Orchestrating Data Quality - Quality Data Brought To You By Airflow 3.0

Maggie Stark

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2018

Founded
Astronomer to take Airflow to the next level

Airflow 3.0
50%+ of code

Astro Observe
Data products

Astro (2023)
Multi-cloud, fully managed Airflow

Airflow 2.0 (2020)
Led development with 60%+ of code contributed

Management Software (2018)
Suite of software to help organizations manage Airflow in any environment

Orchestration Platform **Unifying DataOps**

Today

One platform for DataOps

Used by **all data teams**
Deployed **everywhere**

700+
Customers

300+
Employees

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- Centralized Data Team
- Build critical operational and analytical pipelines with Airflow
- Product Influencers
  - Providing a Data-First Perspective

Configuration as Code

```
/*
operator: include.task_groups.transform.CreateTable
description: >-
    Creates standard calendar, where each row
    represents a date with common date operations.
fields:
    date: Date (iso format yyyy-mm-dd).
    is_weekend: Date is Sat. or Sun.
    is_weekday: Date is weekday (MTWTF).
schema: !switch_value
    sandbox: env__sandbox_schema
    default: commons
primary_key:
    - date
tests:
    check_null:
        - is_weekend
*/

SELECT
    gd.date::DATE AS date,
    IFF(gd.dow IN (0, 6), TRUE, FALSE) AS is_weekend,
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FROM generated_dates AS gd
ORDER BY date ASC
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calendar.sql

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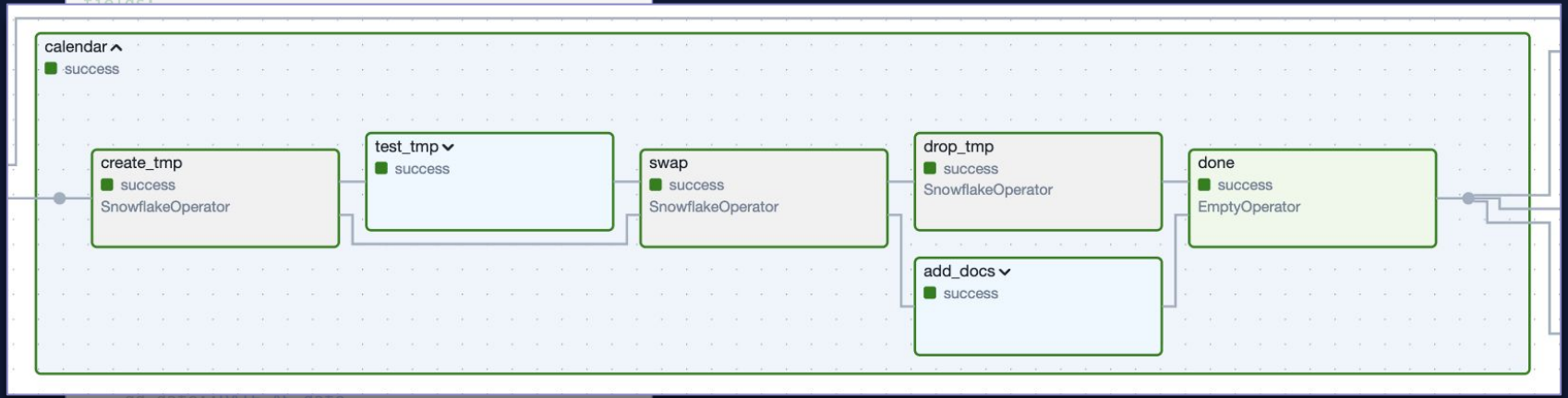


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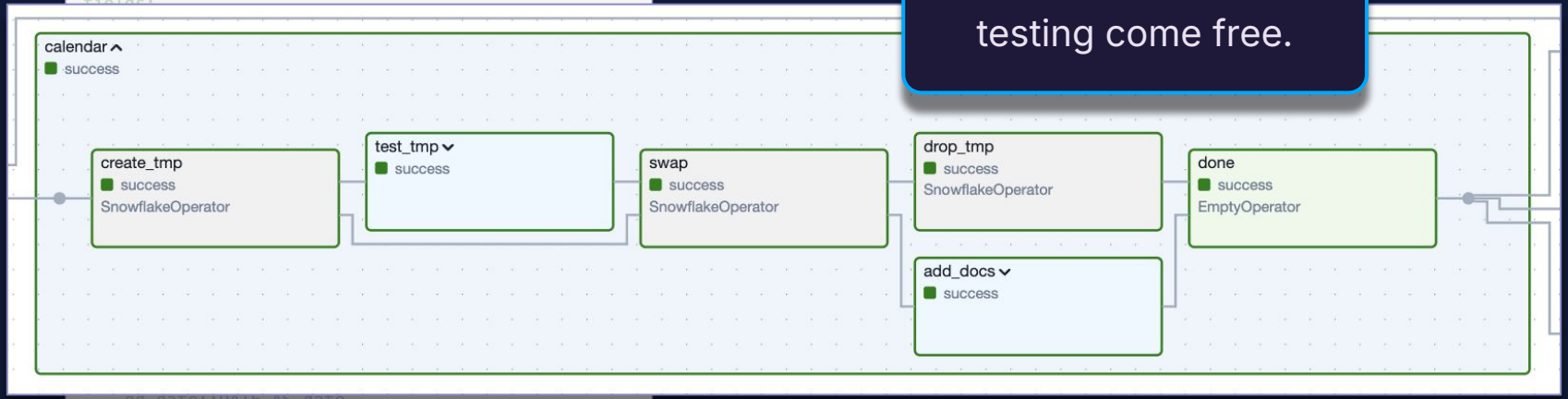


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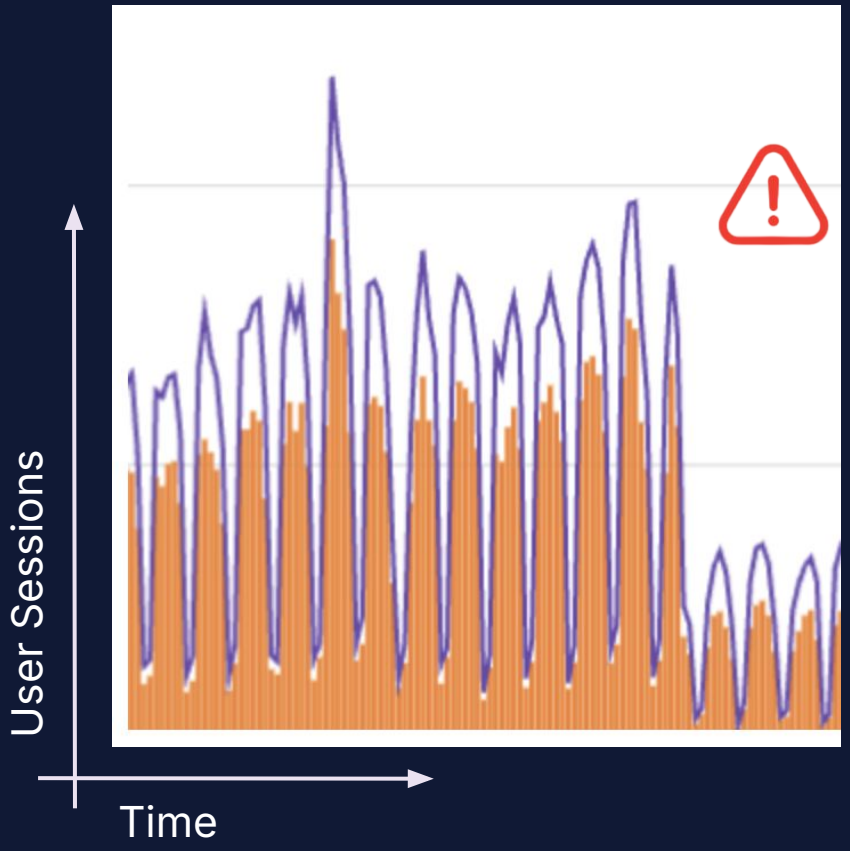
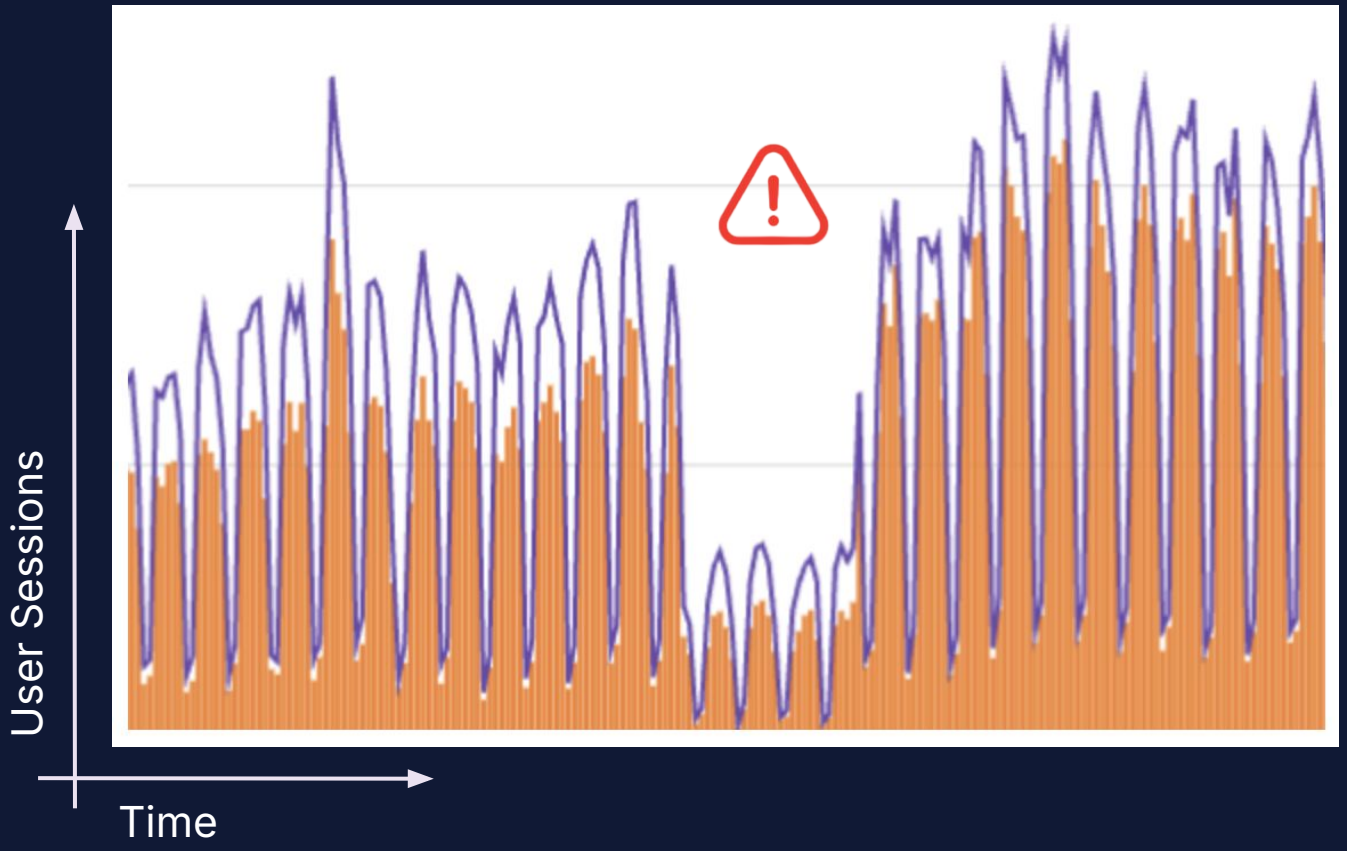
1 file = n tasks!

