Introduction to Airflow

INTRODUCTION TO AIRFLOW IN PYTHON

Mike Metzger
Data Engineer

What is data engineering?

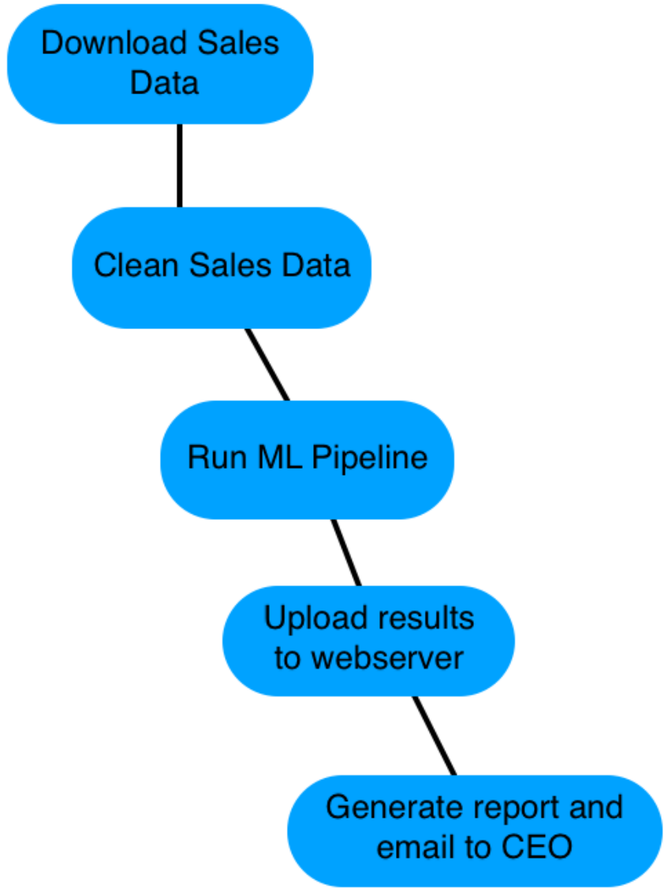
Data engineering is:

- Taking any action involving data and turning it into a reliable, repeatable, and maintainable process.

What is a workflow?

A *workflow* is:

- A set of steps to accomplish a given data engineering task
  - Such as: downloading files, copying data, filtering information, writing to a database, etc
- Of varying levels of complexity
- A term with various meaning depending on context



What is Airflow?

Airflow is a platform to program workflows, including:

- Creation
- Scheduling
- Monitoring

Airflow continued...

- Can implement programs from any language, but workflows are written in Python
- Implements workflows as DAGs: Directed Acyclic Graphs
- Accessed via code, command-line, or via web interface

[1] https://airflow.apache.org/docs/stable/

Other workflow tools

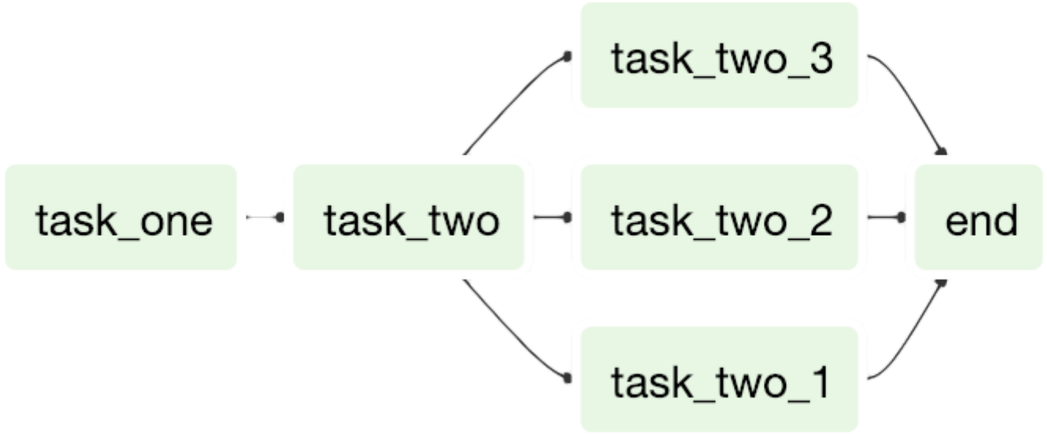
Other tools:

- Luigi
- SSIS
- Bash scripting

Quick introduction to DAGs

A *DAG* stands for *Directed Acyclic Graph*

- In Airflow, this represents the set of tasks that make up your workflow.
- Consists of the tasks and the dependencies between tasks.
- Created with various details about the DAG, including the name, start date, owner, etc.
- Further depth in the next lesson.



DAG code example

Simple DAG definition:

```
etl_dag = DAG(
    dag_id='etl_pipeline',
    default_args={"start_date": "2020-01-08"}
)
```

Running a workflow in Airflow

Running a simple Airflow task

```
airflow run <dag_id> <task_id> <start_date>
```

Using a DAG named *example-etl*, a task named *download-file* and a start date of 2020-01-10:

```
airflow run example-etl download-file 2020-01-10
```

Let's practice!

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Airflow DAGs

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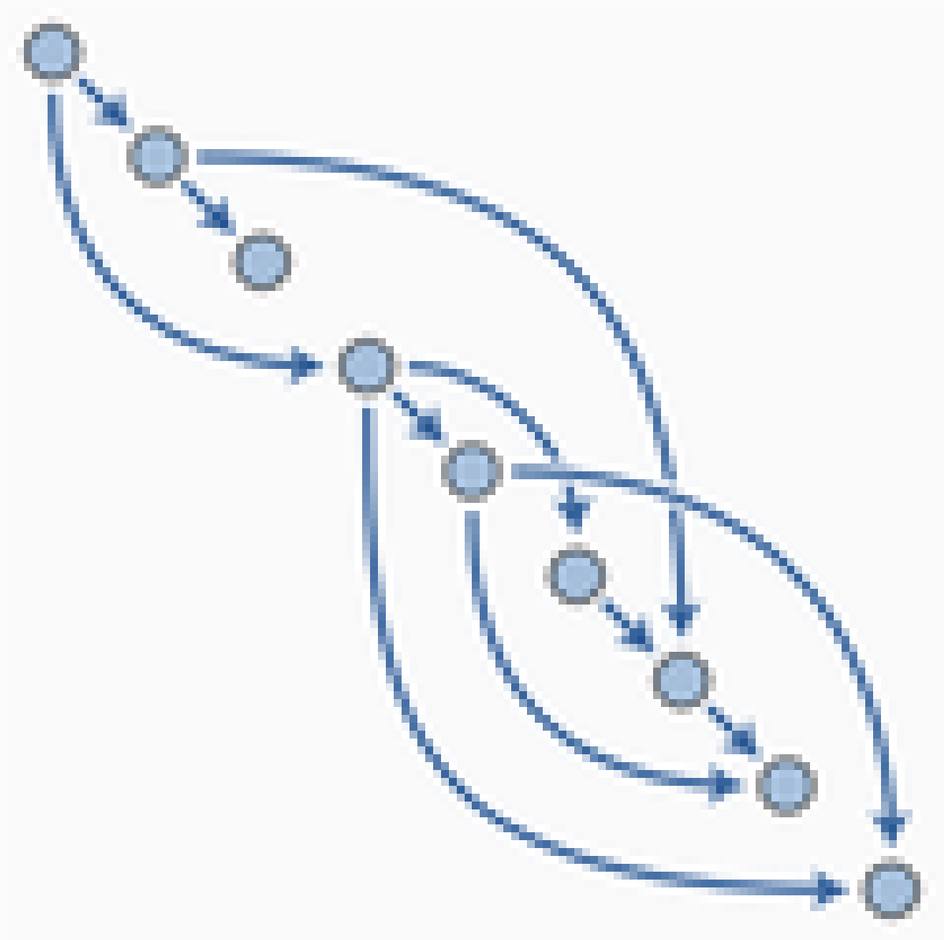
What is a DAG?

