Mastering Data Engineering

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About me

- Data Engineer in SUSE
- Over 10 years working experience in data related jobs
- Education: Finance, Data Analytics & Computer Science
- Ex kaggler
- Founder & organiser of DSEClub

What is Apache Airflow?

- Apache Airflow is an open-source platform for authoring, scheduling and monitoring data and computing workflows.

DAG Directed Acyclic Graph – is a collection of all the tasks you want to run, organized in a way that reflects their relationships and dependencies.

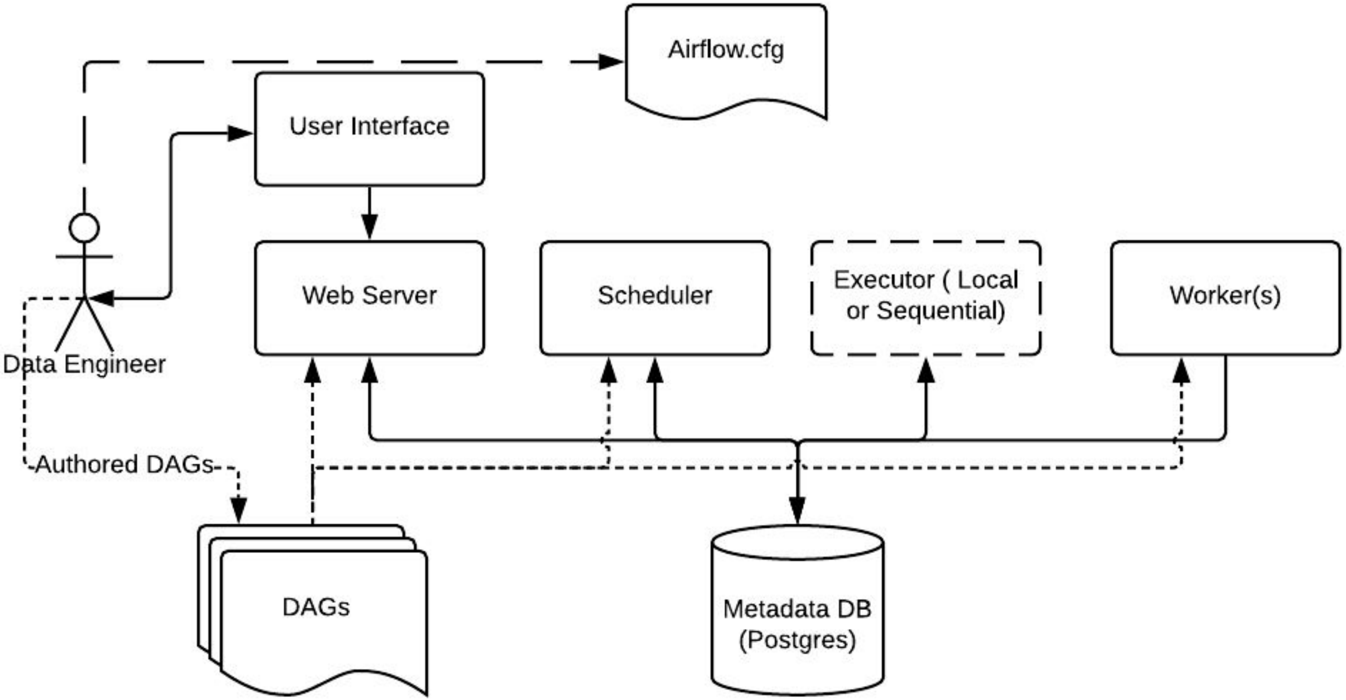
Batch oriented data processing - scheduler   cron

- Airflow was created in 2014 by Maxime Beauchemin at Airbnb.

Features of Apache Airflow

- Simple and friendly User Interface
- Open source
- Python code
- Robust Integrations
- Jinja templates
- Dynamic pipeline generation
- Scalable and distributed
- Wide and active community