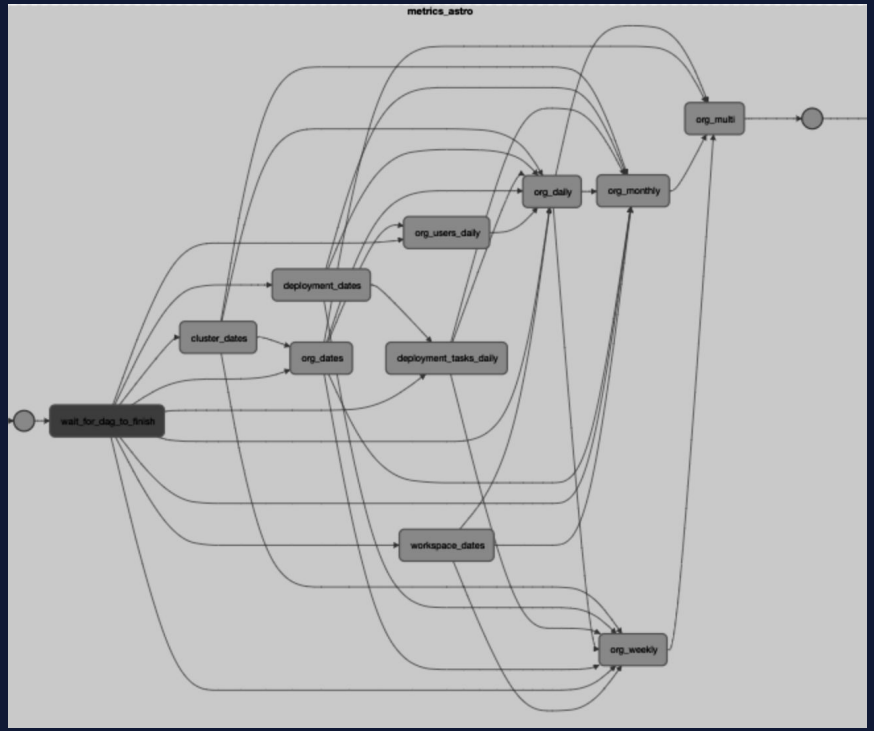
Create a table; get documentation and testing come free.


User Sessions
Time


User Sessions
Time

Standalone Data-Quality DAG

- Hard to Maintain
- Duplicative
- Poor Visibility and Adoption



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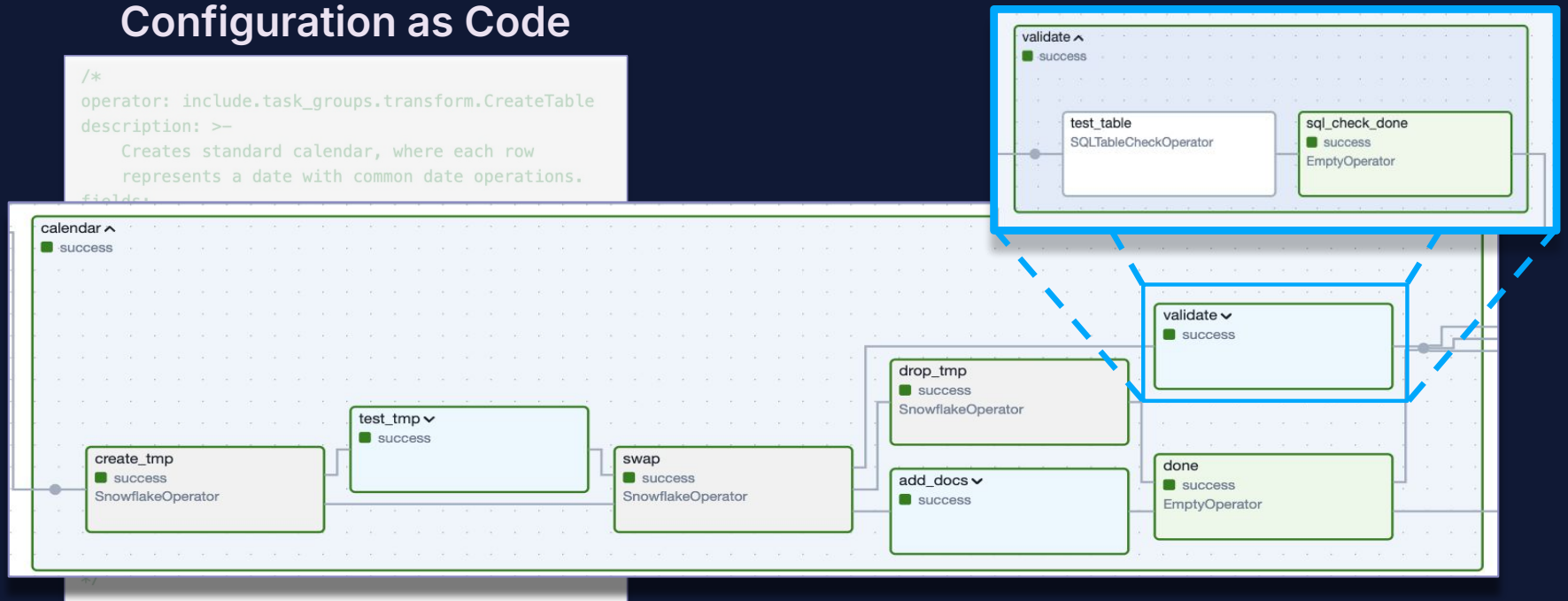

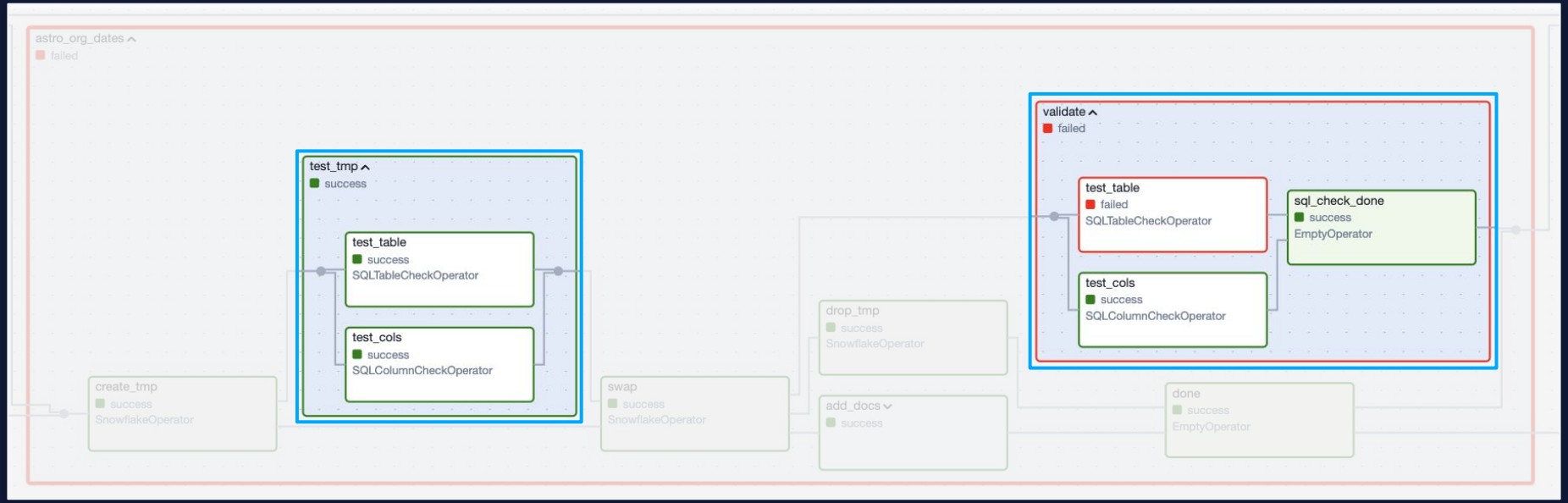
astro_org_dates
failed
test_tmp
success
test_table
success
SQLTableCheckOperator
test_cols
success
SQLColumnCheckOperator
create_tmp
success
SnowflakeOperator
swap
success
SnowflakeOperator
drop_tmp
success
SnowflakeOperator
add_docs
success
validate
failed
test_table
