Deploy Workloads with Databricks Workflows

Module 05

Module Agenda

Deploy Workloads with Databricks Workflows

Introduction to Workflows

Building and Monitoring Workflow Jobs

DE 5.1 - Scheduling Tasks with the Jobs UI

DE 5.2L - Jobs Lab

Introduction to Workflows

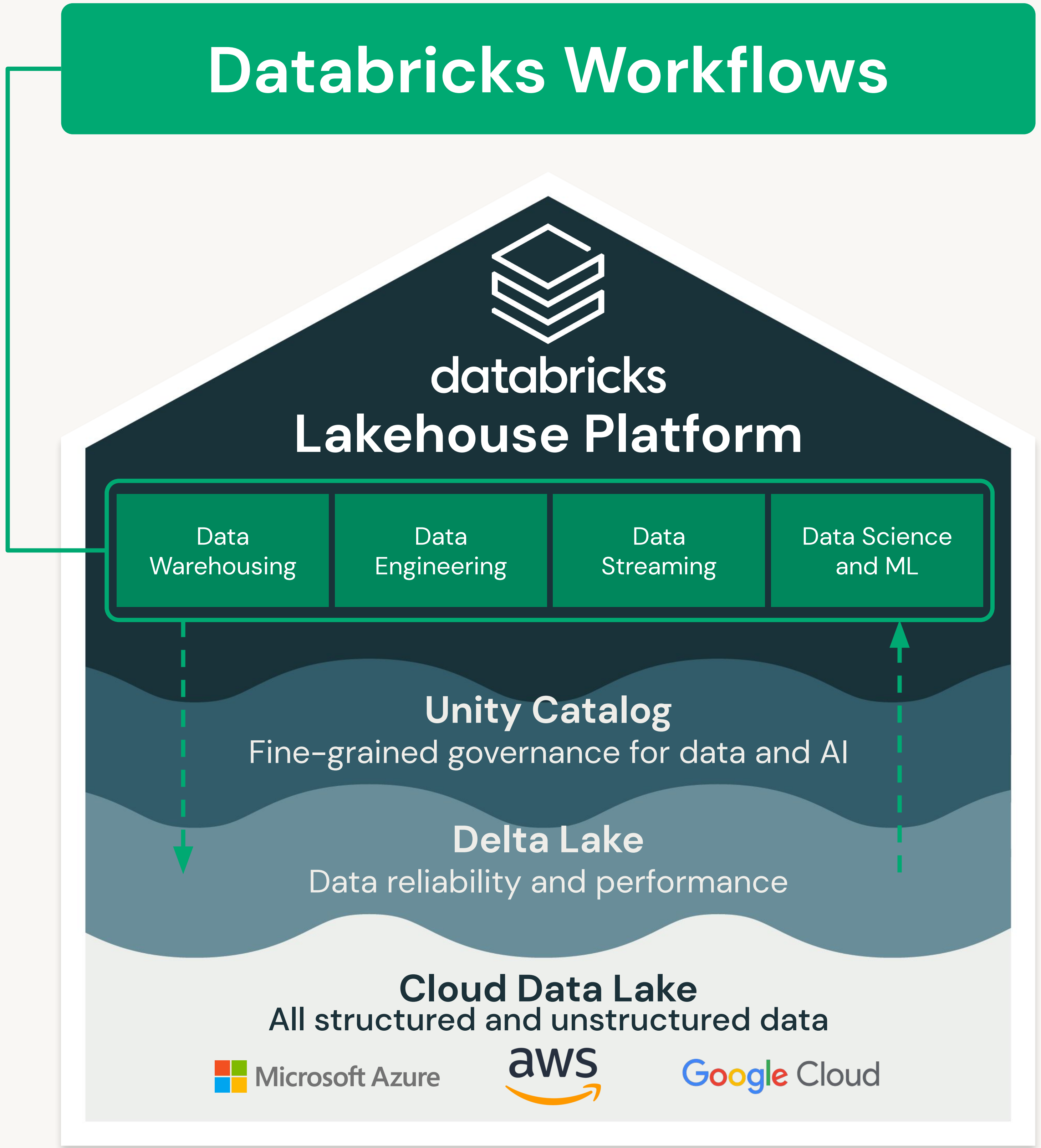
Course Objectives

1. Describe the main features and use cases of Databricks Workflows
2. Create a task orchestration workflow composed of various task types
3. Utilize monitoring and debugging features of Databricks Workflows
4. Describe workflow best practices

Databricks Workflows

Workflows is a **fully-managed cloud-based general-purpose task orchestration service** for the entire Lakehouse.

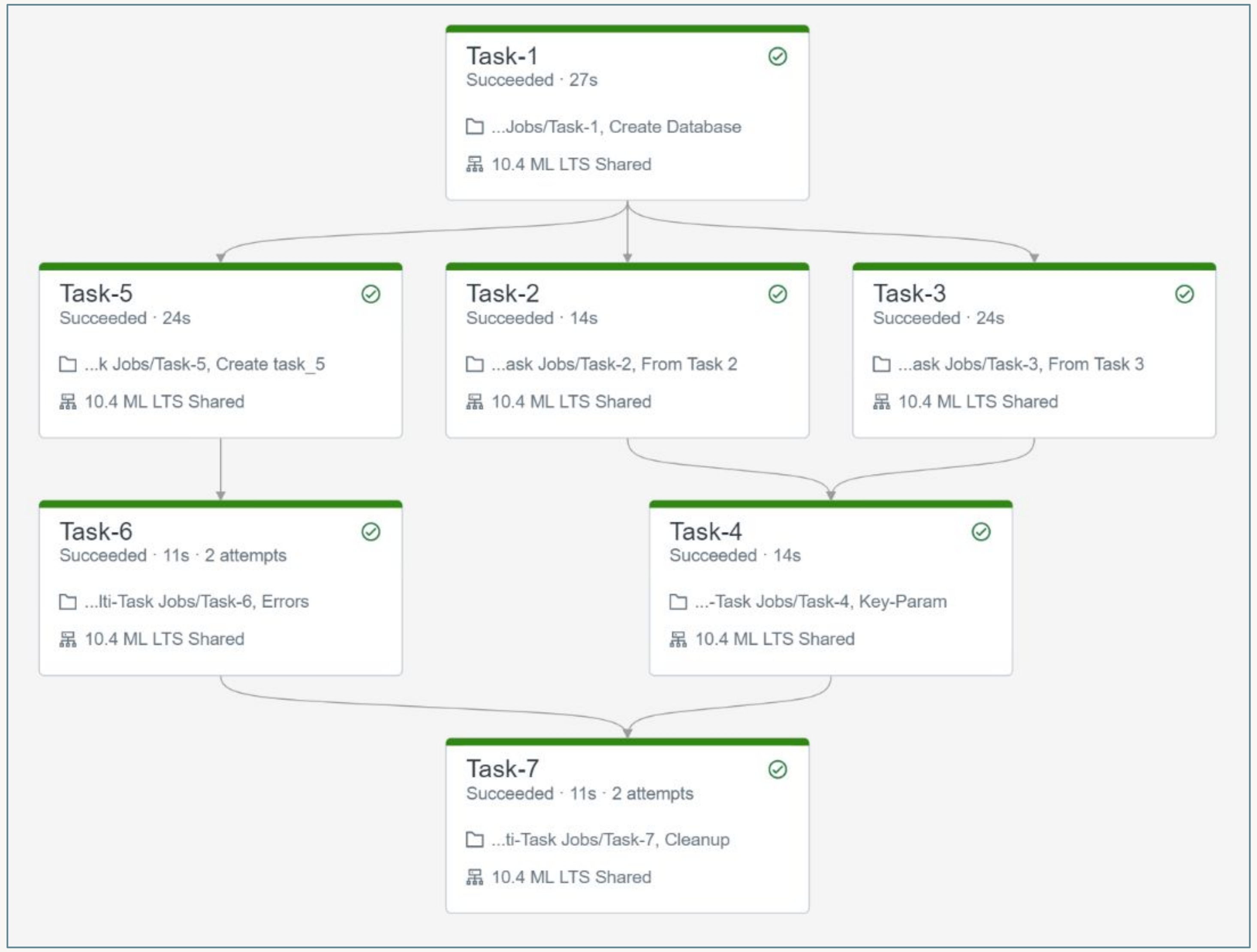
Workflows is a service for data engineers, data scientists and analysts to build reliable data, analytics and AI workflows on any cloud.