DAG, or *Directed Acyclic Graph*:

- *Directed*, there is an inherent flow representing dependencies between components.
- *Acyclic*, does not loop / cycle / repeat.
- *Graph*, the actual set of components.
- Seen in Airflow, Apache Spark, Luigi



[1] https://en.m.wikipedia.org/wiki/Directed_acyclic_graph

DAG in Airflow

Within Airflow, DAGs:

- Are written in Python (but can use components written in other languages).
- Are made up of components (typically *tasks*) to be executed, such as operators, sensors, etc.
- Contain dependencies defined explicitly or implicitly.
  - ie, Copy the file to the server before trying to import it to the database service.

Define a DAG

Example DAG:

```
from airflow.models import DAG


from datetime import datetime
default_arguments = {
  'owner': 'jdoe',
  'email': 'jdoe@datacamp.com',
  'start_date': datetime(2020, 1, 20)
}


etl_dag = DAG( 'etl_workflow', default_args=default_arguments )
```

DAGs on the command line

Using `airflow` :

- The `airflow` command line program contains many subcommands.
- `airflow -h` for descriptions.
- Many are related to DAGs.
- `airflow list_dags` to show all recognized DAGs.

Command line vs Python

Use the command line tool to:

- Start Airflow processes
- Manually run DAGs / Tasks
- Get logging information from Airflow

Use Python to:

- Create a DAG
- Edit the individual properties of a DAG

Let's practice!

