Moving to Managed Airflow

Chris Munns
Senior Manager/ Principal Developer Advocate - Serverless
Amazon Web Services

aws

About me

Chris Munns - munns@amazon.com, @chrismunns

- Sr Manager/ Principal Developer Advocate – Serverless
- New Yorker (ehhh…ish.. kids/ burbs/ ya know?)

  Previously:
  - AWS Business Development Manager – DevOps, July ‘15 - Feb ‘17
  - AWS Solutions Architect Nov ‘11- Dec ‘14
  - Formerly on operations teams @Etsy and @Meetup
  - Little time at a hedge fund, Xerox and a few other startups
- Rochester Institute of Technology: Applied Networking and Systems Administration ’05
- Internet infrastructure geek

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Agenda

Amazon Managed Workflows for Apache Airflow (MWAA)

- What it is
- How it works
- Setting it up
- Working with it

We will not get deep into DAG design or Airflow use-cases today.

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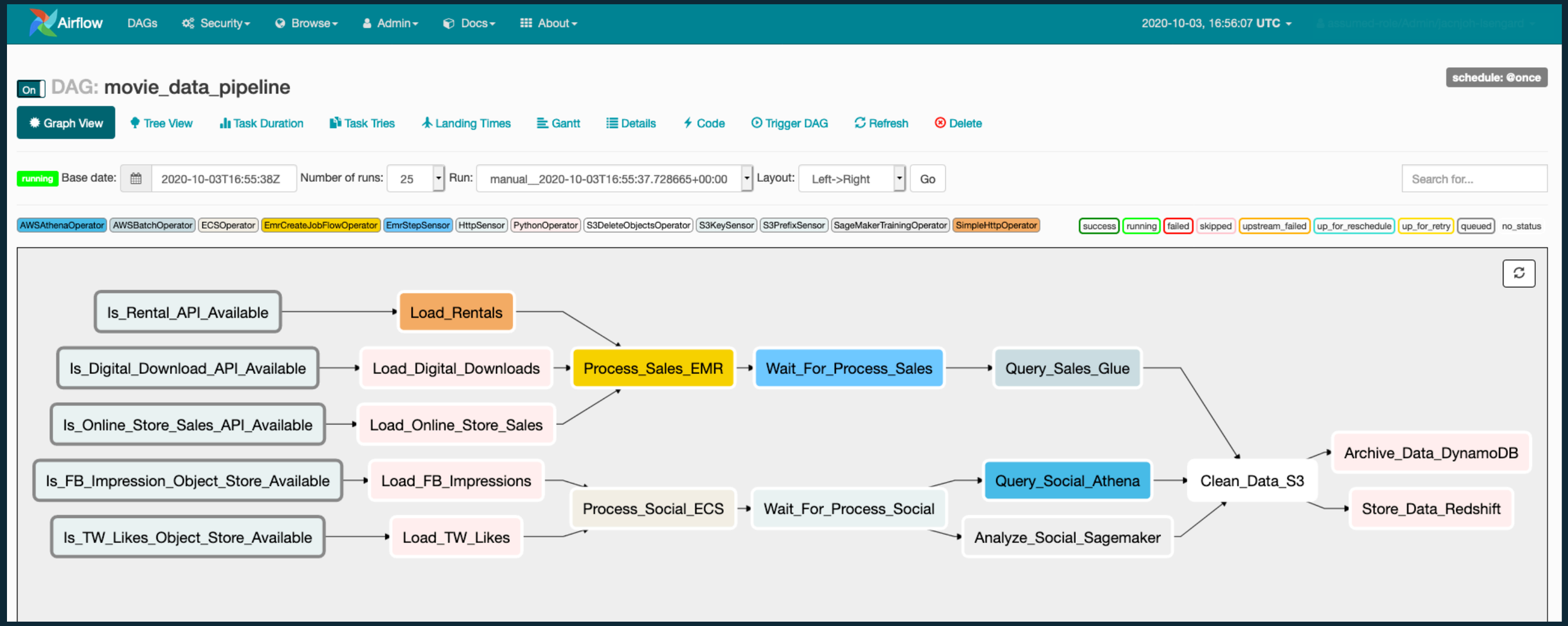
Apache Airflow



Apache Airflow use cases

ETL

AI/ML

DevOps

Apache Airflow components

Scheduler

Worker

Web server

Meta database

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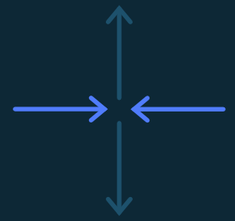
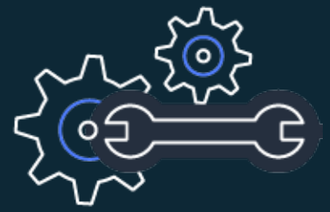
Apache Airflow challenges

