



Assets

Past, Present, Future

TP Chung

3.0



About me

- Astronomer
 - Airflow PMC member
 - Python packaging
 - Community organiser
- in Taiwan
- Timetables
 - Dynamic task mapping
 - Un-execution date
 - Assets

What are
assets
really?

3.0



Dataset

- Airflow 2.4
- OpenLineage (since ??)
- Some place data live
- The data themselves



DatasetEvent

- “There’s an update”
- Runtime vs declared context
- Not from OpenLineage?

Airflow needs its own
terminology



“It’s more than data...”

- Machine learning
- Vaguer!
- “Thing”

Where
we are
now

3.0



Concepts

- Asset
- AssetEvent
- AssetAlias



Eventing

- Producing task
- Consuming dag
- Metadata
- AssetWatcher

```
example = Asset(name="example", uri="s3://asset-bucket/example.csv")
```

```
example = Asset(name="example", uri="s3://asset-bucket/example.csv")

with DAG(dag_id="output_to_example", schedule="@daily"):
    create_object = S3CreateObjectOperator(
        task_id="create_object",
        s3_bucket="asset-bucket",
        s3_key="example.csv",
        data=YOUR_DATA_HERE,
        replace=True,
        outlets=[example],
    )
```

```
example = Asset(name="example", uri="s3://asset-bucket/example.csv")

with DAG(dag_id="output_to_example", schedule="@daily"):
    create_object = S3CreateObjectOperator(
        task_id="create_object",
        s3_bucket="asset-bucket",
        s3_key="example.csv",
        data=YOUR_DATA_HERE,
        replace=True,
        outlets=[example],
    )
```

```
with DAG(dag_id="trigger_on_example_write", schedule=example):
    @task
    def do_something():
        context = get_current_context()
        last_event = context["triggering_asset_events"][example][-1]
        print("Triggered by", last_event.source_dag_run)
```

```
s3_bucket = AssetAlias(name="s3_bucket")

per_day_assets = {
    i: Asset(name=f"first_day", uri=f"s3://asset_bucket/{i}.csv")
    for i in range(1, 8)
}
```

```
s3_bucket = AssetAlias(name="s3_bucket")

per_day_assets = {
    i: Asset(name=f"first_day", uri=f"s3://asset_bucket/{i}.csv")
    for i in range(1, 8)
}

with DAG(dag_id="output_to_example", schedule="@daily"):
    @task(outlets=[s3_bucket])
    def emit_conditionally():
        context = get_current_context()
        asset = per_day_assets[context["logical_date"].isoweekday()]
        yield Metadata(asset, alias=s3_bucket)
```

```
s3_bucket = AssetAlias(name="s3_bucket")

per_day_assets = {
    i: Asset(name=f"first_day", uri=f"s3://asset_bucket/{i}.csv")
    for i in range(1, 8)
}

with DAG(dag_id="output_to_example", schedule="@daily"):
    @task(outlets=[s3_bucket])
    def emit_conditionally():
        context = get_current_context()
        asset = per_day_assets[context["logical_date"].isoweekday()]
        yield Metadata(asset, alias=s3_bucket)

with DAG(dag_id="process_monday", schedule=per_day_assets[1]):
    ...

with DAG(dag_id="process_everything", schedule=s3_bucket):
    ...
```

```
example = Asset(  
    name="example",  
    uri="s3://asset-bucket/example.csv",  
    watchers=[AssetWatcher(...)],  
)
```

```
example = Asset(  
    name="example",  
    uri="s3://asset-bucket/example.csv",  
    watchers=[AssetWatcher(...)],  
)  
  
with DAG(dag_id="trigger_on_example_write", schedule=example):  
    @task  
    def do_something():  
        context = get_current_context()  
        last_event = context["triggering_asset_events"][example][-1]  
        if last_event.extra.get("from_trigger"):  
            print("Triggered by watcher!")
```

```
example = Asset(name="example", uri="s3://asset-bucket/example.csv")

with DAG(dag_id="output_to_example", schedule="@daily"):
    create_object = S3CreateObjectOperator(
        ..., outlets=[example],
    )

# Different file...

with DAG(dag_id="trigger_on_example", schedule=Asset.ref("example")):
    ...
```

Where
we are
going

3.0



Better integration

- Object Storage
- Dataframes!
- I/O manager

```
example_asset = Asset(  
    name="example",  
    uri="s3://asset-bucket/example.csv",  
)  
  
example_path = ObjectStoragePath(  
    example_asset.uri,  
    conn_id="aws_default",  
)  
  
@task(outlets=[example_asset])  
def write_data():  
    with example_path.open("wb") as f:  
        f.write(YOUR_DATA_HERE)  
  
@task(inlets=[example_asset])  
def read_data():  
    with example_path.open("rb") as f:  
        data = f.read()
```

```
example_asset = Asset(  
    name="example",  
    uri="mysql://myhost/example",  
)
```

```
example_asset = Asset(  
    name="example",  
    uri="mysql://myhost/example",  
)  
  
example_client = DatabaseClient(  
    example_asset.uri,  
    conn_id="mysql_default",  
)
```

```
example_asset = Asset(  
    name="example",  
    uri="mysql://myhost/mydb/mytable",  
)  
  
example_client = DatabaseClient(  
    example_asset.uri,  
    conn_id="mysql_default",  
)  
  
@task(outlets=[example_asset])  
def write_data():  
    with example_client.connect() as t:  
        t.insert(YOUR_DATA_HERE)  
  
@task(inlets=[example_asset])  
def read_data():  
    with example_client.connect() as t:  
        data = t.to_pandas()
```

```
example_asset = Asset(  
    name="example",  
    uri="mysql://myhost/mydb/mytable",  
)  
  
example_client = DatabaseClient(  
    example_asset.uri,  
    conn_id="mysql_default",  
)  
  
@task(outlets=[example_asset])  
def write_data():  
    with example_client.connect() as t:  
        t.insert(YOUR_DATA_HERE)  
  
@task(inlets=[example_asset])  
def read_data():  
    with example_client.connect() as t:  
        data = t.to_pandas()
```

```
example_asset = Asset(  
    name="example",  
    uri="mysql://myhost/mydb/mytable",  
)  
  
@task(outlets=[example_asset])  
def write_data(io_manager):  
    with io_manager.connect(example_asset) as t:  
        t.insert(YOUR_DATA_HERE)  
  
@task(inlets=[example_asset])  
def read_data(io_manager):  
    with io_manager.connect(example_asset) as t:  
        data = t.to_pandas()
```



Better metadata

- Validation
- Partition
- Watermarking
- Structured extra



Validation

- Not to replace e.g. GX
- Fail task on critical errors
- Prevent writes



Partitions

- Granular freshness
- Downstream selectivity
- UI integration



Watermarking

- Different enough
- Focus on latest state
- State after run

```
example = Asset(  
    name="example",  
    uri="s3://asset-bucket/example.csv",  
    watchers=[AssetWatcher(...)],  
)  
  
with DAG(dag_id="trigger_on_example_write", schedule=example):  
    @task  
    def do_something():  
        context = get_current_context()  
        last_event = context["triggering_asset_events"][example][-1]  
        if last_event.extra.get("from_trigger"):  
            print("Triggered by watcher!")
```



Words at the end

- I love this
- For the crowd
- As a crowd



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



Questions?

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