Databricks Workflows

Databricks has two main task orchestration services:

- **Workflow Jobs (Workflows)**
  - Workflows for every job
- **Delta Live Tables (DLT)**
  - Automated data pipelines for Delta Lake


Task-1
Succeeded · 27s
...Jobs/Task-1, Create Database
10.4 ML LTS Shared
Task-5
Succeeded · 24s
...k Jobs/Task-5, Create task_5
10.4 ML LTS Shared
Task-2
Succeeded · 14s
...ask Jobs/Task-2, From Task 2
10.4 ML LTS Shared
Task-3
Succeeded · 24s
...ask Jobs/Task-3, From Task 3
10.4 ML LTS Shared
Task-6
Succeeded · 11s · 2 attempts
...lti-Task Jobs/Task-6, Errors
10.4 ML LTS Shared
Task-4
Succeeded · 14s
...-Task Jobs/Task-4, Key-Param
10.4 ML LTS Shared
Task-7
Succeeded · 11s · 2 attempts
...ti-Task Jobs/Task-7, Cleanup
10.4 ML LTS Shared

Note: DLT pipeline can be a task in a workflow

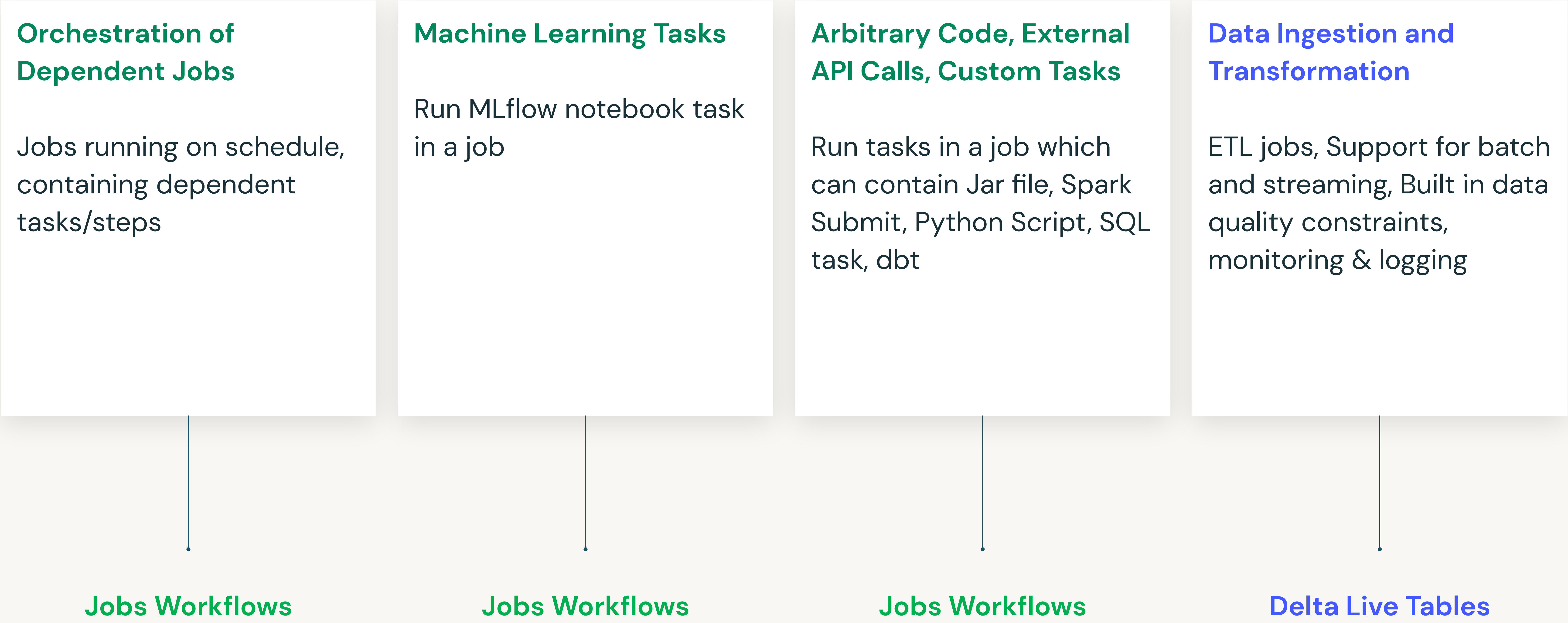
DLT versus Jobs

Considerations

	Delta Live Tables	Workflow Jobs
Source	Notebooks only	JARs, notebooks, DLT, application written in Scala, Java, Python
Dependencies	Automatically determined	Manually set
Cluster	Self-provisioned	Self-provisioned or existing
Timeouts and Retries	Not supported	Supported
Import Libraries	Not supported	Supported

DLT versus Jobs

Use Cases



Orchestration of Dependent Jobs

Jobs running on schedule, containing dependent tasks/steps

Jobs Workflows

Machine Learning Tasks

Run MLflow notebook task in a job

Jobs Workflows

Arbitrary Code, External API Calls, Custom Tasks

Run tasks in a job which can contain Jar file, Spark Submit, Python Script, SQL task, dbt

Jobs Workflows

Data Ingestion and Transformation

ETL jobs, Support for batch and streaming, Built in data quality constraints, monitoring & logging

Delta Live Tables

Workflows Features

Part 1 of 2

Orchestrate Anything Anywhere

Run diverse workloads for the full data and AI lifecycle, on any cloud. Orchestrate;

- Notebooks
- Delta Live Tables
- Jobs for SQL
- ML models, and more

Fully Managed

Remove operational overhead with a fully managed orchestration service enabling you to focus on your workflows not on managing your infrastructure

Simple Workflow Authoring

An easy point-and-click authoring experience for all your data teams not just those with specialized skills

Workflows Features

Part 2 of 2

Deep Platform Integration

Designed and built into your lakehouse platform giving you deep monitoring capabilities and centralized observability across all your workflows

Proven Reliability

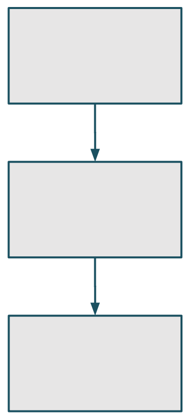
Have full confidence in your workflows leveraging our proven experience running tens of millions of production workloads daily across AWS, Azure, and GCP

