



# EdgeExecutor

The new option to run  
anywhere



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3.0

# Airflow EdgeExecutor – Where we came from...

- Initial discussion of idea in [AIP-69 Remote Executor](#)

The screenshot shows a page titled "AIP-69 Remote Executor" under the "Seiten / ... / Completed" section. It was created by Jens Scheffler and last updated on April 19, 2024. A warning message at the top says: "Sie zeigen eine alte Version dieser Seite an. Zeigen Sie die [aktuelle Version](#) an." Below it are links to "Unterschiede anzeigen" and "Seitenhistorie anzeigen". Navigation buttons include "Vorherige Version anzeigen", "Version 5" (which is highlighted), and "Nächste Version anzeigen". The "Status" section contains a table with the following data:

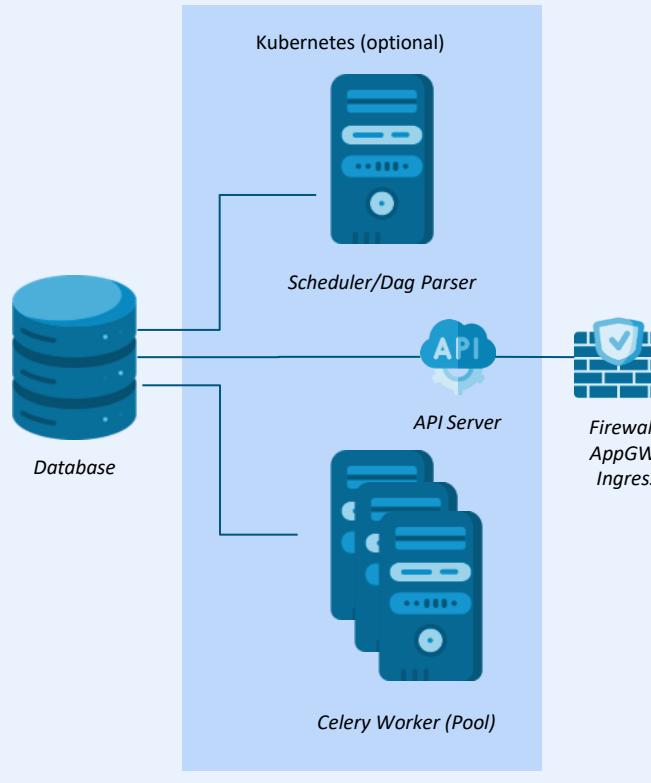
State	Draft
Discussion Thread	<a href="https://lists.apache.org/thread/8hlitm9brdxqyf8jyw1syrb11hi52k5">https://lists.apache.org/thread/8hlitm9brdxqyf8jyw1syrb11hi52k5</a>
Vote Thread	
Vote Result Thread	

The sidebar on the left lists "Seiten" (Pages) such as "File lists", "Airflow Improvement Proposals", "Airflow 3 Workstreams", "Airflow 3.0", "Archives", and "SEITENHIERARCHIE" sections for "Airflow 3.0", "Airflow 3.x", "Airflow Improvement Proposals", and "Abandoned or Replaced".

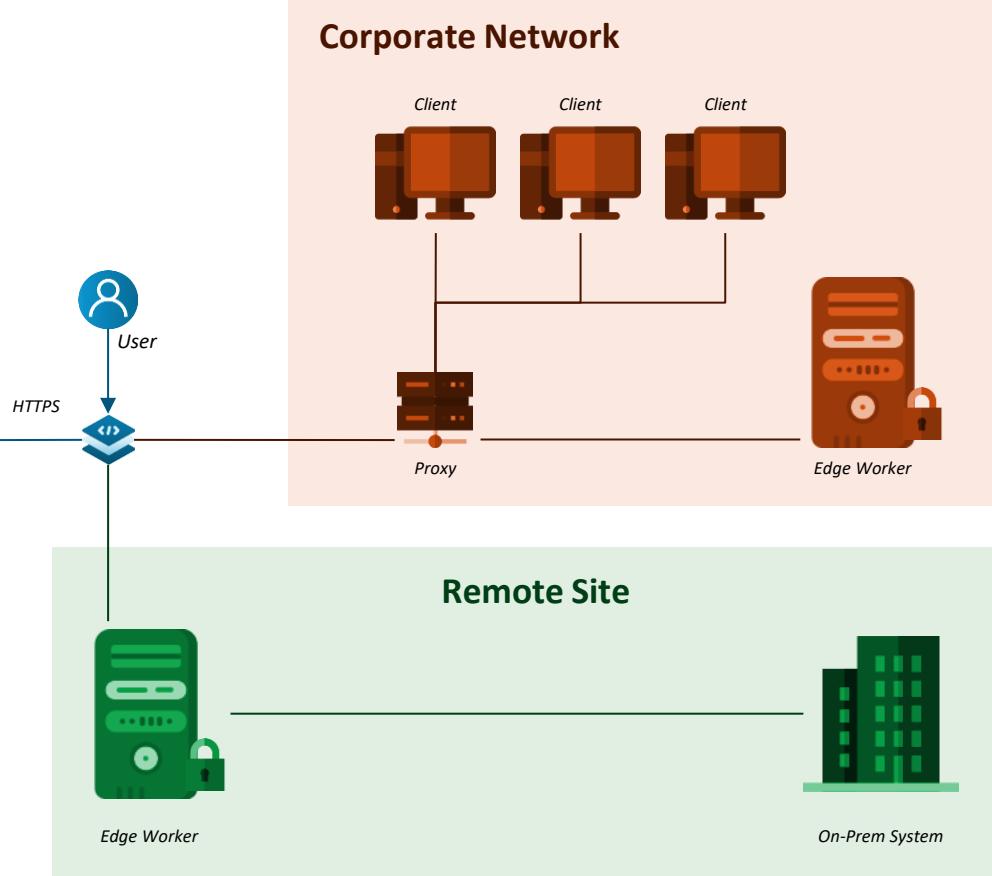
- Big support by Airflow community
- Contributed to Airflow 3 as major release → Task SDK