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Airflow web interface

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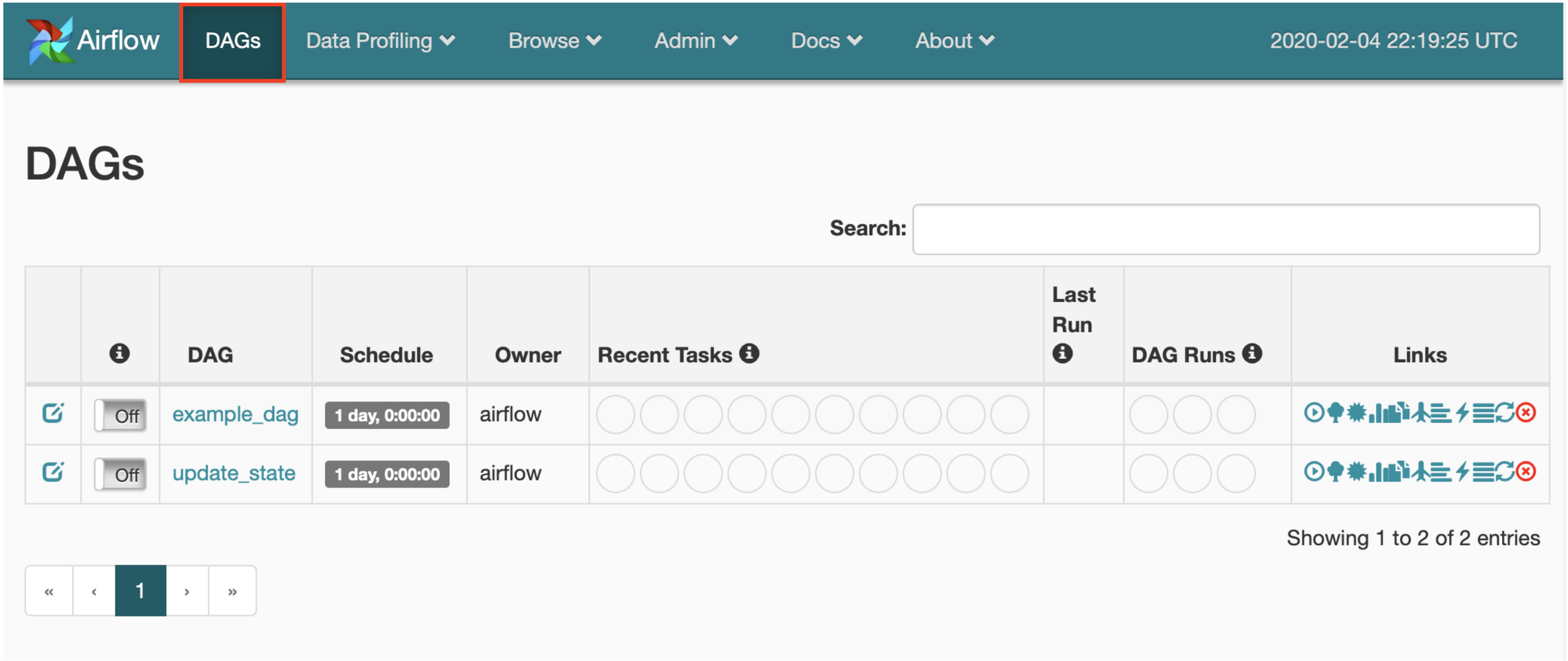
DAGs view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Owner