Setup



Scaling

Security

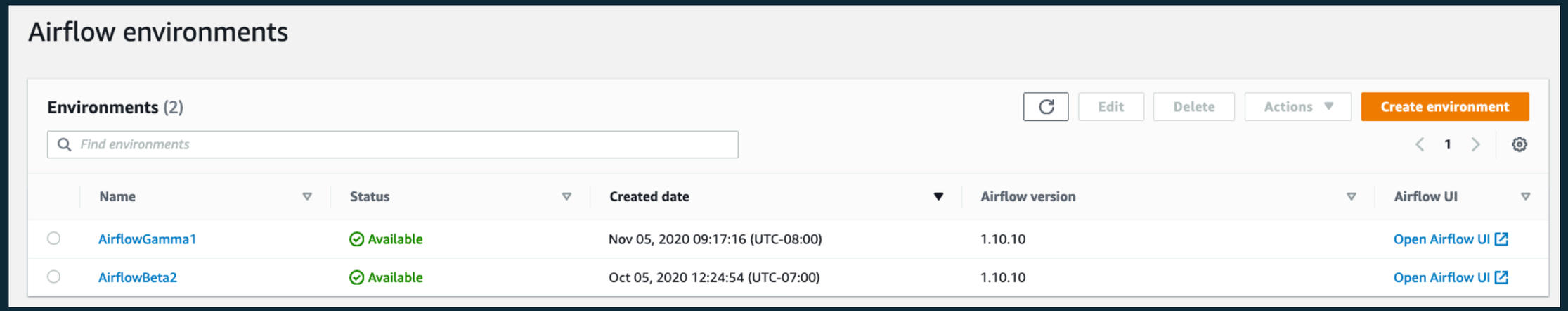


Upgrades

Maintenance

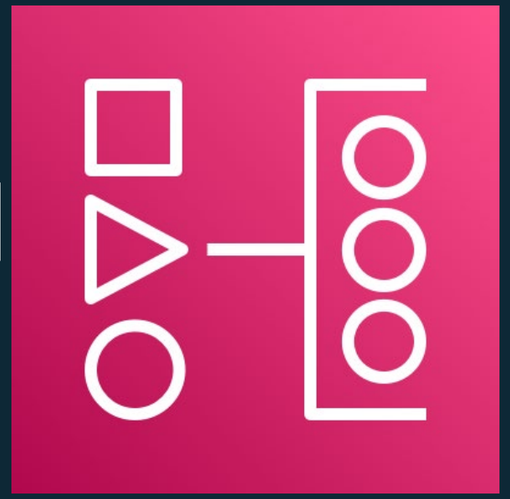
Amazon Managed Workflows for Apache Airflow (MWAA)

A new managed service for Apache Airflow that makes it easy for data engineers and data scientists to execute data processing workflows on AWS



Announced in November 2020!

What does MWAA do for you



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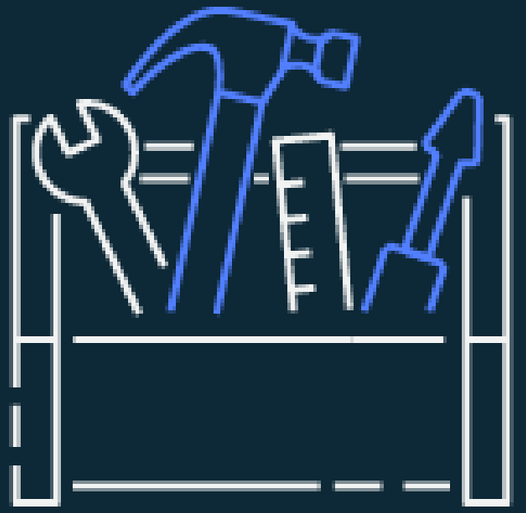
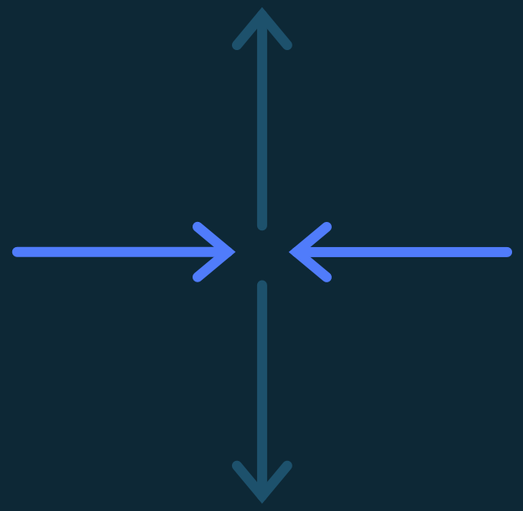
What Amazon MWAA does for you