# Edge Executor

## Airflow Main Deployment/Cloud

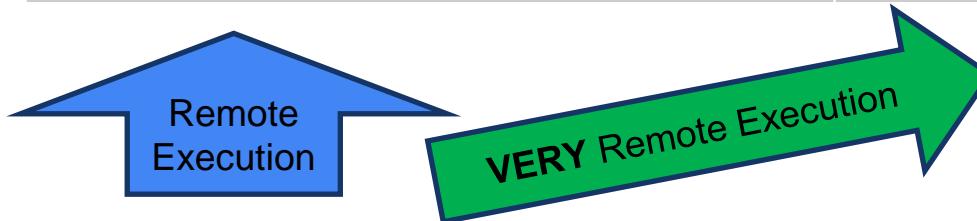


## Corporate Network



# Remote Execution – Which Options do you have?

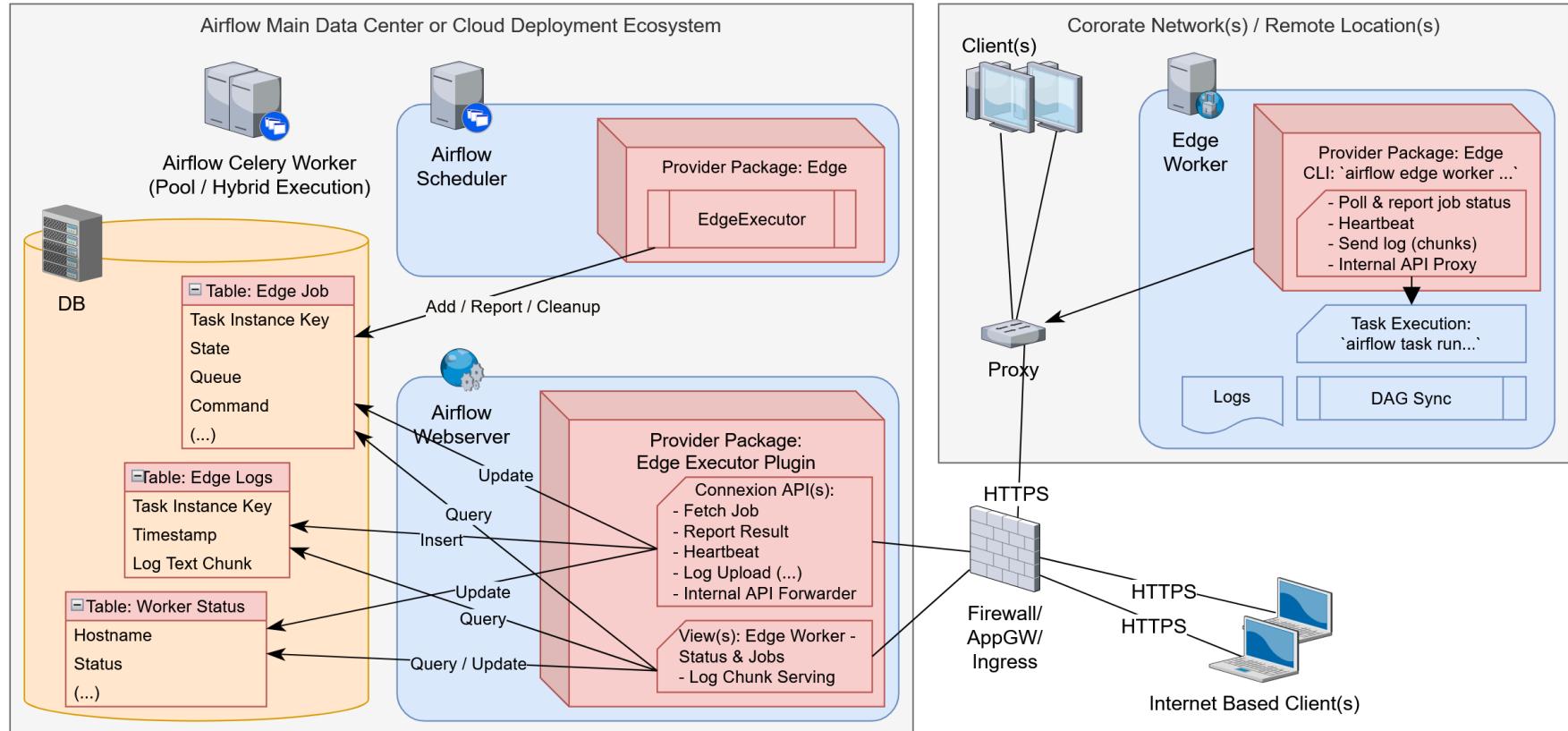
Option to Run Remote Tasks	Impact / Limitations
Use SshOperator	Need to allow inbound TCP on your remote site
Use Kubernetes[PodOperator Executor]	Requires inbound HTTPS and K8s Deployment
Connect Worker via VPN	Requires VPN+Endpoint, Instable, Low Performance (Chatty)
Connect Worker via HTTP Tunnel	Even more instability, especially with Celery
Set-up multiple Airflow instances	No End-2-End Workflow, needs „meta-orchestration“