Recent Tasks
Last Run
DAG Runs
Links
Off
example_dag
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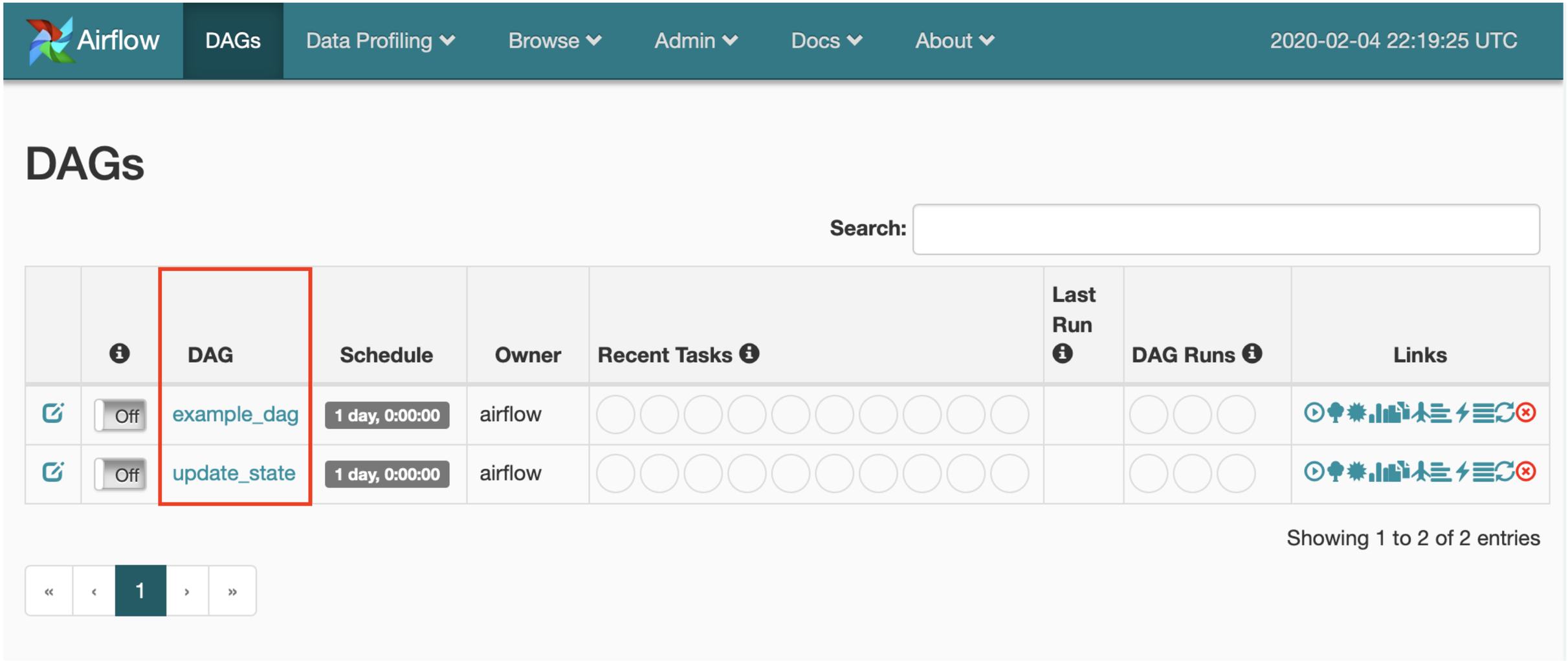
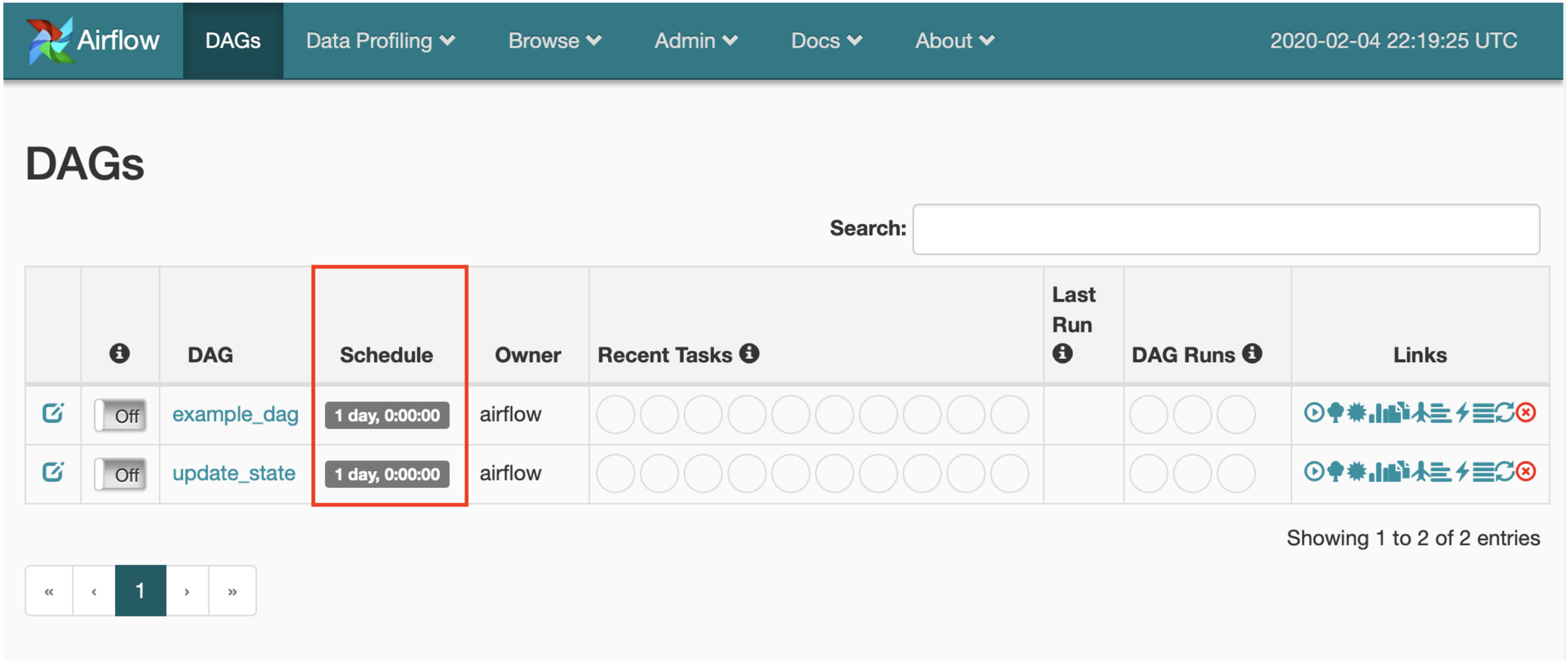
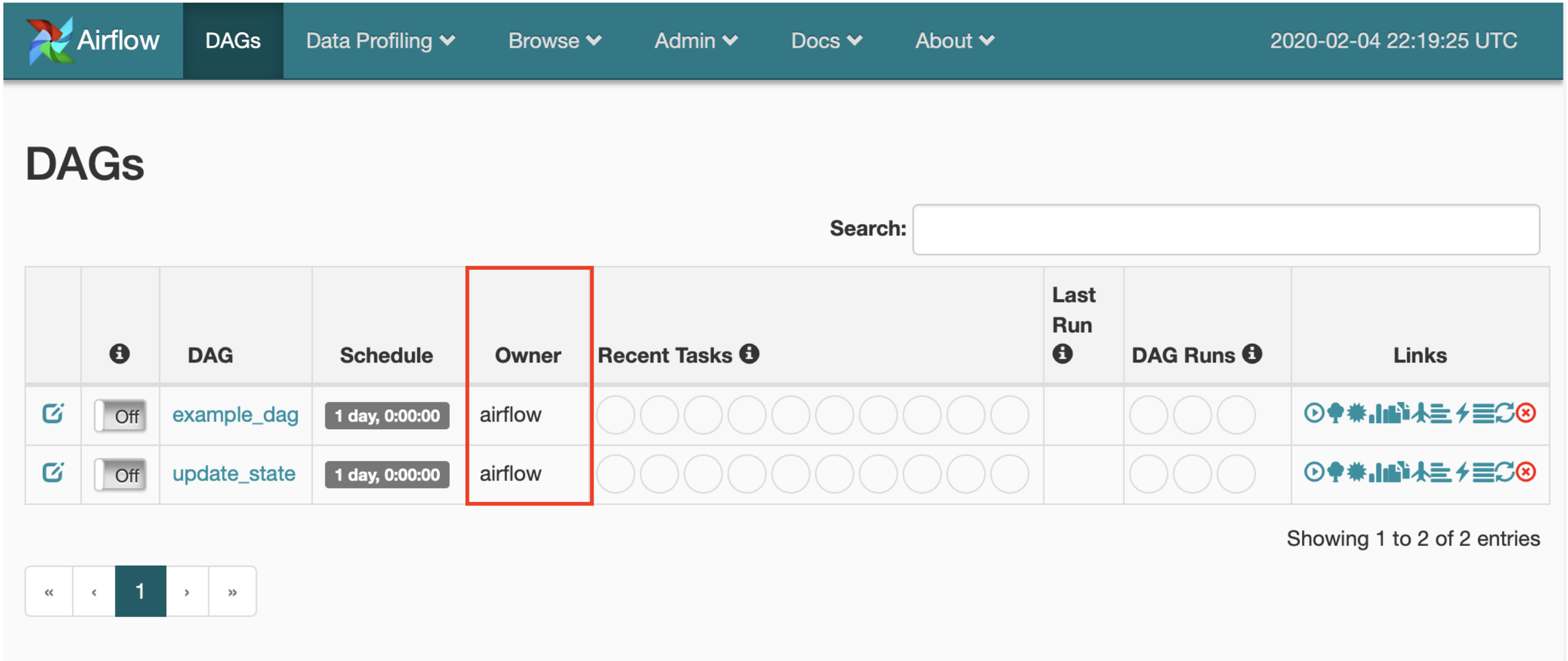
DAGs view DAGs