How to Leverage Workflows

- Allows you to build simple ETL/ML task orchestration
- Reduces infrastructure overhead
- Easily integrate with external tools
- Enables non-engineers to build their own workflows using simple UI
- Cloud-provider independent
- Enables re-using clusters to reduce cost and startup time

Common Workflow Patterns

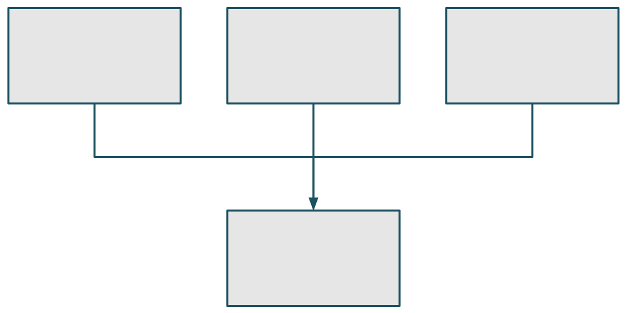
Sequence



Sequence

- Data transformation/ processing/cleaning
- Bronze/silver/gold tables

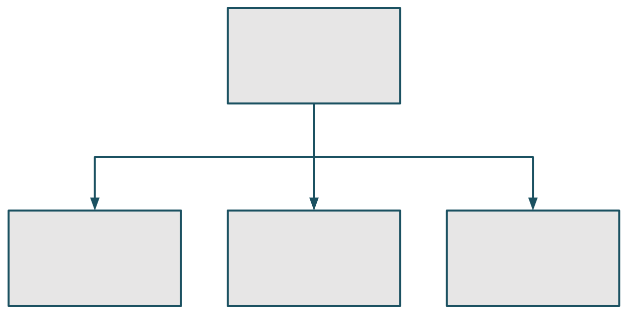
Funnel



Funnel

- Multiple data sources
- Data collection

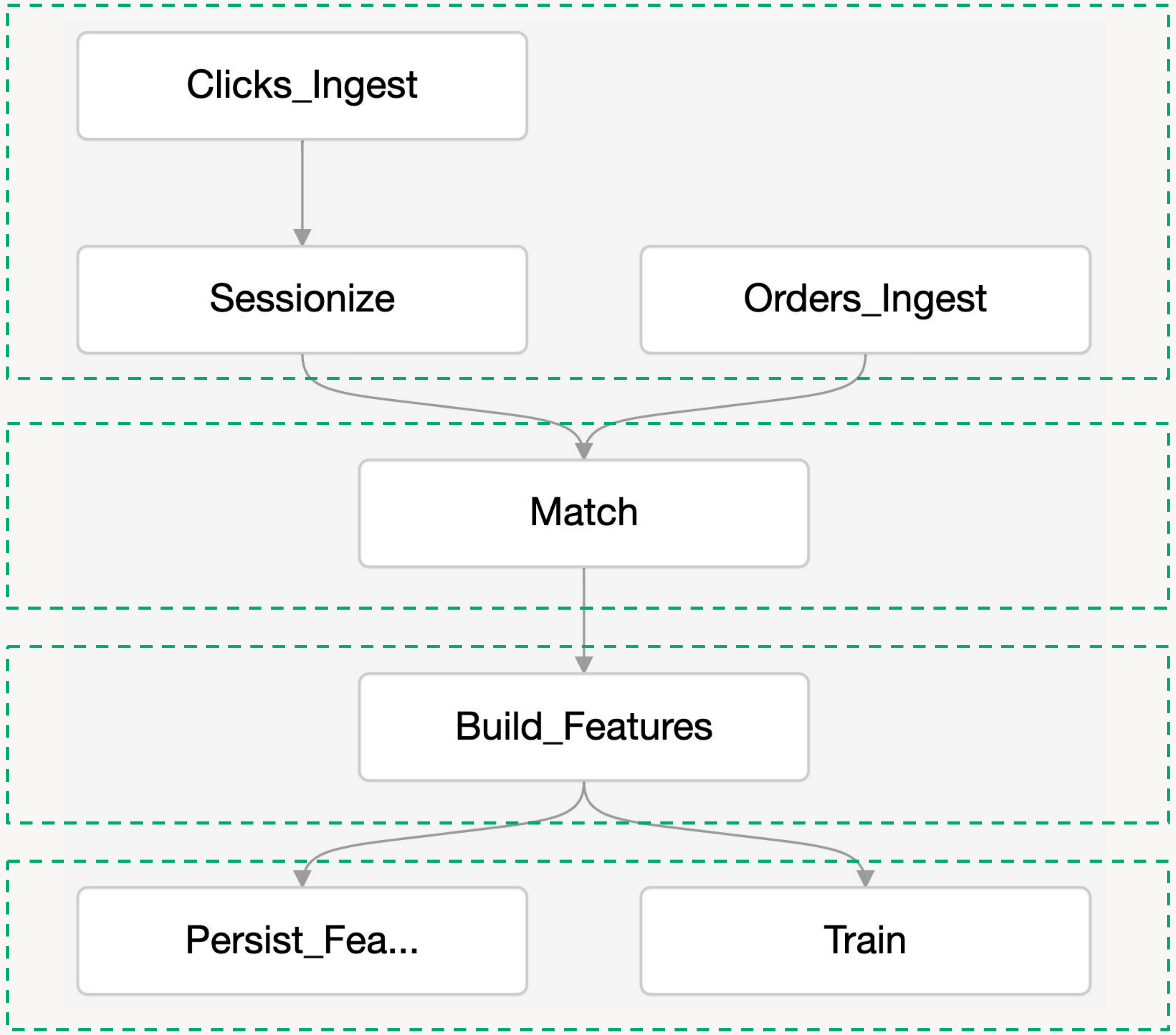
Fan-out



Fan-out, star pattern

- Single data source
- Data ingestion and distribution

Example Workflow



Data ingestion funnel

E.g. Auto Loader, DLT

Data filtering, quality assurance, transformation

E.g. DLT, SQL, Python

ML feature extraction

E.g. MLflow

Persisting features and training prediction model

Building and Monitoring Workflow Jobs

Workflows Job Components

TASKS

What?

SCHEDULE

When?