What is Apache Airflow Architecture

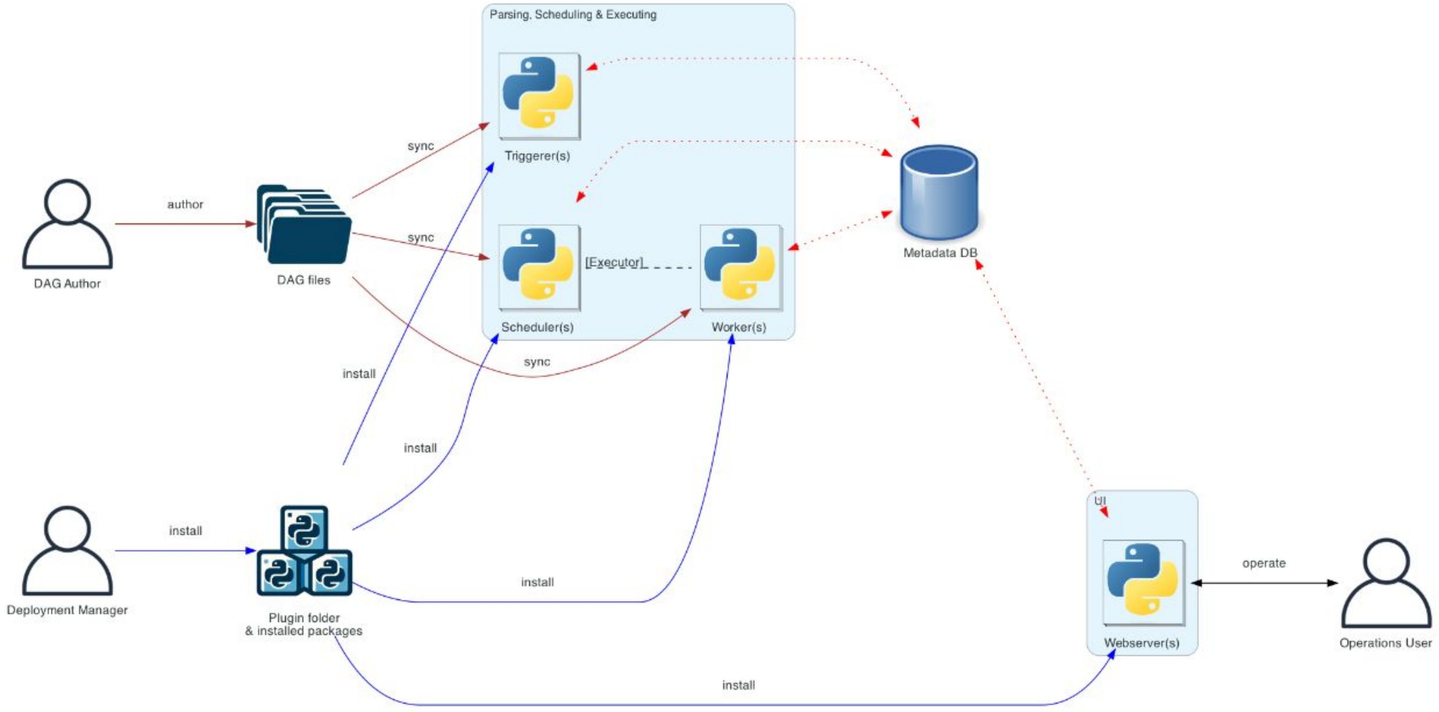


https://airflow.apache.org/docs/apache-airflow/2.0.1/concepts.html

Airflow Components:

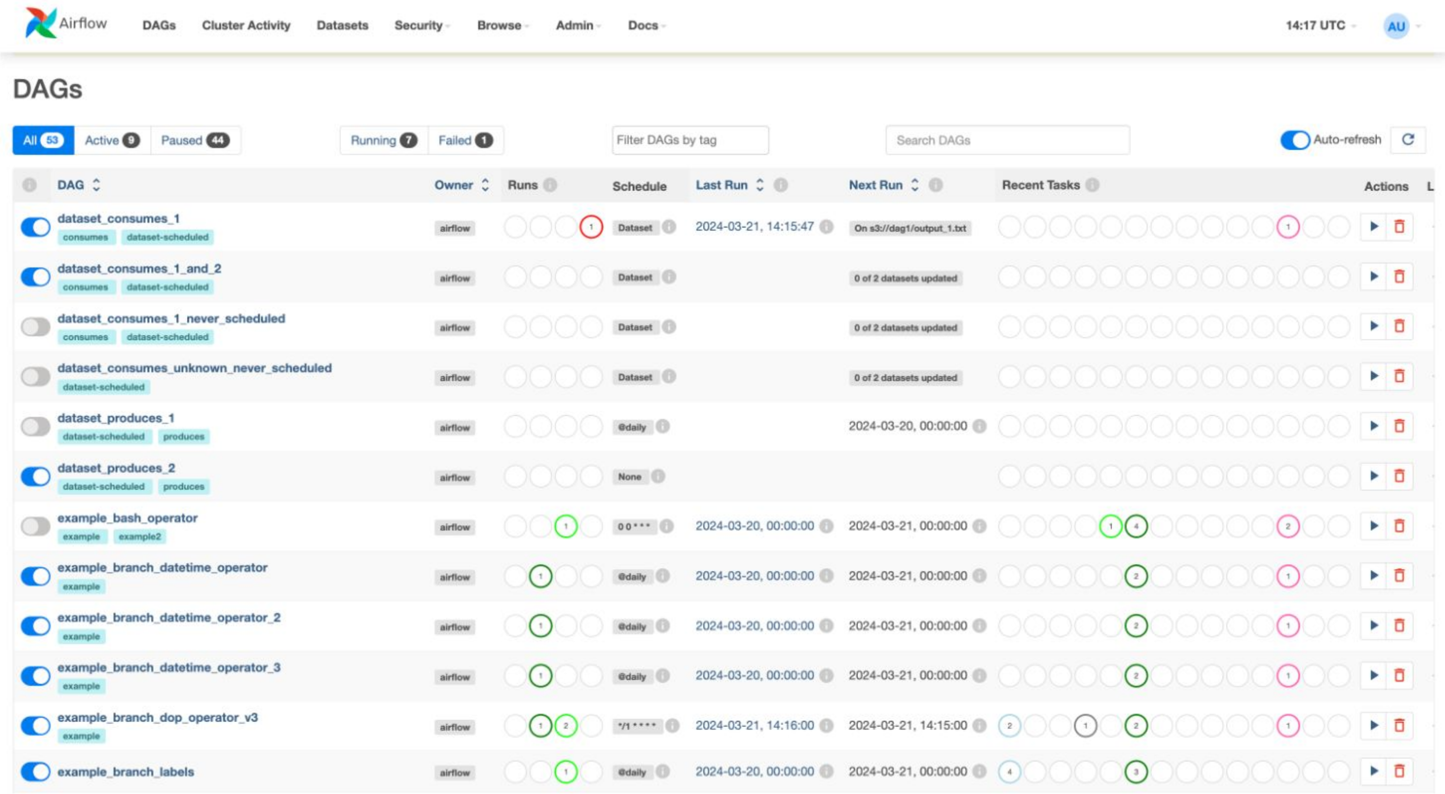
- **DAG**: It is the Directed Acyclic Graph – a collection of the tasks that you want to run which is organized and shows the relationship between different tasks.
- **Task** is the basic unit of execution in Airflow. Operators,Sensors,Taskflow-decorator
- Operators: class, function for tasks that define what a task does.
- Sensors: are operators that wait for certain condition to be met before processing.
- **Web Server:** It is the user interface built on the Flask. It allows us to monitor the status of the DAGs and trigger them.
- **Metadata Database**: Airflow stores the status of all the tasks in a database Postgres and do all read/write operations of a workflow.
- **Scheduler**: is responsible for scheduling the execution of DAGs. It retrieves and updates the status of the task in the database.
- **Executor:** is process by which task instances are run
- **Worker:** a separate instance which job run specific task
- XComs (cross-Communications) & Datasets