Setup

- Deploys Apache Airflow rapidly
- Same open-source Airflow
- Same Airflow UI
- AWS Management Console, AWS CLI, API, or AWS CloudFormation

What Amazon MWAA does for you



- Worker scaling,
  no configurations required
- Uses Celery Executor
- Amazon ECS on AWS Fargate

What Amazon MWAA does for you

Security

- Integrated AuthN and AuthZ with AWS Identity and Access Management (IAM)
- Airflow UI with either VPC or public, secured endpoint
- Workers assume IAM execution roles for simplified access to AWS services
- Workers and Scheduler run in customer VPC for access to customer resources

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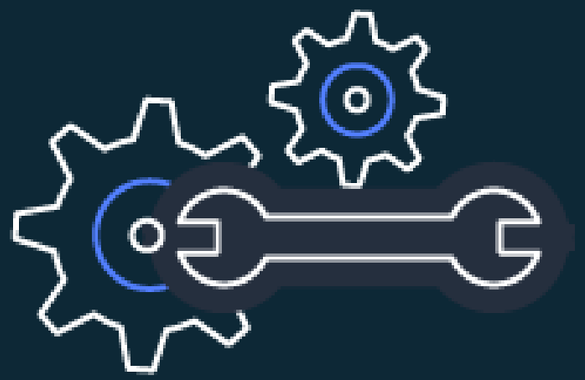
What Amazon MWAA does for you



Upgrades

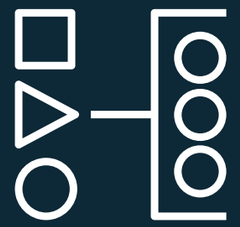
- Maintenance windows for upgrades
- Snapshot and rollback in case of failure

What Amazon MWAA does for you

Maintenance

- Integrated monitoring with Amazon CloudWatch
- Multi-AZ
- Automatically restarts on failure