CLUSTER

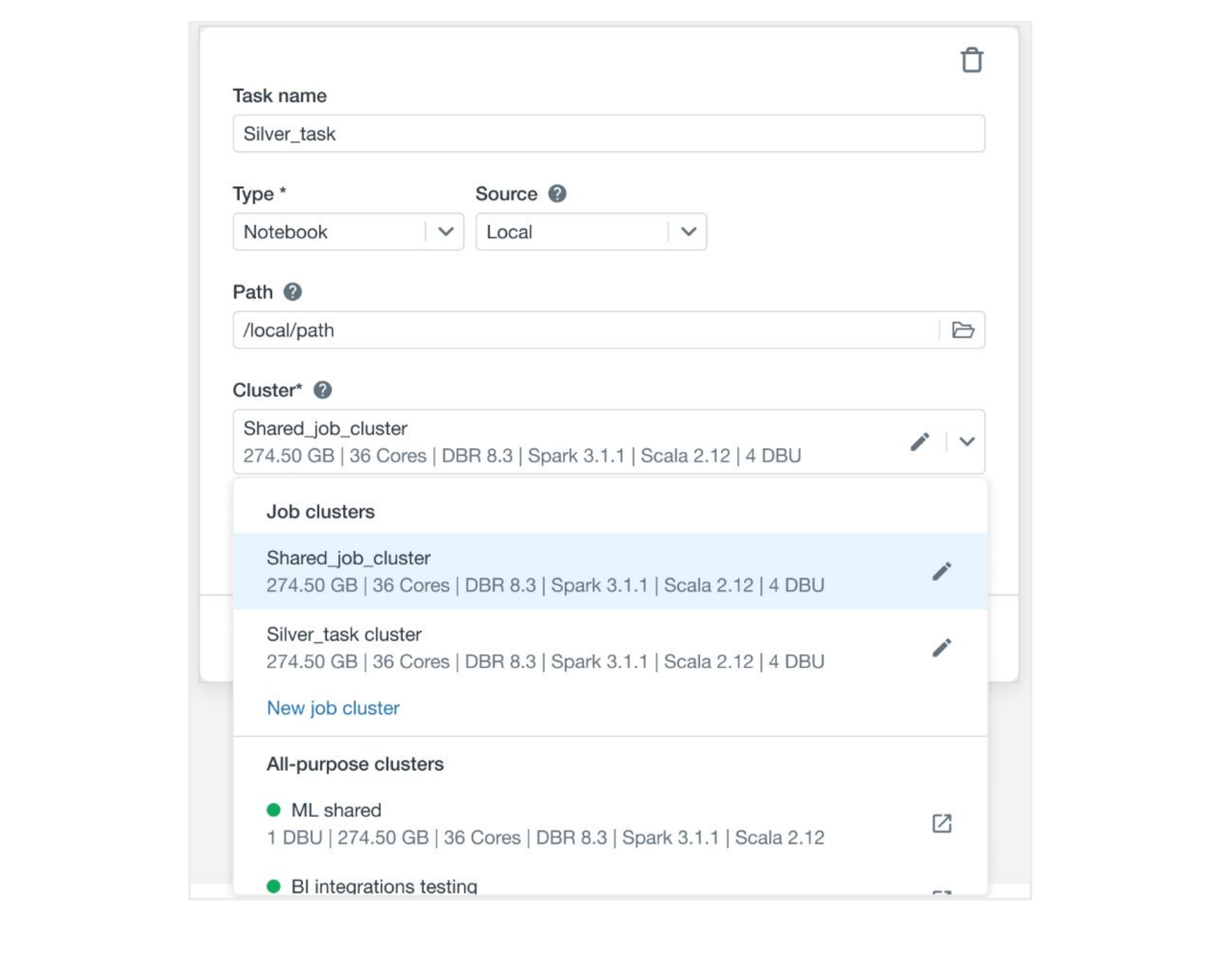
How?

Creating a Workflow

Task Definition

While creating a task;

- Define the task type
- Choose the cluster type
  - Job clusters and All-purpose clusters can be used.
  - A cluster can be used by multiple tasks. This reduces cost and startup time.
- If you want to create a new cluster, you must have required permissions.
- Define task dependency if task depends on another task



Task name

Silver_task

Type *: Notebook

Source: Local

Path: /local/path

Cluster*

Shared_job_cluster
274.50 GB | 36 Cores | DBR 8.3 | Spark 3.1.1 | Scala 2.12 | 4 DBU

Job clusters

Shared_job_cluster
274.50 GB | 36 Cores | DBR 8.3 | Spark 3.1.1 | Scala 2.12 | 4 DBU

Silver_task cluster
274.50 GB | 36 Cores | DBR 8.3 | Spark 3.1.1 | Scala 2.12 | 4 DBU

New job cluster

All-purpose clusters

● ML shared
1 DBU | 274.50 GB | 36 Cores | DBR 8.3 | Spark 3.1.1 | Scala 2.12

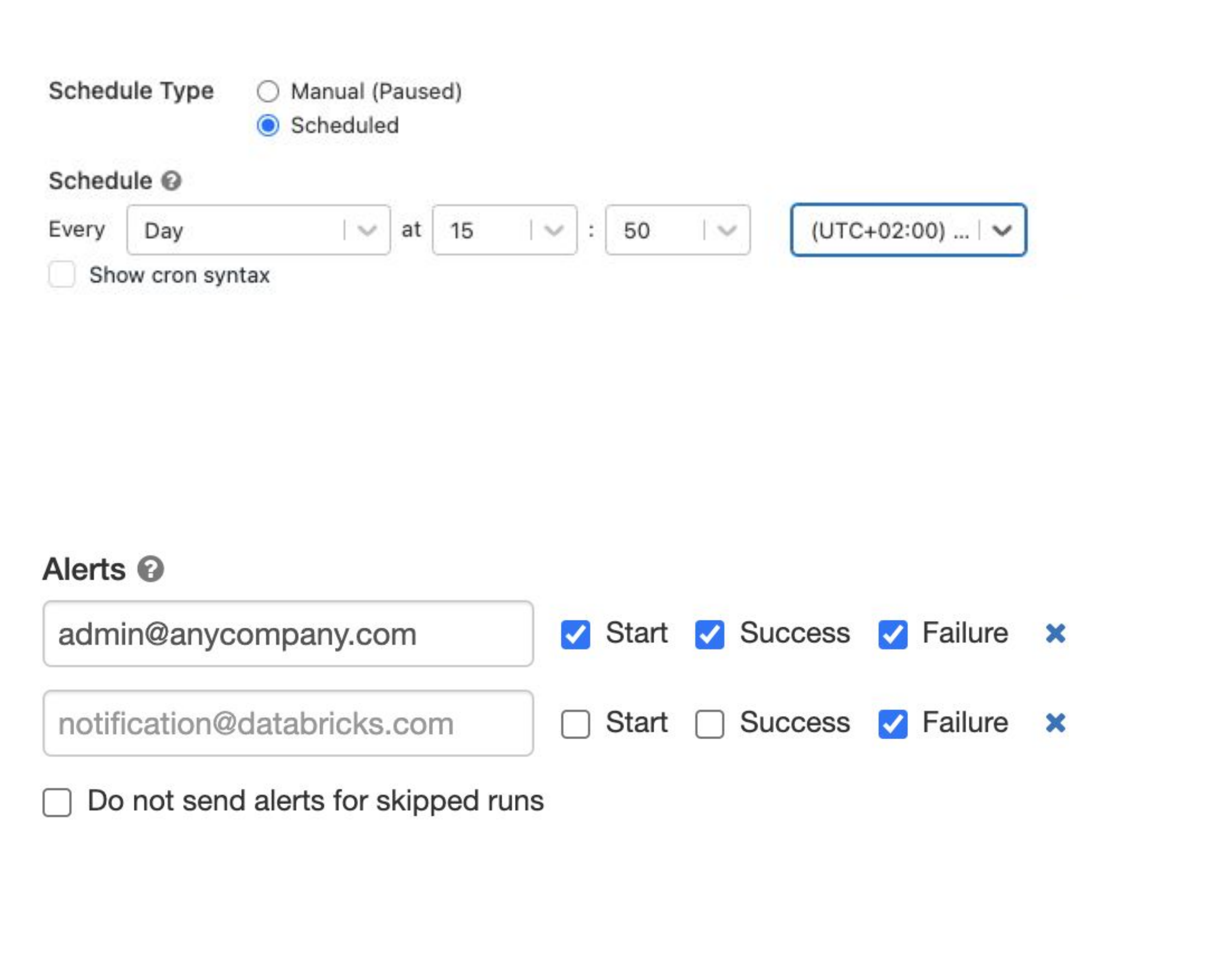
● BI integrations testing

Monitoring and Debugging

Scheduling and Alerts

You can run your jobs **immediately** or **periodically** through an easy-to-use scheduling system.

