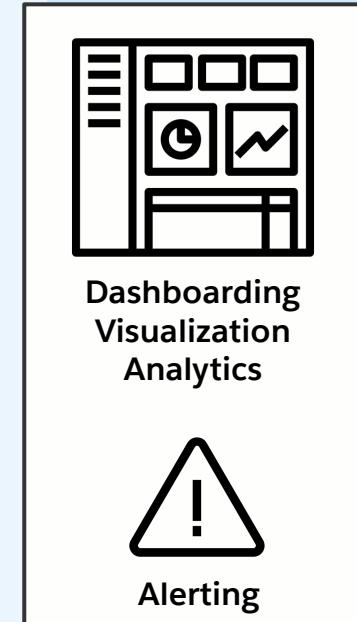
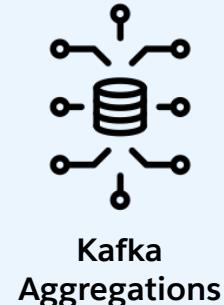
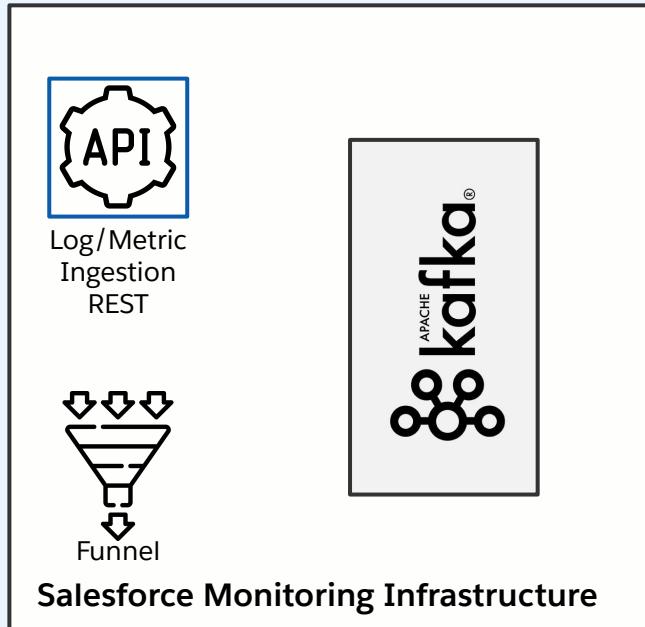
Logging, Monitoring and Alerting



Cloud Native
Monitoring
Infrastructure



Salesforce Airflow
Infrastructure



Putting it all together: Operationalizing our Architecture

User Journey

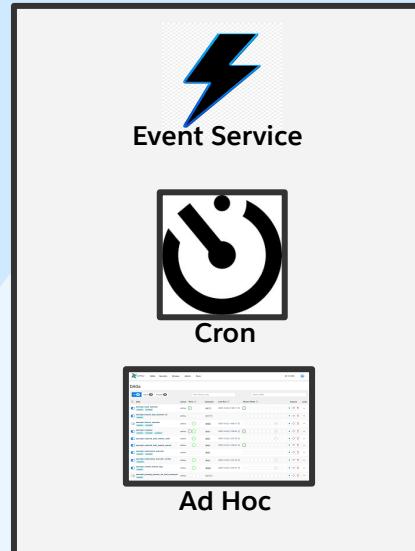
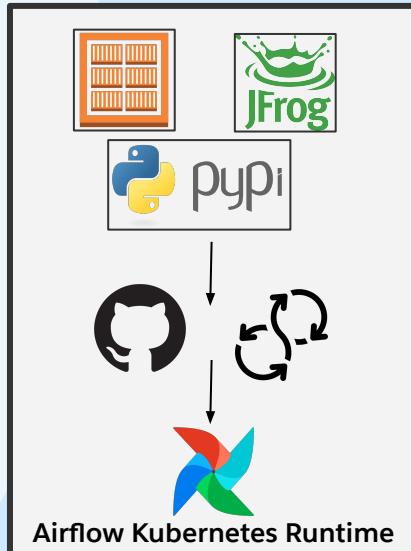
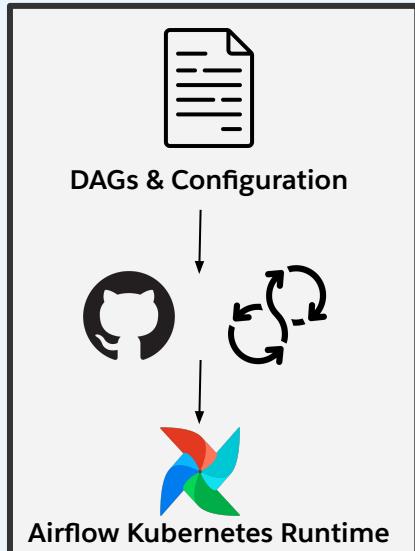