## Requirements for Edge Execution

- Lean Setup
- Robust Network Connection (HTTPS)
- Seamlessly Integrated with Core

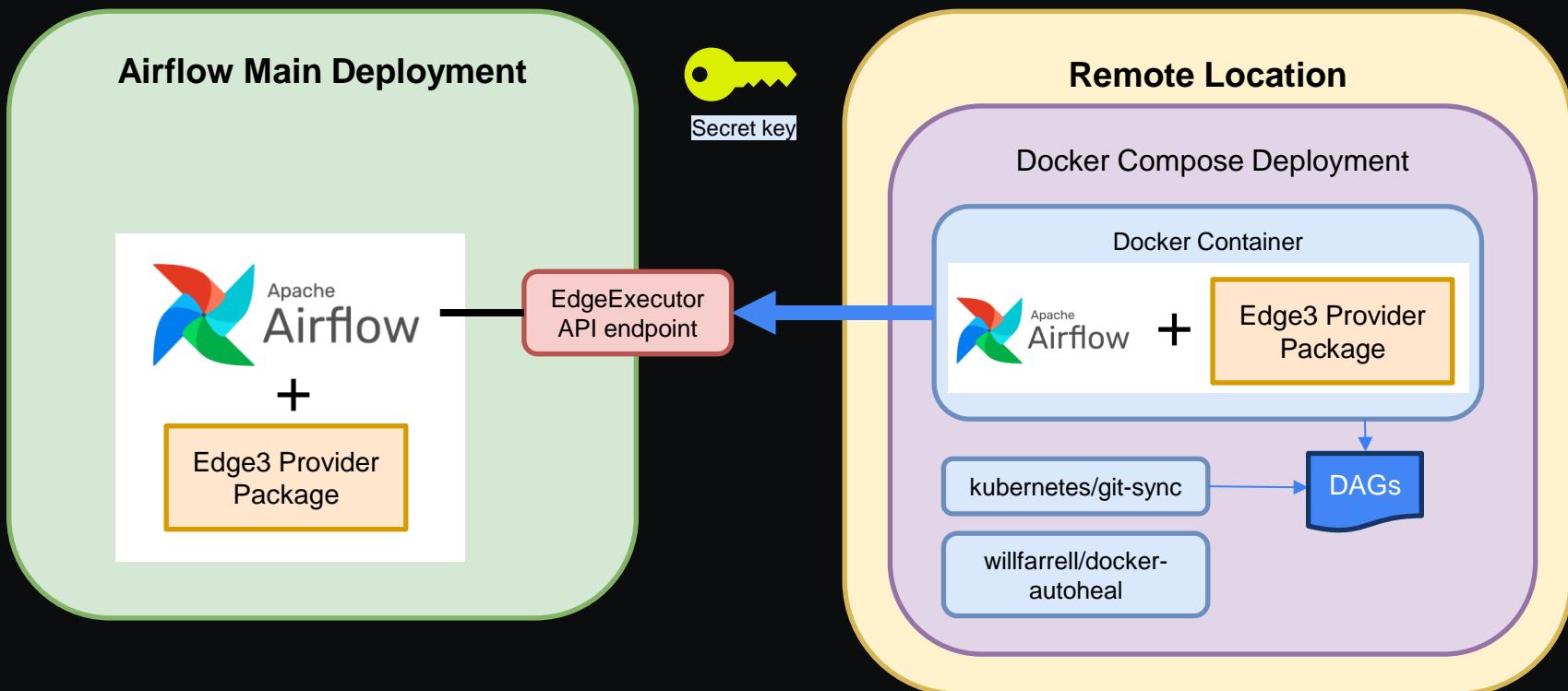
# EdgeExecutor – How does it work?