You can specific alerts to be notified when runs of a job **begin, complete or fail**. Notifications can be sent via email, Slack or AWS SNS.



Schedule Type ○ Manual (Paused) ● Scheduled

Schedule

Every Day at 15 : 50 (UTC+02:00) ...

□ Show cron syntax

Alerts

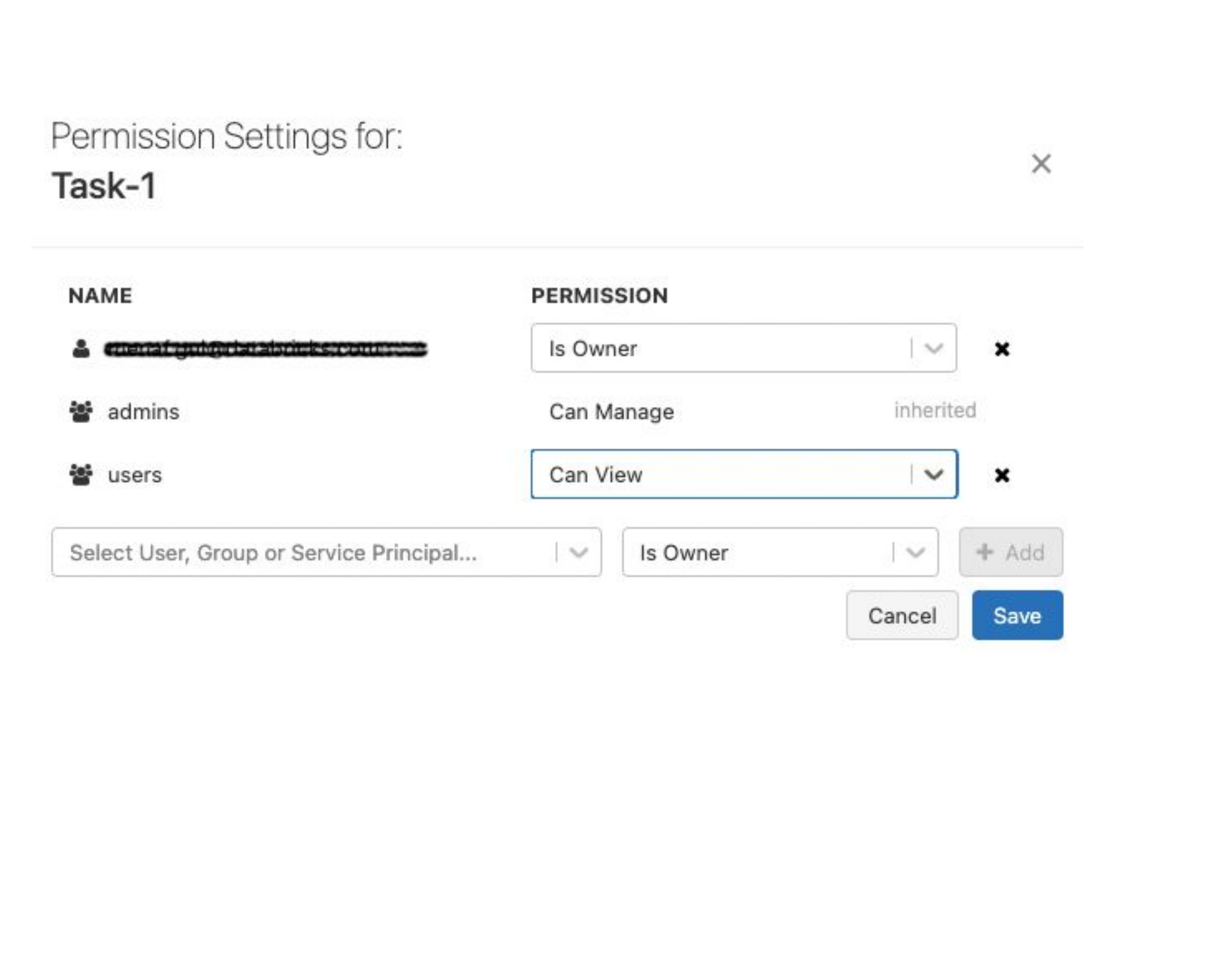
admin@anycompany.com	☑ Start	☑ Success	☑ Failure	✖
notification@databricks.com	□ Start	□ Success	☑ Failure	✖

□ Do not send alerts for skipped runs

Monitoring and Debugging

Access Control

Workflows integrates with existing resources access controls, enabling you to easily manage access across different teams.



Permission Settings for:
Task-1

NAME	PERMISSION	
[redacted]	Is Owner	
admins	Can Manage	inherited
users	Can View	

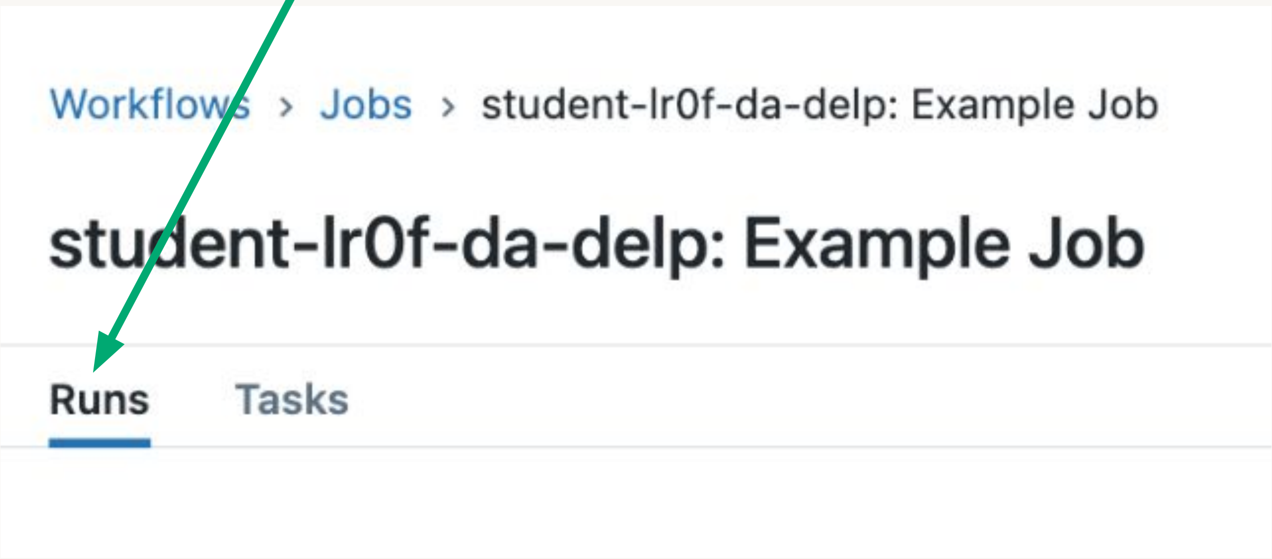
Select User, Group or Service Principal... | Is Owner