failed
SQLTableCheckOperator
test_cols
success
SQLColumnCheckOperator
sql_check_done
success
EmptyOperator
done
success
EmptyOperator

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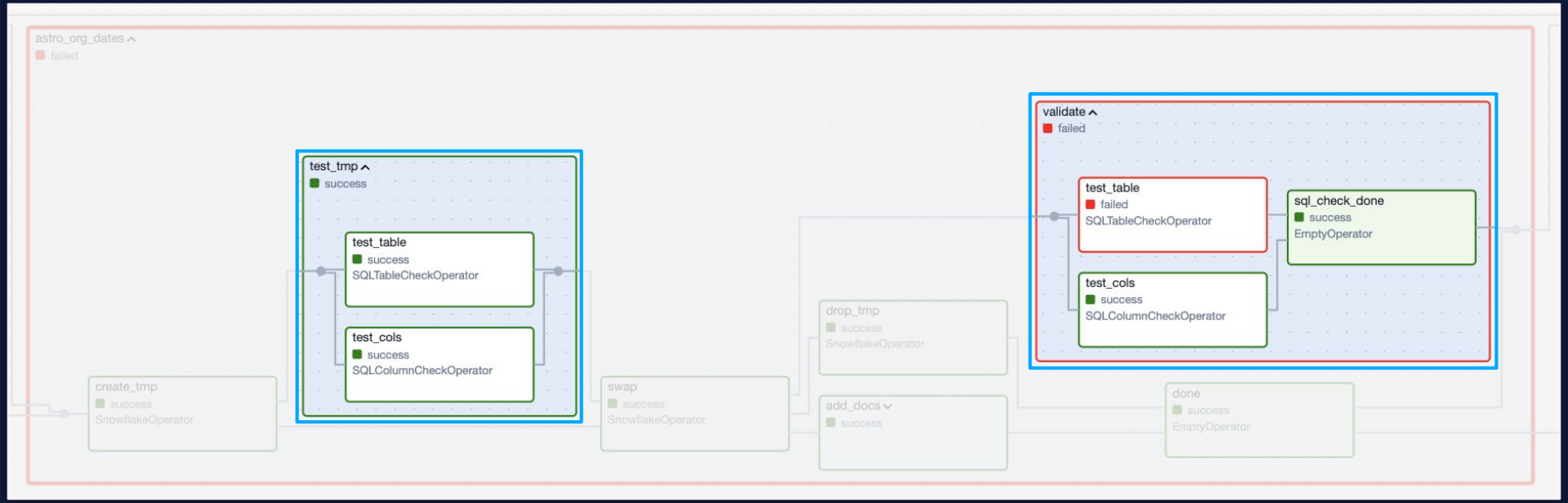
Data Contracts	Expected attributes exist, NULLs, field values, conditionals based on understanding of data source.
Data Integrity	PKs, FKs, NULLs, unique field composites, field values.
Data Accuracy	Metrics align between related grains of aggregations, business-process conditionals which have external impact.
Non-Blocking Validations	Business-process conditionals with no external impact, field values, parity between dev./prod.