How Amazon MWAA works



Create an MWAA environment

Copy your DAGs and plugins to Amazon S3

Access the Airflow UI

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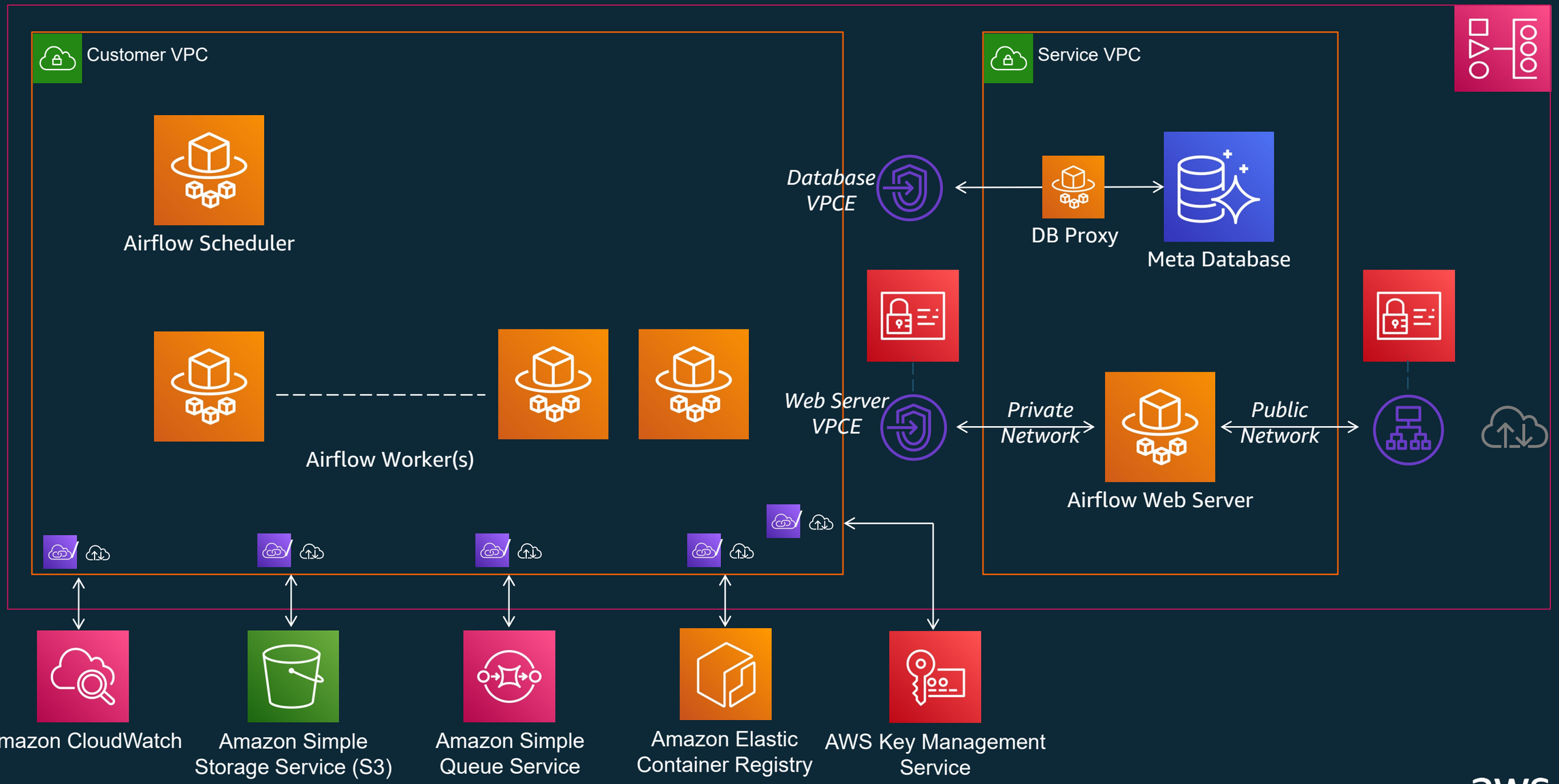
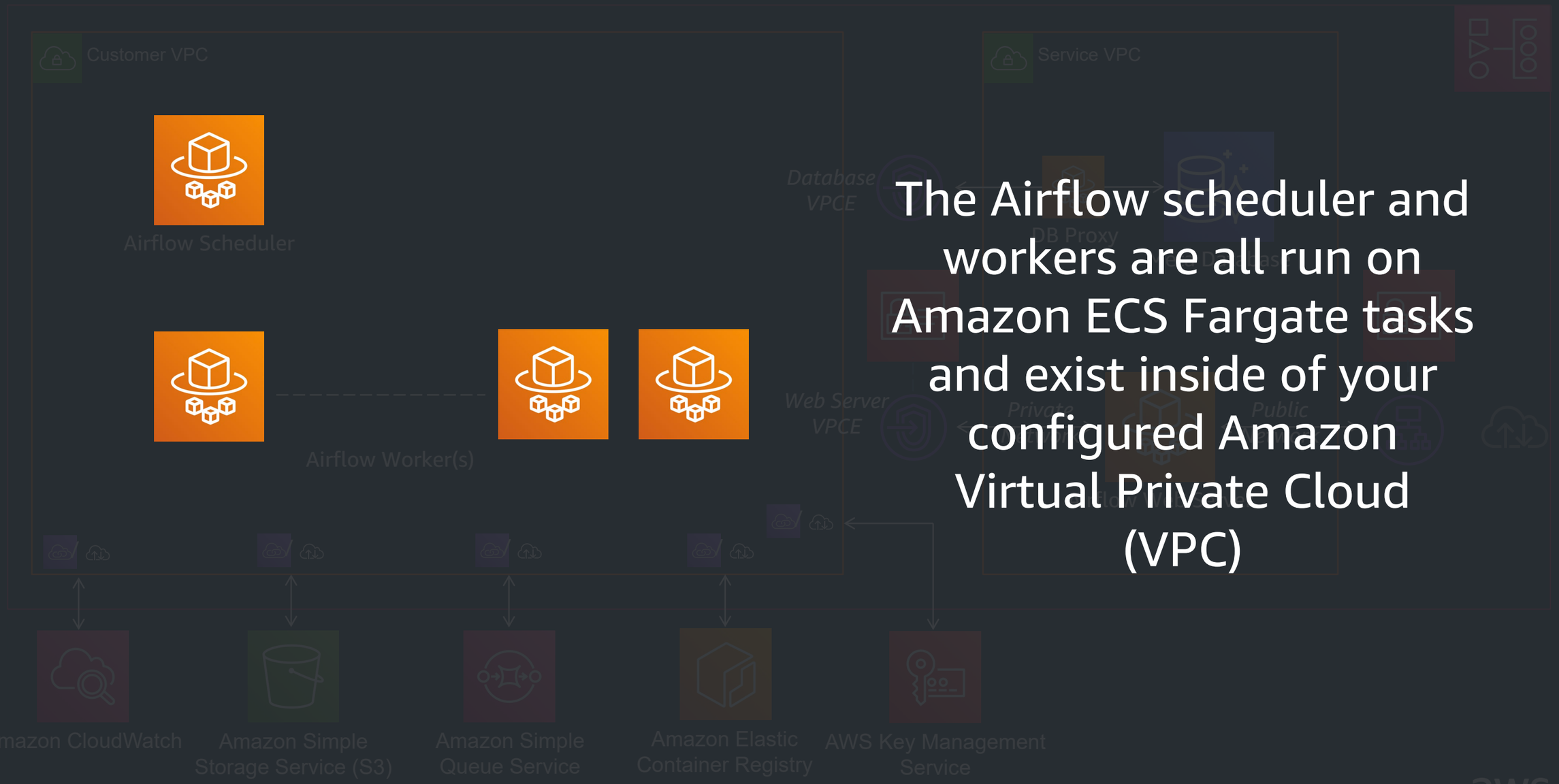
Amazon MWAA Architecture