Monitoring and Debugging

Job Run History

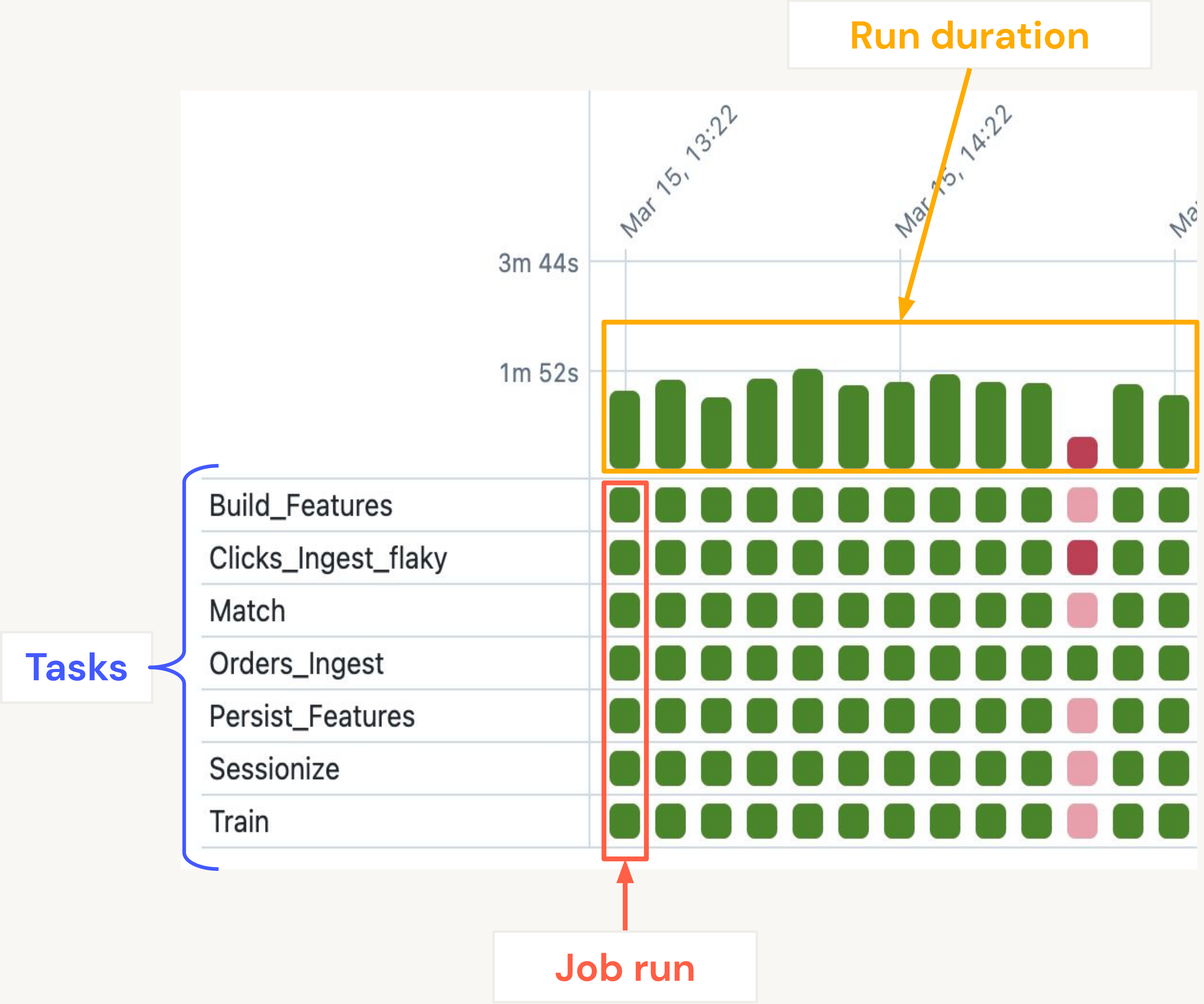
Workflows keeps track of job runs and save information about the success or failure of each task in the job run.

Navigate to the **Runs** tab to view completed or active runs for a job.



Workflows › Jobs › student-lr0f-da-delp: Example Job

student-lr0f-da-delp: Example Job



Run duration

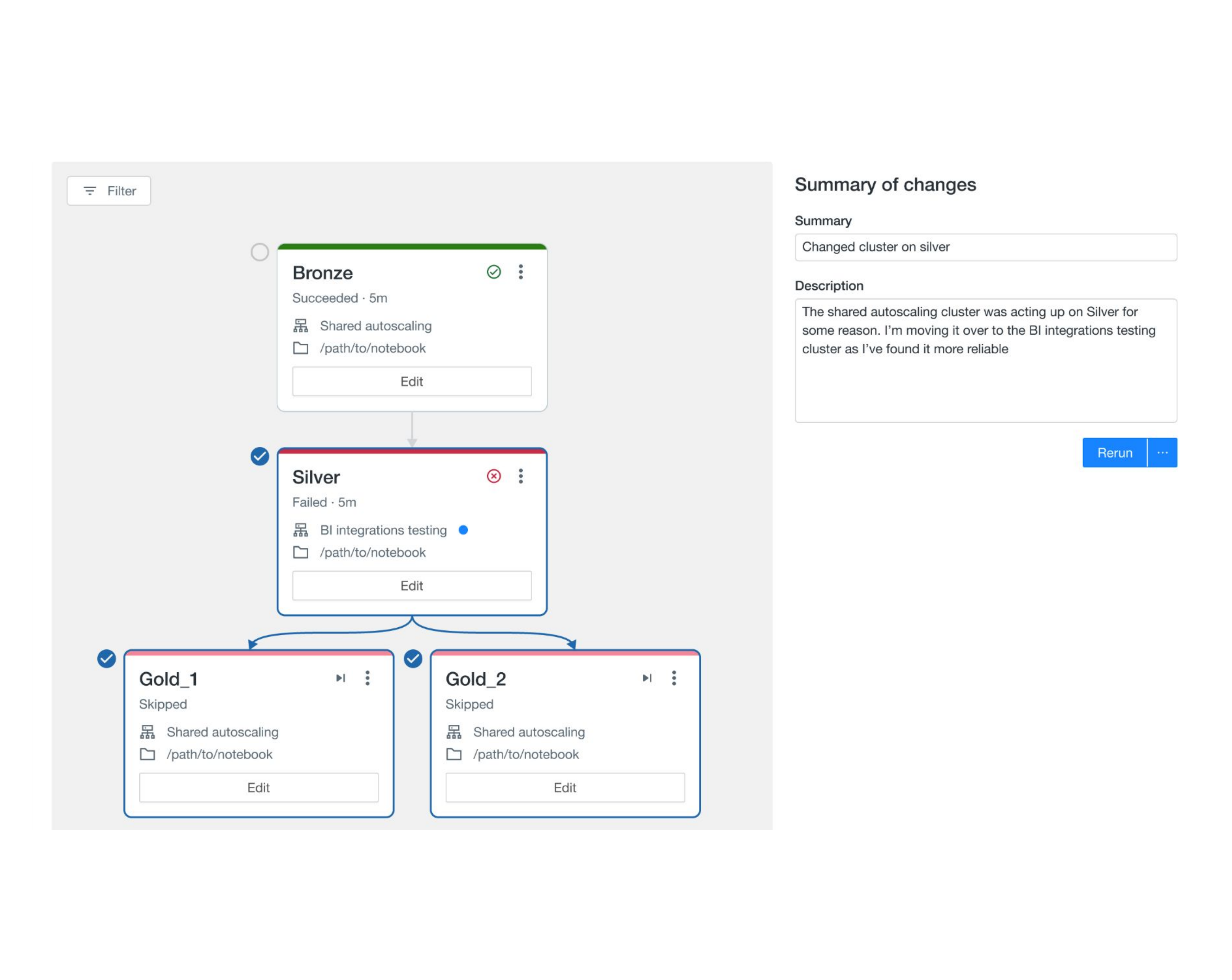
Tasks

Job run

Monitoring and Debugging

Repair a Failed Job Run

Repair feature allows you to re-run only the failed task and sub-tasks, which reduces the time and resources required to recover from unsuccessful job runs.