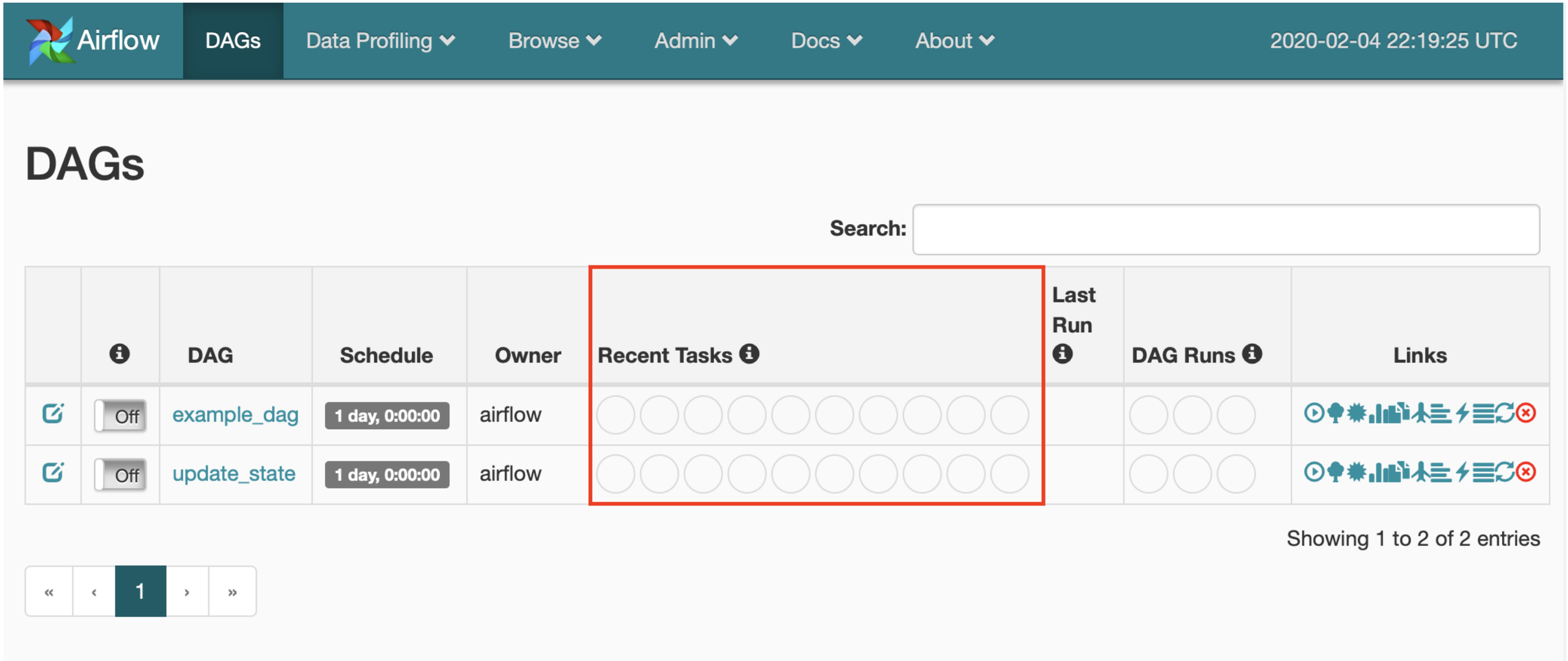
DAGs view schedule



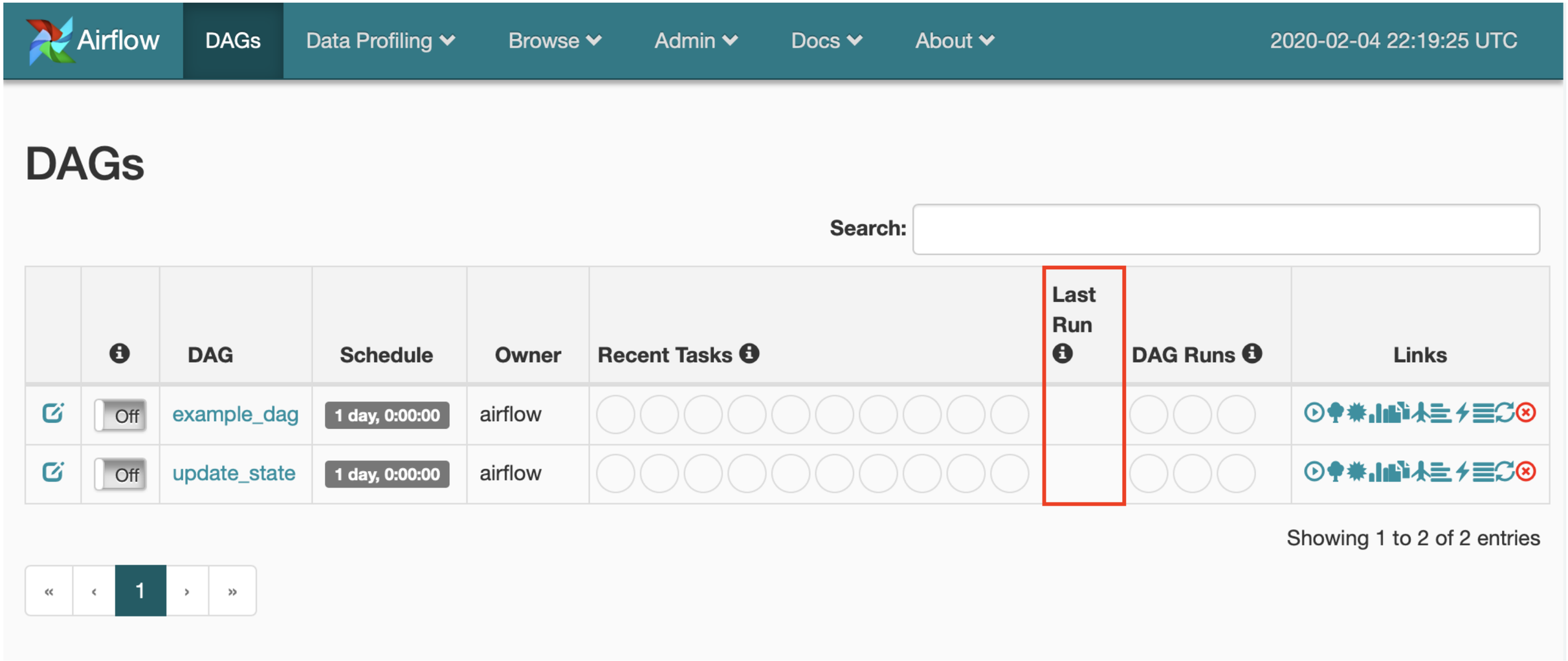
DAGs view owner



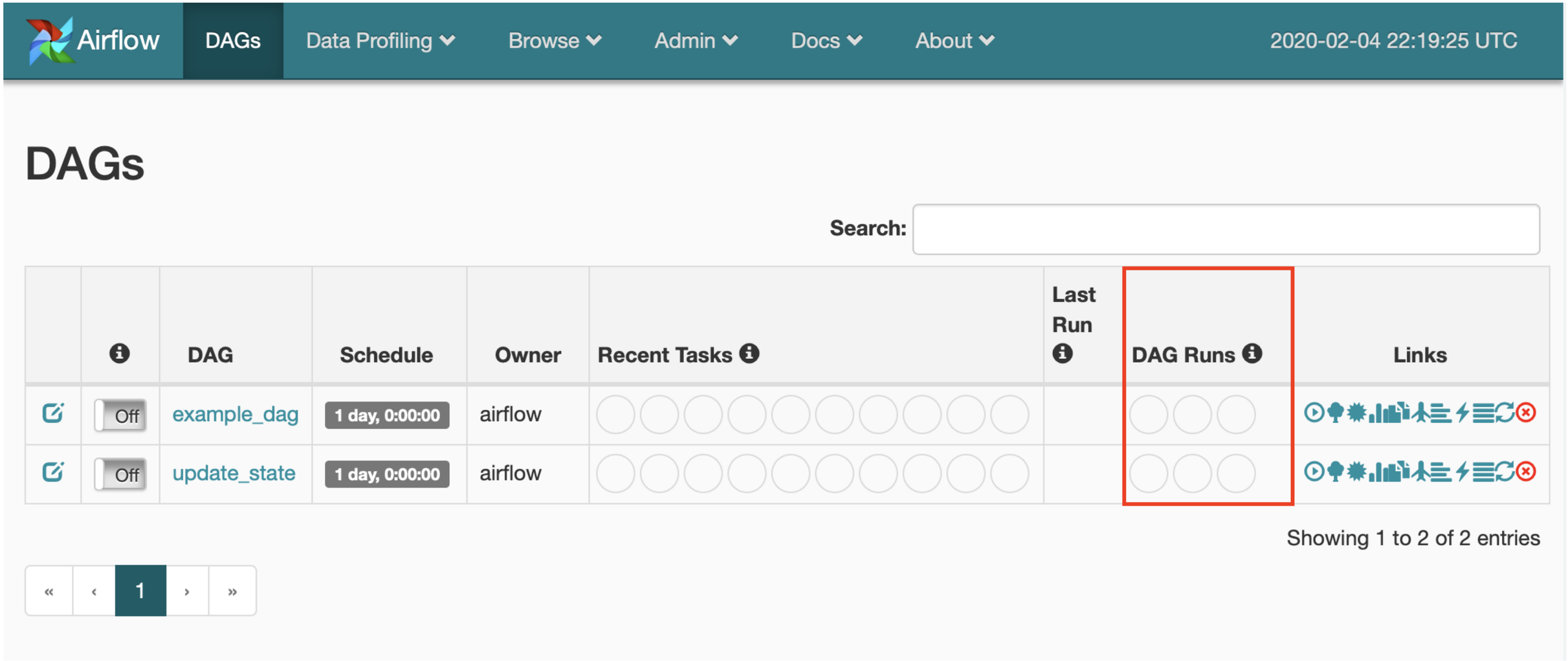
DAGs view recent tasks



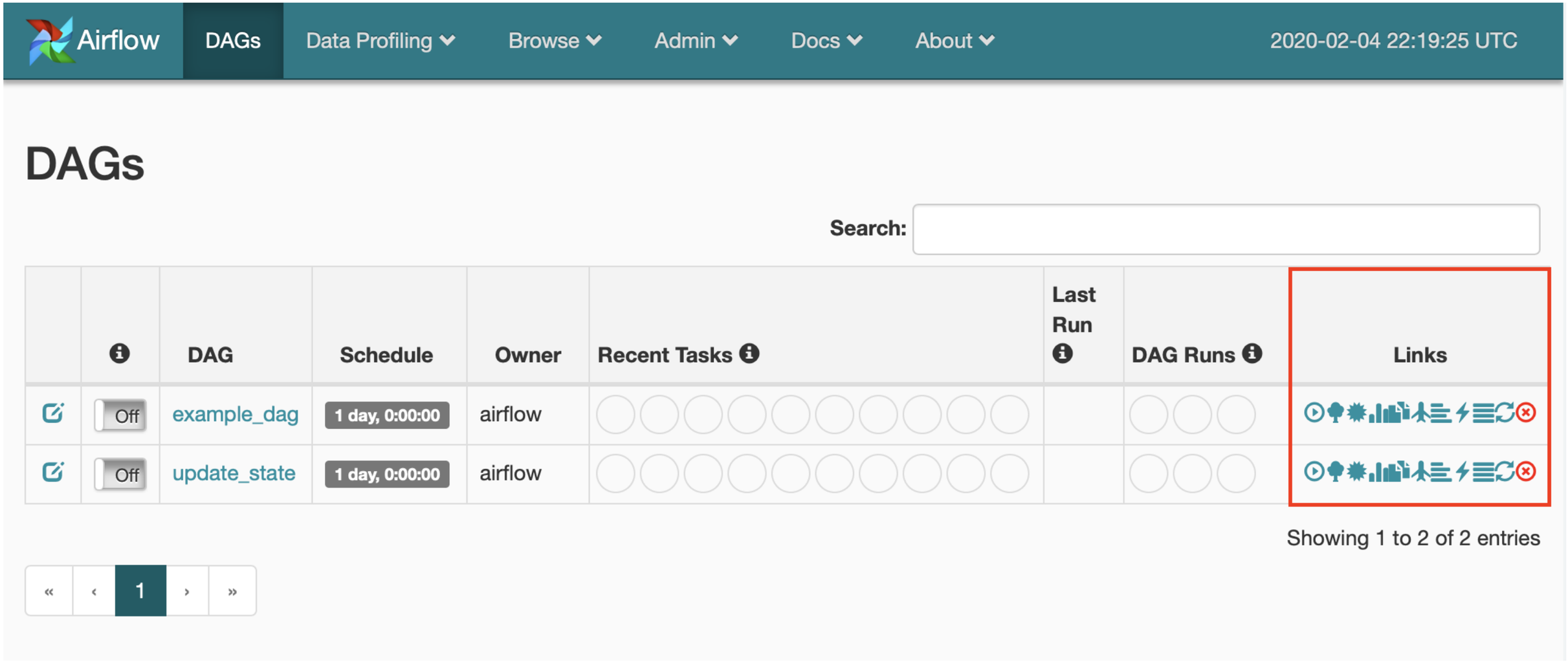
DAGs view last run



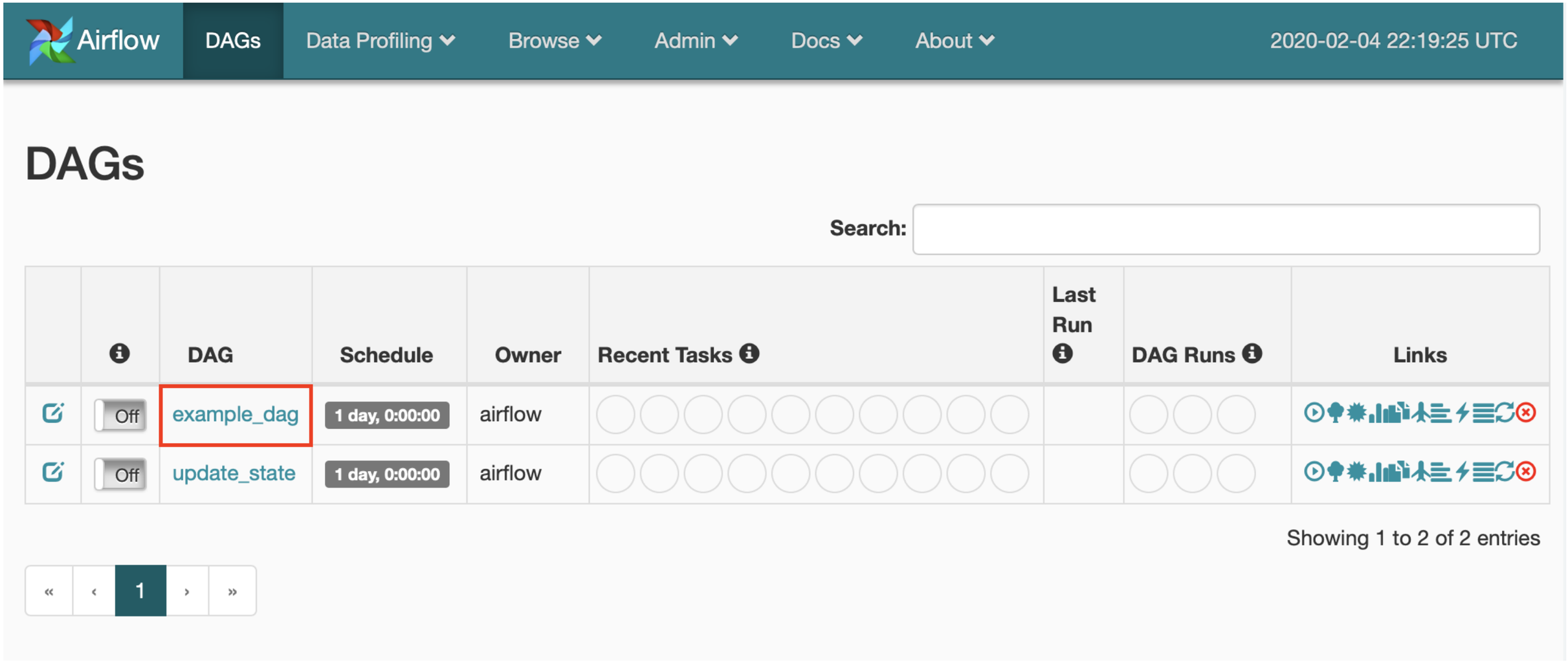