Amazon MWAA Architecture

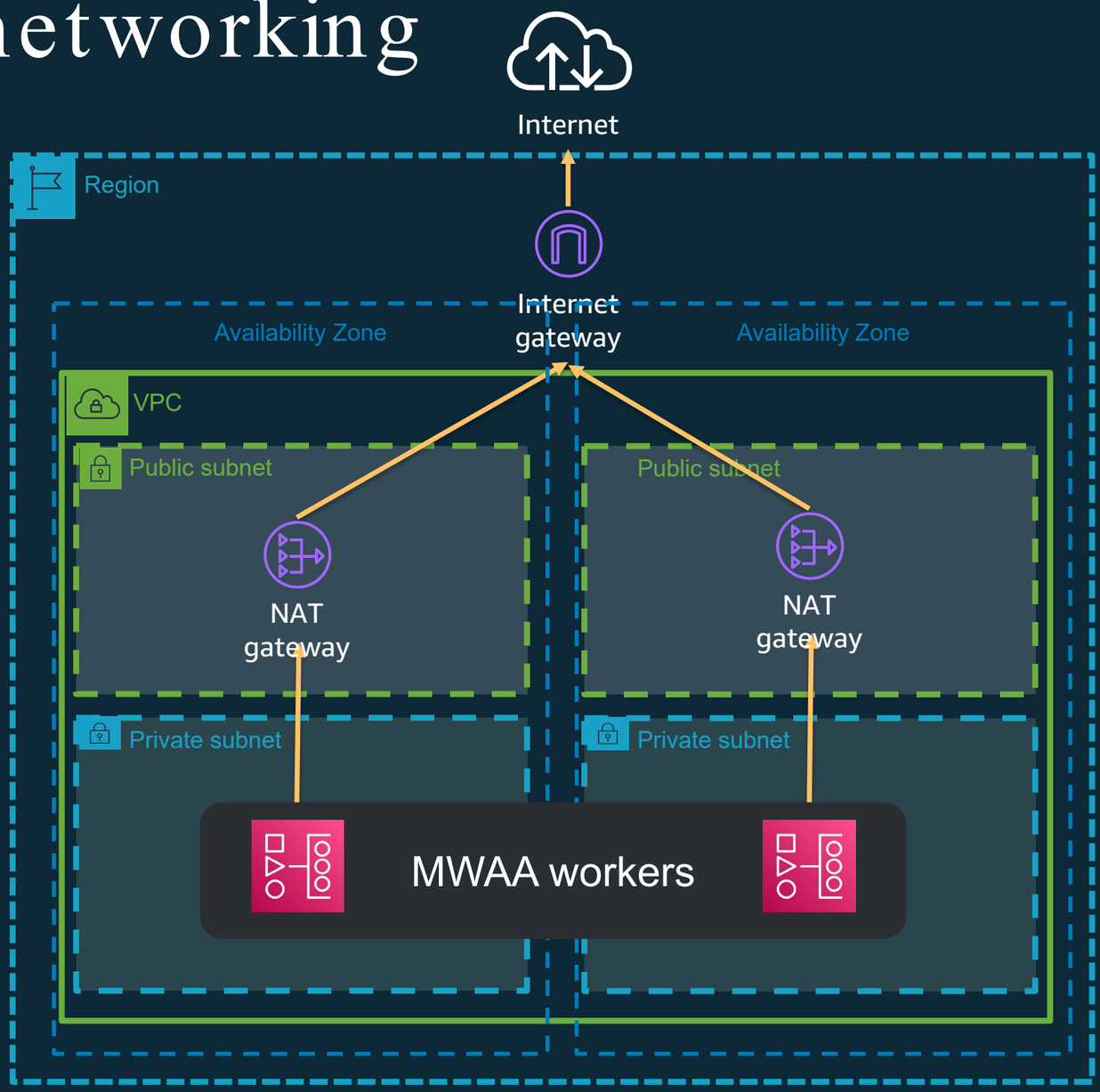


The Airflow scheduler and workers are all run on Amazon ECS Fargate tasks and exist inside of your configured Amazon Virtual Private Cloud (VPC)