Where are data quality checks performed?

	Ingest	Model	Maps	Metrics	Marts	Reporting
Data Contracts						
Data Integrity						
Data Accuracy						
Non-Blocking Validations						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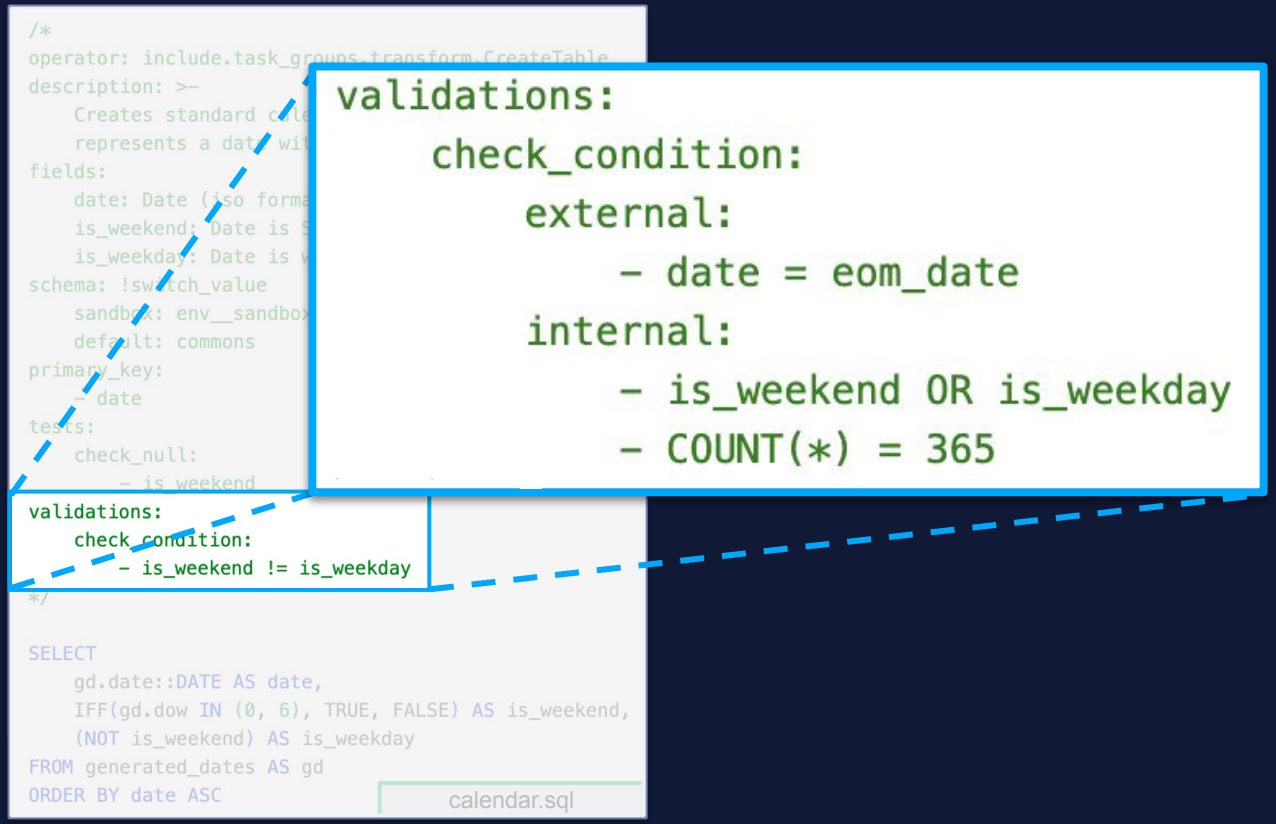
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calendar.sql
validations:
check_condition:
external:
- date = eom_date
internal:
- is_weekend OR is_weekday
- COUNT(*) = 365

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Logging

	DAG_ID	TASK_ID	LOGICAL_TS
1	model_crm	sf_accounts.validate.test_table	2025-09-18 06:29

[] RESULTS