Bronze
Succeeded · 5m
Shared autoscaling
/path/to/notebook

Silver
Failed · 5m
BI integrations testing
/path/to/notebook

Gold_1
Skipped
Shared autoscaling
/path/to/notebook

Gold_2
Skipped
Shared autoscaling
/path/to/notebook

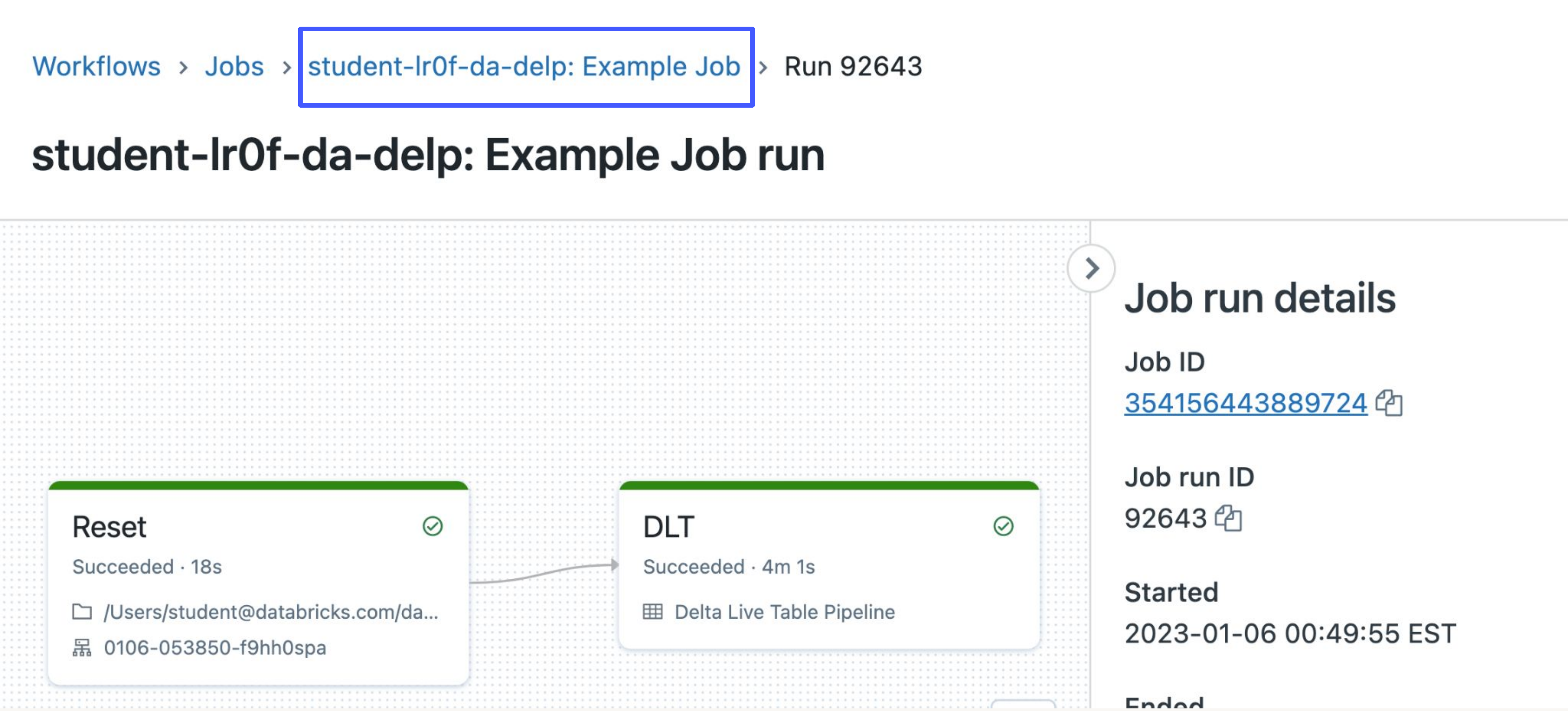
Summary of changes

Summary
Changed cluster on silver

Description
The shared autoscaling cluster was acting up on Silver for some reason. I'm moving it over to the BI integrations testing cluster as I've found it more reliable