MWAA and Amazon VPC networking

You do need an Amazon Virtual Private Network (VPC) configured to run your MWAA scheduler and workers:

- We recommend multiple Availability Zones for high availability configurations
- Security Groups can be configured for fine grained access
- MWAA scheduler and workers need access to core services either via NAT-Gateways or via AWS PrivateLink endpoints

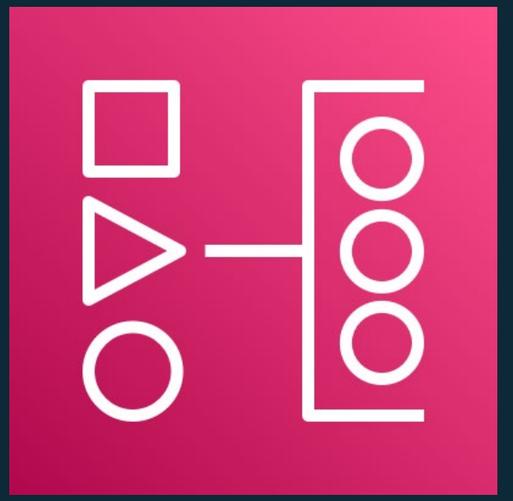


Working with Amazon MWAA

Working with MWAA and Airflow DAGs

Directed Acyclic Graphs (DAGs) are the unit of work and the structure for jobs run in Airflow. They have several common components:

- DAG definition
- Plugins
- Requirements
- Configurations



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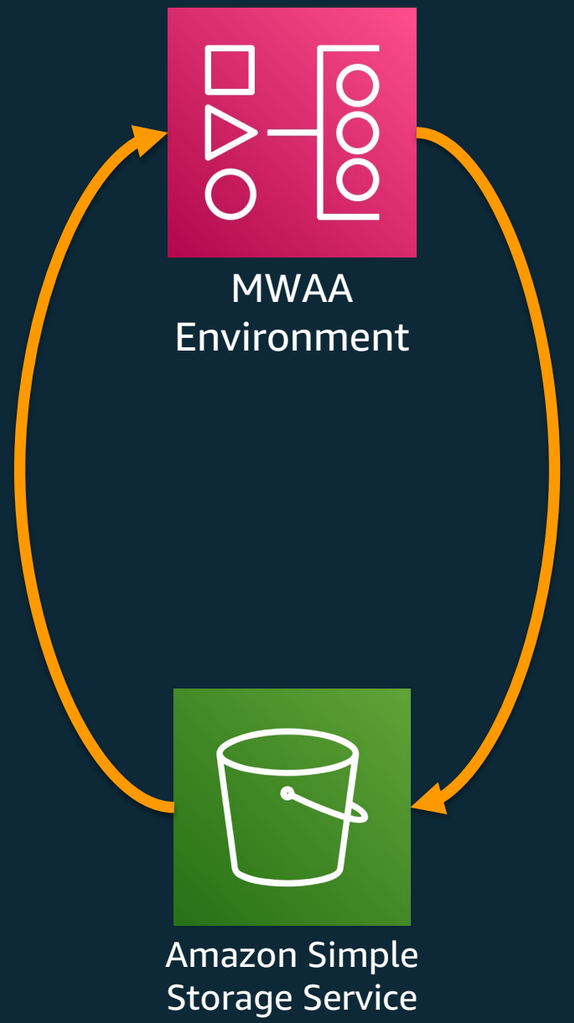
Working with MWAA and Airflow DAGs

DAG definitions:

1. Upload directly to Amazon S3
2. Configure environment for the path of the bucket namespace DAGs will be stored in
3. Your environment checks S3 every 30 seconds for new DAGs and related files
4. After import from S3, DAGs show available in the Airflow web interface



Working with MWAA and Airflow DAGs

MWAA supports the built-in plugin manager in Airflow

1. Zip up plugins directory
2. Upload directly to Amazon S3
3. Configure environment for the object in the bucket namespace plugins will be stored in
4. Your environment checks S3 every 30 seconds for new plugins
5. After import from S3, plugins show installed in the Airflow web interface
6. Configure DAGs to use plugins

```
__init__.py
my_airflow_plugin.py
hooks/
    |-- __init__.py
    |-- my_airflow_hook.py
operators/
    |-- __init__.py
    |-- my_airflow_operator.py
sensors/
    |-- __init__.py
    |-- my_airflow_sensor.py
```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Working with MWAA and Airflow DAGs