Develop DAGs

Source DAGs

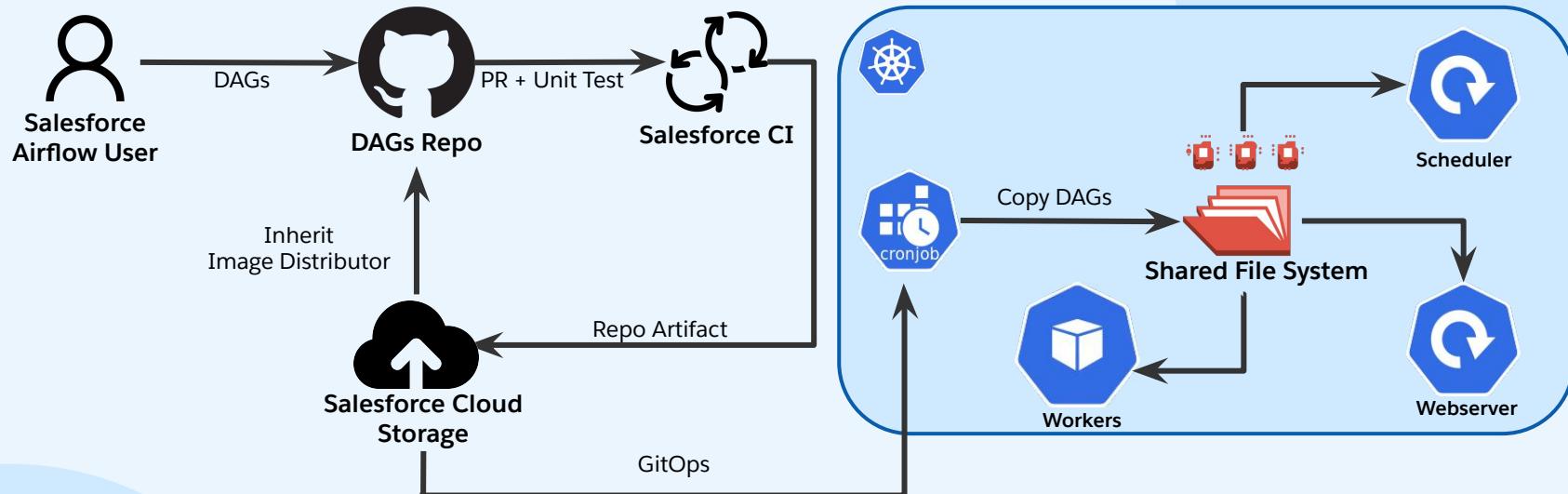
Source Dependencies

Execute Workflows



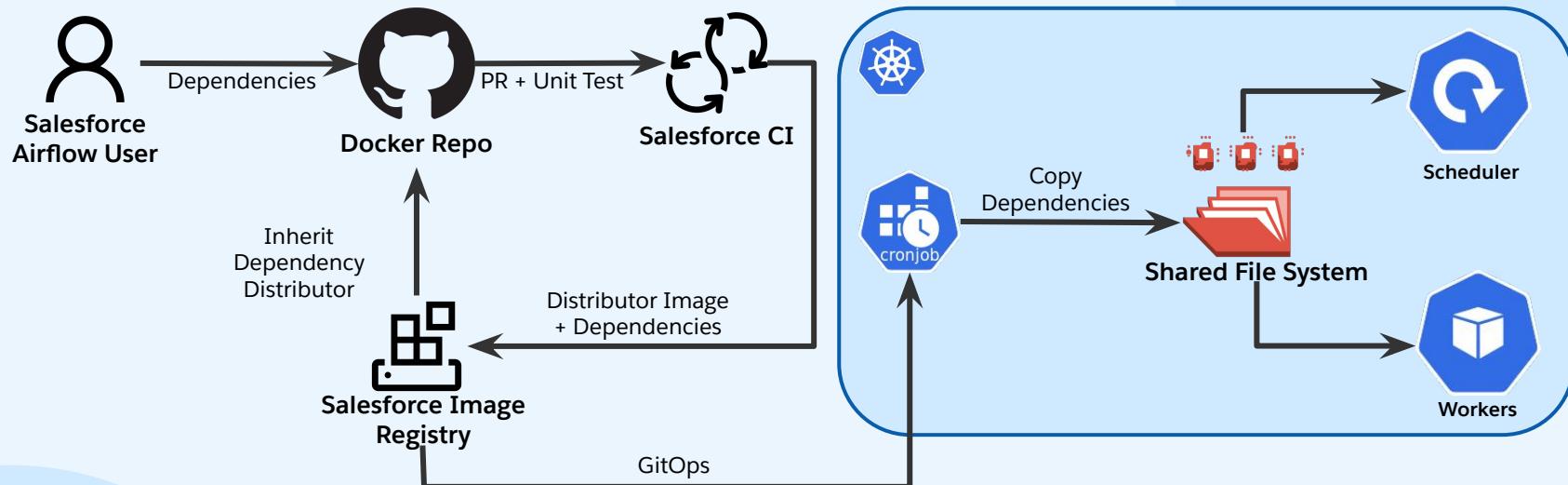
User Journey

Sourcing DAGS



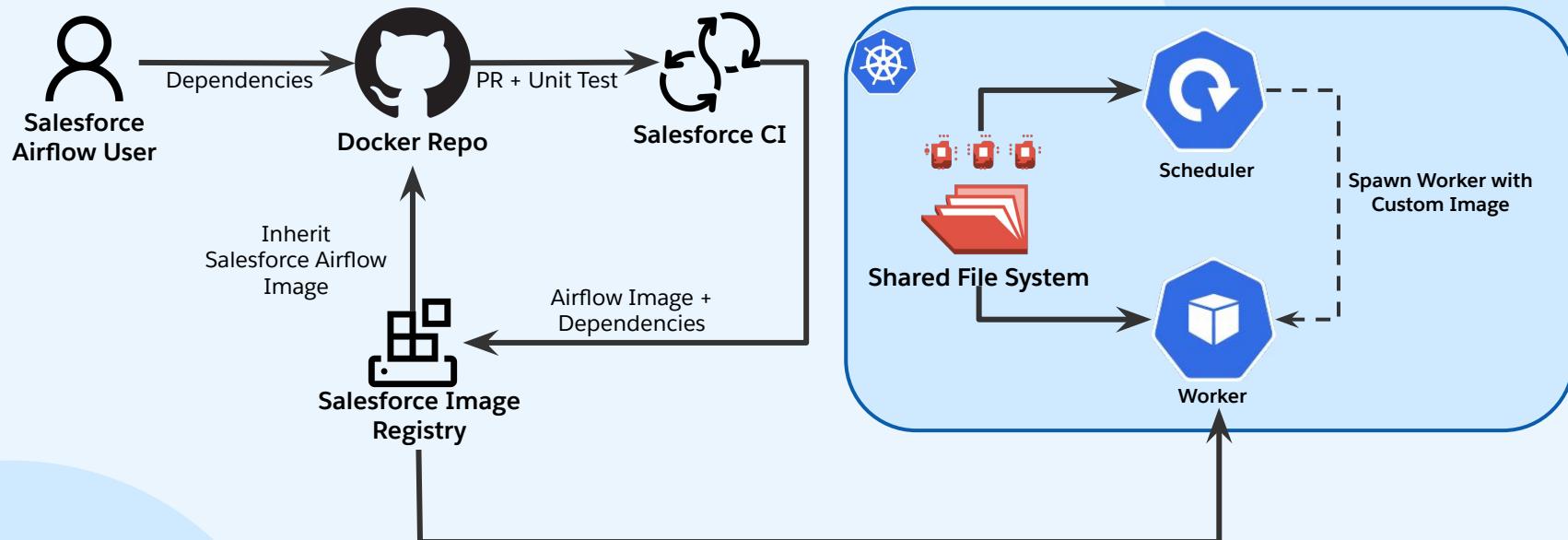
User Journey

Sourcing Dependencies for Kubernetes Executor



User Journey

Sourcing Dependencies for Kubernetes Pod Operator



Conclusion & Takeaways

Airflow “Easy” at Scale

Unburden Customer Operations, Focus on Business Excellence



Unified Developer Experience



Securely Connected Platforms



Monitoring, Alerting & Support



Salesforce Compliant



Hyperforce

TRUST



Salesforce Airflow

Flexible,
Scalable and
Automated
Orchestration

salesforce

Thank you