```
[
  {
    "failed_row_count": "50",
    "is_success": "False",
    "owner": "external",
    "sql": "zd_org_id IS NOT NULL OR
is_deleted OR NOT is_current_cust",
    "test_name": "check_condition_1"
  },
  {
    "failed_row_count": "10",
    "is_success": "False",
    "owner": "external",
    "sql": "NOT is_current_cust OR
support_level IS NOT NULL OR product IS NULL",
    "test_name": "check_condition_2"
  }
]
```


	DAG_ID	TASK_ID	LOGICAL_TS
1	test_mart_cust	test_current_astro_custs	2025-09-17 17:

RESULTS


```
{"owner": "internal", "test_severity": "validation", "failed_row_count": 2, "is_success":
false, "failed_rows":
"D566485B7B22414343545F4944223A2230303134783001012462765335 7A414145222C091F4C4E414D45223A2
6E647265645820496E632E111CC454414753223A2250726F6A6563746564207573616765206F76657220313235
F6E73756D7074696F6E2067726F777468091C4035302520284C617374203720646179732 98A2A000433300D2B5
772075736572732061646465643B4163746976650D1324696
57211174C55524C223A2268747470733A2F2F617374726F6E
2E636F6D2F1514282F722F4163636F756E742F463601102F7
33044223A395A1A00185F4C4147223A32361E00045043051C
```


[] HUMAN_READABLE


```
[
  {
    "ACCT_ID": "0014x00000bvS5zAAE",
```


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Recapping

- Use Airflow-native operators to perform DQ checks.
- Write-audit-publish approach.
- Checks are mainly configured in task definition
  - New/different standalone DQ pipelines
- Surface some validation results in dashboards to take action.

The 2025 Apache Airflow® Survey is here!

Fill it out to for a free Airflow 3 Fundamentals or DAG Authoring in Airflow 3 certification code

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Questions?