MWAA supports Python dependencies for your DAG code

1. Create a Python requirements.txt with required dependencies
2. Upload directly to Amazon S3
3. Configure environment for the version of the requirements.txt file in S3
4. Your environment will pull down that version of the file
5. Logs for the scheduler will show processing of the requirements.txt file
6. Configure DAG code to use dependencies

```
apache-airflow-providers-apache-
hive[amazon]>=1.0.1
hmsclient>=0.1.0
pyhive[hive]>=0.6.0
thrift>=0.9.2
apache-airflow-providers-
presto>=1.0.1
presto-python-client>=0.7.0
```

(example requirements.txt file)

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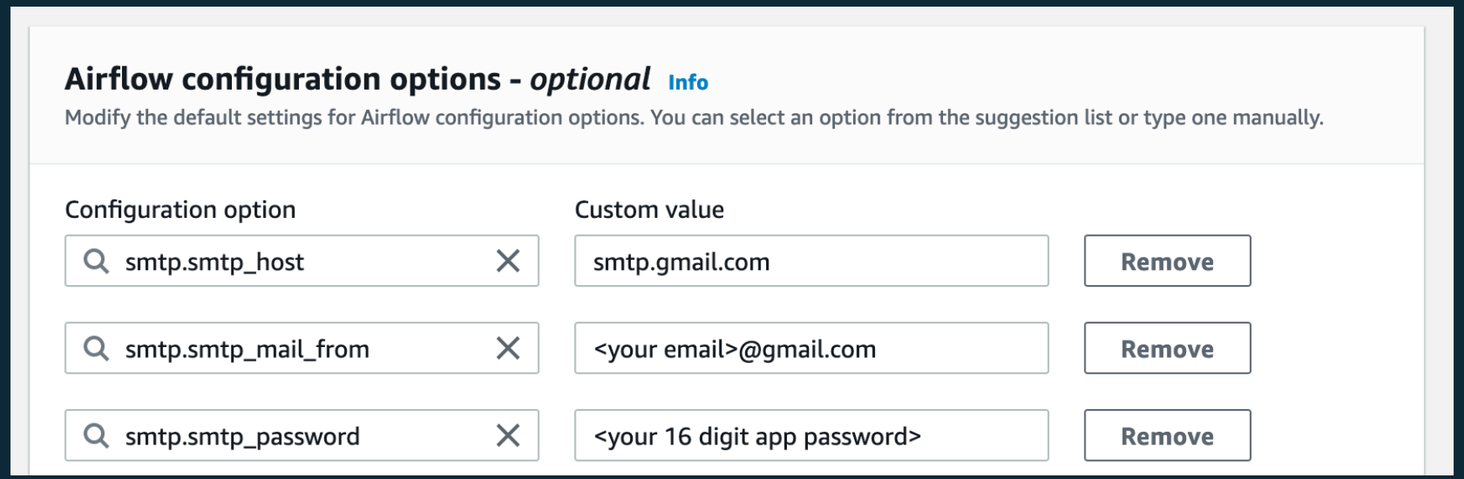
Working with MWAA and Airflow DAGs

MWAA supports Airflow configuration settings typically seen in airflow.cfg

- Settings are configured in the Amazon MWAA console
- Some settings appear in the dropdown, but the full list can be found in the Airflow documentation: https://airflow.apache.org/docs/stable/configurations-ref.html

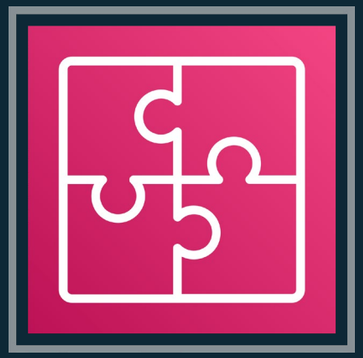


Integrations

Amazon MWAA has integration with several other AWS services via plugins:

- Amazon EKS
- Amazon EMR
- Amazon RDS
- AWS Glue
- AWS Batch
- Amazon DynamoDB

more!