Distributed Airflow architecture



https://airflow.apache.org/docs/apache-airflow/2.10.2/core-concepts

Airflow DAG and UI



DAGs

All 53 | Active 9 | Paused 44 | Running 7 | Failed 1 | Filter DAGs by tag | Search DAGs | Auto-refresh

DAG	Owner	Runs	Schedule	Last Run	Next Run	Recent Tasks	Actions	L
dataset_consumes_1 consumes dataset-scheduled	airflow	1	Dataset	2024-03-21, 14:15:47	On s3://dag1/output_1.txt	1	▶ 🗑	
dataset_consumes_1_and_2 consumes dataset-scheduled	airflow		Dataset		0 of 2 datasets updated		▶ 🗑	
dataset_consumes_1_never_scheduled consumes dataset-scheduled	airflow		Dataset		0 of 2 datasets updated		▶ 🗑	
dataset_consumes_unknown_never_scheduled dataset-scheduled	airflow		Dataset		0 of 2 datasets updated		▶ 🗑	
dataset_produces_1 dataset-scheduled produces	airflow		@daily		2024-03-20, 00:00:00		▶ 🗑	
dataset_produces_2 dataset-scheduled produces	airflow		None				▶ 🗑	
example_bash_operator example example2	airflow	1	0 0 * * *	2024-03-20, 00:00:00	2024-03-21, 00:00:00	1 4 2	▶ 🗑	
example_branch_datetime_operator example	airflow	1	@daily	2024-03-20, 00:00:00	2024-03-21, 00:00:00	2 1	▶ 🗑	
example_branch_datetime_operator_2 example	airflow	1	@daily	2024-03-20, 00:00:00	2024-03-21, 00:00:00	2 1	▶ 🗑	
example_branch_datetime_operator_3 example	airflow	1	@daily	2024-03-20, 00:00:00	2024-03-21, 00:00:00	2 1	▶ 🗑	
example_branch_dop_operator_v3 example	airflow	1 2	*/1 * * * *	2024-03-21, 14:16:00	2024-03-21, 14:15:00	2 1 2 1	▶ 🗑	
example_branch_labels	airflow	1	@daily	2024-03-20, 00:00:00	2024-03-21, 00:00:00	4 3	▶ 🗑	

https://airflow.apache.org/docs/apache-airflow/2.10.2/core-concepts

Competitors of Apache Airflow:

- **Dagster** https://github.com/dagster-io/dagster
- **Prefect** https://github.com/PrefectHQ/prefect

Apache Airflow learning resources:

- https://airflow.apache.org/docs/apache-airflow/stable/tutorial/index.html
- https://academy.astronomer.io/path/airflow-101
- https://www.astronomer.io/docs/learn/intro-to-airflow

https://theaisummer.com/apache-airflow-tutorial/

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Via meetup.com/messages

https://github.com/dseclub

https://www.kaggle.com/rgolovnya

Thank you!

Any Questions?