DAGs view last three



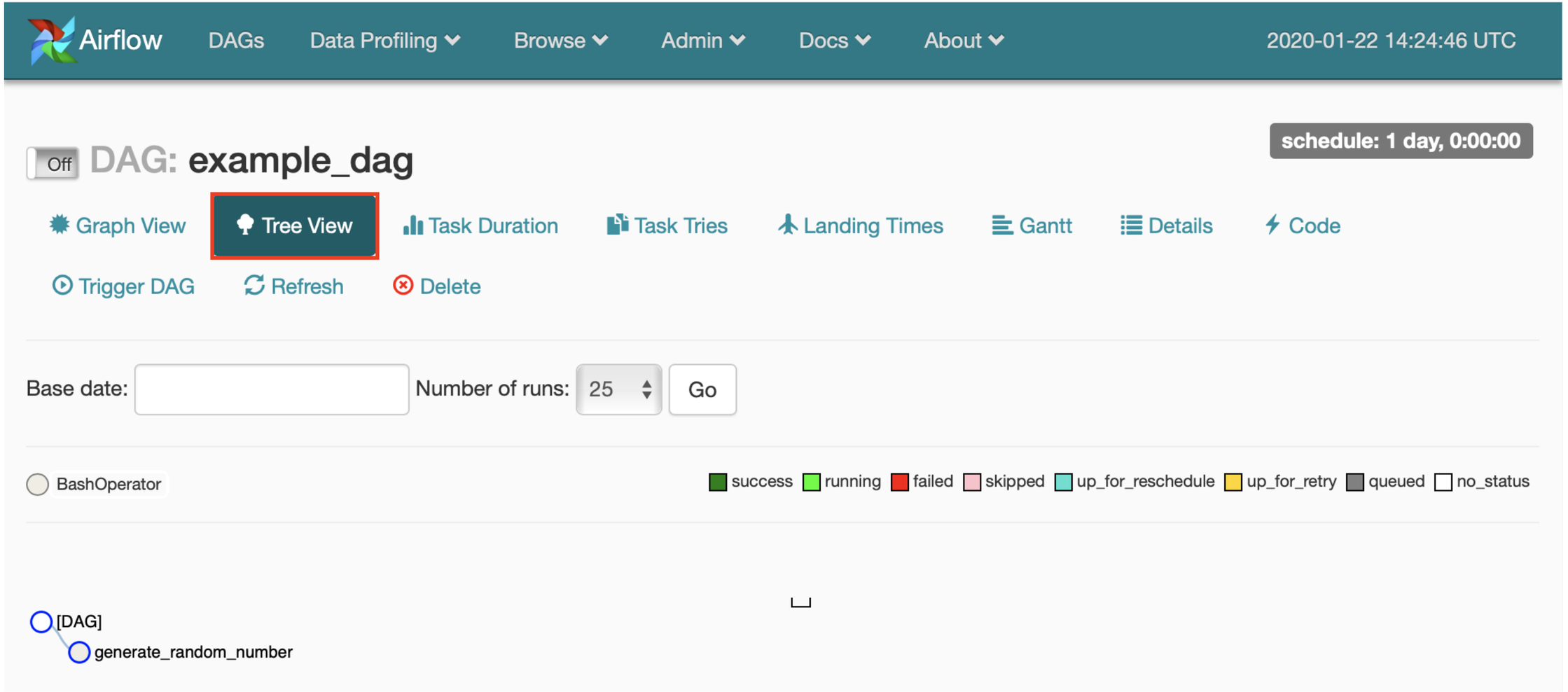
DAGs view links



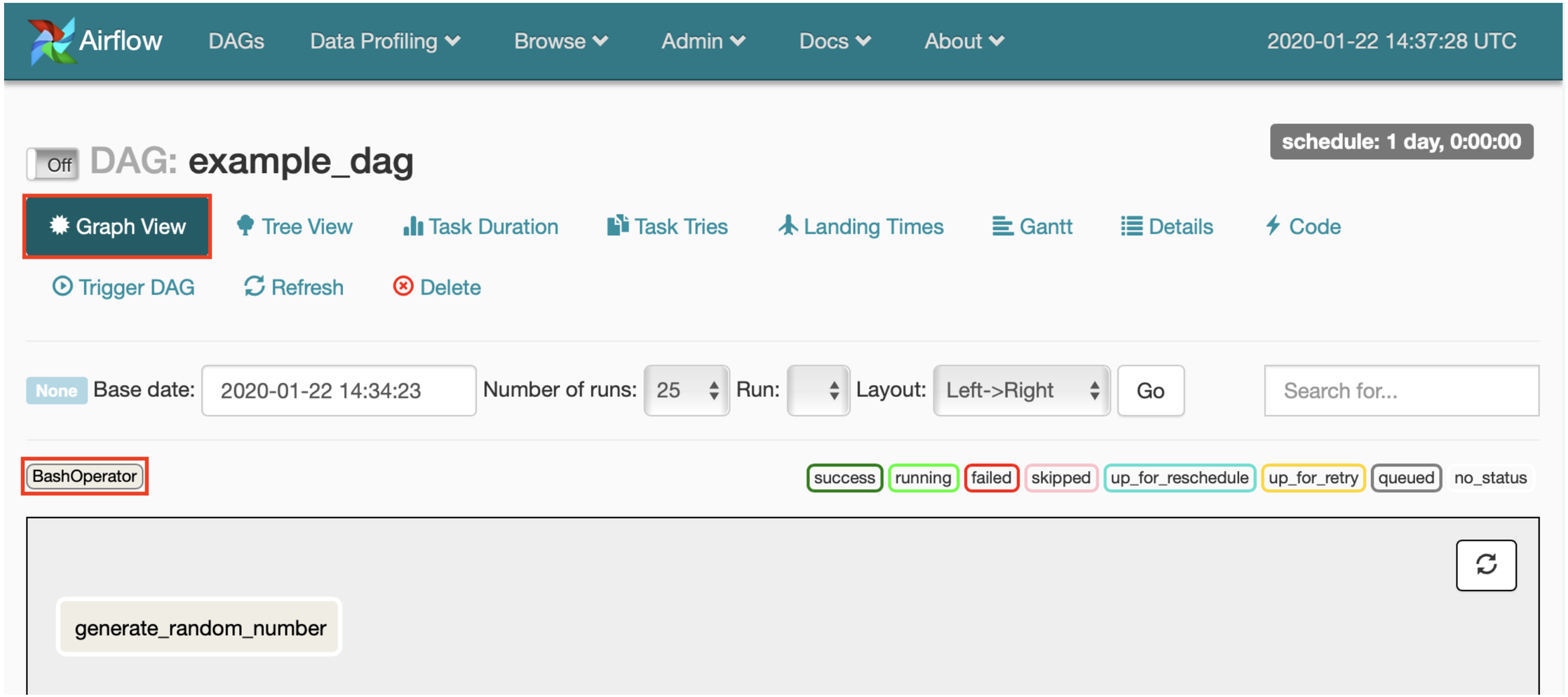
DAGs view example_dag



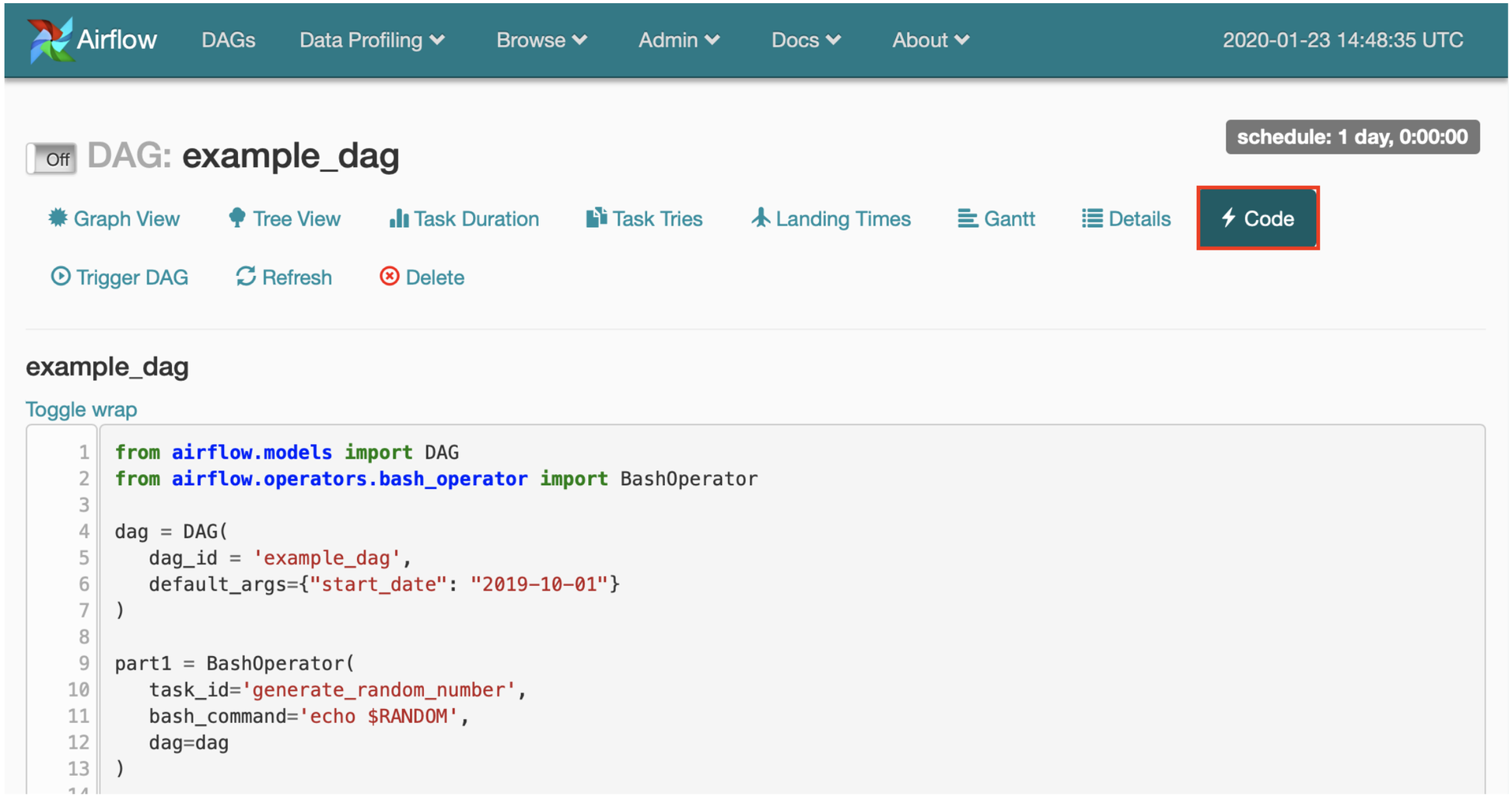
DAG detail view



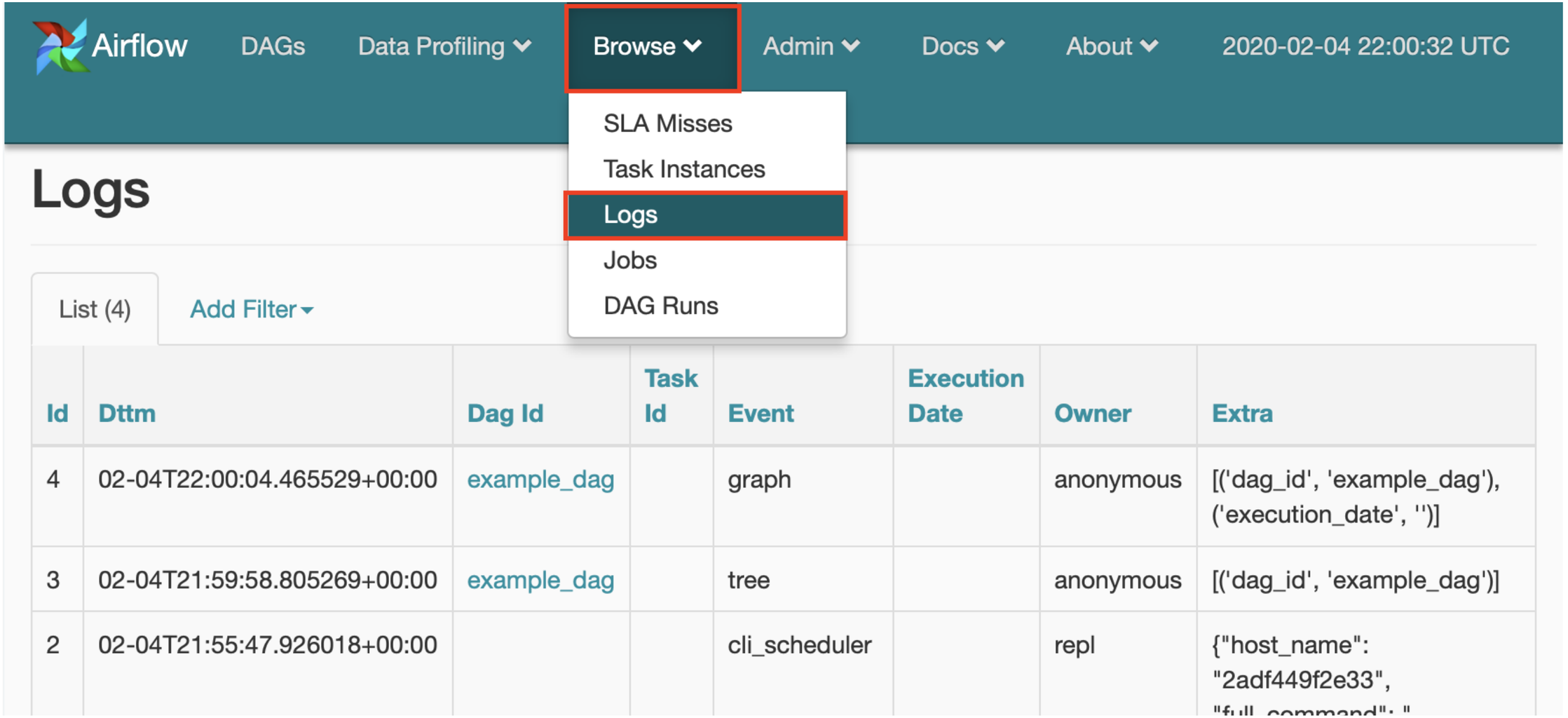
DAG graph view



DAG code view



Logs


Airflow
DAGs
Data Profiling
Browse
Admin
Docs
About
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SLA Misses
Task Instances
Logs
Jobs
DAG Runs
Logs
List (4)
Add Filter
Id
Dttm
Dag Id
Task Id
Event
Execution Date
Owner
Extra
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repl
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Web UI vs command line

In most cases:

- Equally powerful depending on needs
- Web UI is easier
- Command line tool may be easier to access depending on settings

Let's practice!

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