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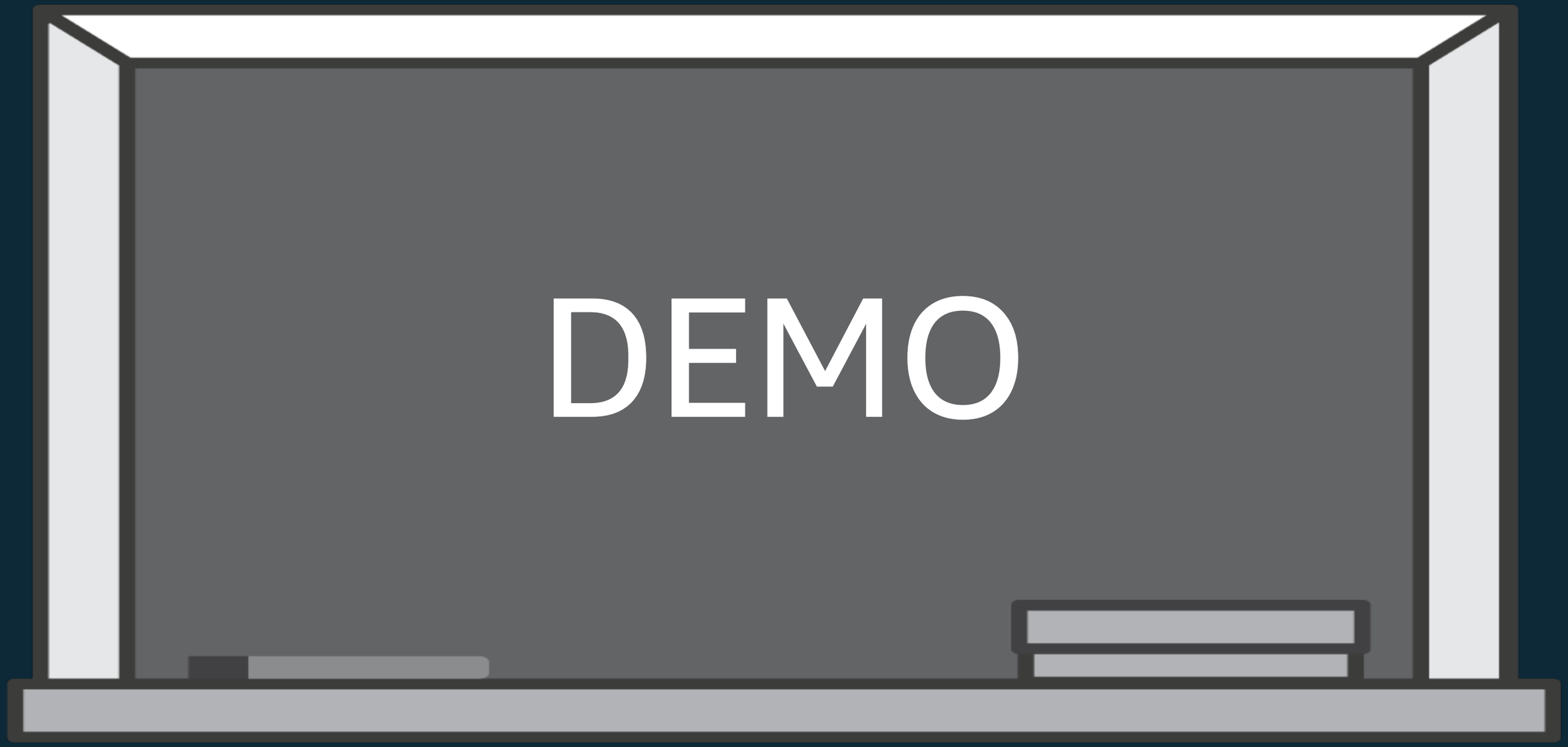


MWAA environments and pricing

Environment Instance Pricing

Region: US East (N. Virginia)

Size	Scheduler vCPU	Worker vCPU	Web Server vCPU	Recommended Workflow Capacity	Price Per Hour
Small	1	1	0.5	Up to 50 DAGs	$0.49
Medium	2	2	1	Up to 250 DAGs	$0.74
Large	4	4	2	Up to 1000 DAGs	$0.99

Additional Worker Instance Pricing

Size	Price Per Hour
Small	$0.055
Medium	$0.11
Large	$0.22

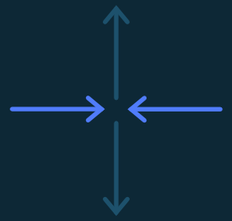
Meta Database Storage

$0.10 per GB Month

https://aws.amazon.com/managed-workflows-for-apache-airflow/pricing/

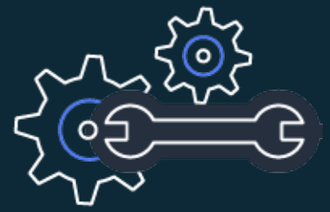
Amazon Managed Workflows for Apache Airflow benefits

Setup



Scaling

Security



Upgrades

Maintenance

Resources

Stay “In The Know”

- Amazon MWAA docs https://docs.aws.amazon.com/mwaa

- Amazon MWAA landing page https://aws.amazon.com/mwaa

- #airflow-aws Slack Channel: https://apache-airflow.slack.com

Thank you!

Chris Munns
munns@amazon.com
@chrismunns