Navigating the Jobs UI

Use breadcrumbs to navigate back to your job from a specific run page



Workflows › Jobs › student-lr0f-da-delp: Example Job › Run 92643

student-lr0f-da-delp: Example Job run

Reset ✓
Succeeded · 18s
/Users/student@databricks.com/da...
0106-053850-f9hh0spa

DLT ✓
Succeeded · 4m 1s
Delta Live Table Pipeline

Job run details

Job ID
354156443889724

Job run ID
92643

Started
2023-01-06 00:49:55 EST

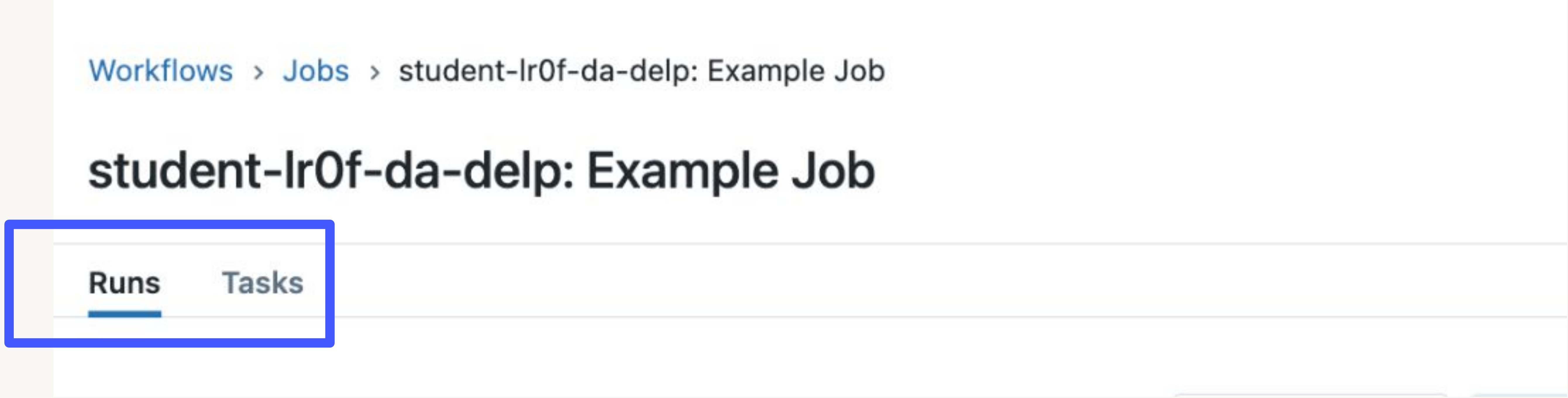
Ended

Navigating the Jobs UI

Runs vs Tasks tabs on the job page

Use **Runs** tab to view completed or active runs for the job

Use **Tasks** tab to modify or add tasks to the job



Workflows › Jobs › student-lr0f-da-delp: Example Job

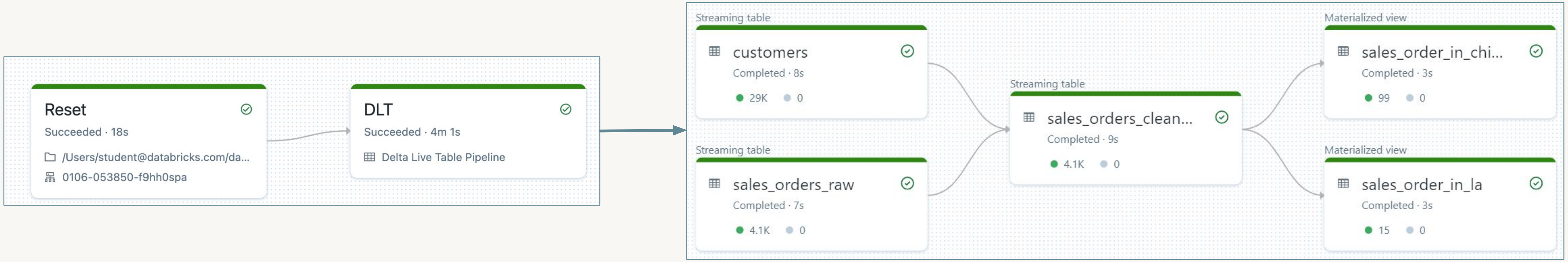
student-lr0f-da-delp: Example Job

DE 5.1.1: Task Orchestration

Demo: Task Orchestration

DE 5.1.1 – Task Orchestration

- Schedule a notebook task in a Databricks Workflow Job
- Describe job scheduling options and differences between cluster types
- Review Job Runs to track progress and see results
- Schedule a DLT pipeline task in a Databricks Workflow Job
- Configure dependency between tasks via Databricks Workflows UI



Reset ✓
Succeeded · 18s
/Users/student@databricks.com/da...
0106-053850-f9hh0spa

DLT ✓
Succeeded · 4m 1s
Delta Live Table Pipeline

Streaming table
customers ✓
Completed · 8s
● 29K ● 0

Streaming table
sales_orders_raw ✓
Completed · 7s
● 4.1K ● 0

Streaming table
sales_orders_clean... ✓
Completed · 9s
● 4.1K ● 0

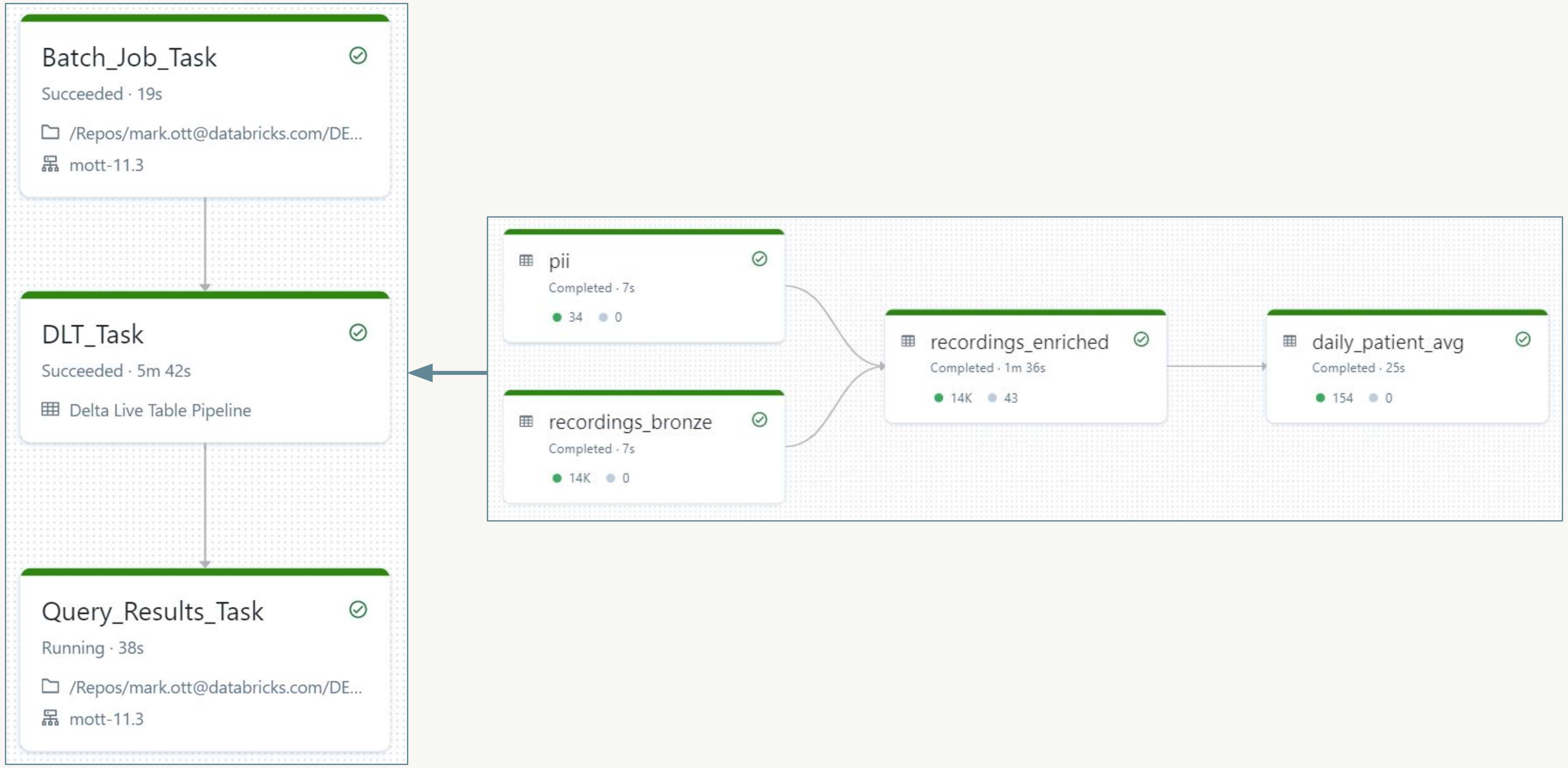
Materialized view
sales_order_in_chi... ✓
Completed · 3s
● 99 ● 0

Materialized view
sales_order_in_la ✓
Completed · 3s
● 15 ● 0

DE 5.2.1.L: Task Orchestration Lab

Lab: Task Orchestration

DE 5.2.1.L – Task Orchestration



Batch_Job_Task
Succeeded · 19s
/Repos/mark.ott@databricks.com/DE...
mott-11.3

DLT_Task
Succeeded · 5m 42s
Delta Live Table Pipeline

Query_Results_Task
Running · 38s
/Repos/mark.ott@databricks.com/DE...
mott-11.3

pii
Completed · 7s
● 34 ● 0

recordings_bronze
Completed · 7s
● 14K ● 0

recordings_enriched
Completed · 1m 36s
● 14K ● 43

daily_patient_avg
Completed · 25s
● 154 ● 0

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