# Getting started with EdgeExecutor

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# EdgeExecutor Deployment Example



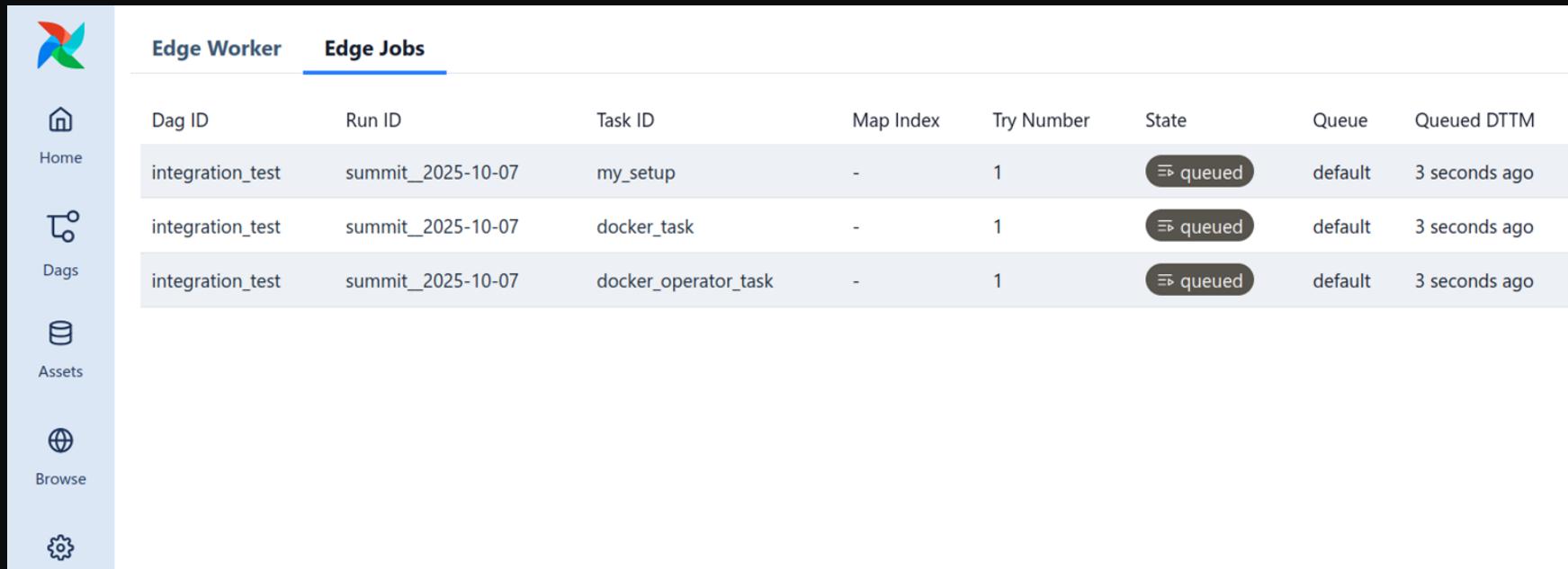
# Edge Worker user interface – Airflow 3.1++

The screenshot shows the Airflow 3.1+ Edge Worker UI. On the left is a sidebar with icons for Home, Dags, Assets, Browse, Admin, and Edge Worker/Jobs. The main area has tabs for Edge Worker and Edge Jobs, with Edge Worker selected. It lists two workers:

Worker Name	State	Queues	First Online	Last Heartbeat	Active Jobs	System Information	Operations
bosch.ffm.ad-alliance.biz	idle	production	1 year ago	1 second ago	0	<ul style="list-style-type: none"><li>airflow_version: 3.1.0</li><li>edge_provider_version: 1.3.1</li><li>concurrency: 8</li><li>free_concurrency: 8</li></ul>	[2025-09-27 20:05] - admin put node into maintenance mode Comment: Moved to production, yeah!
dev-abt.de.bosch.com	maintenance mode	dev	1 year ago	5 seconds ago	0	<ul style="list-style-type: none"><li>airflow_version: 3.1.0</li><li>edge_provider_version: 1.3.1</li><li>concurrency: 8</li><li>free_concurrency: 8</li></ul>	[2025-09-27 20:05] - admin put node into maintenance mode Comment: Moved to production, yeah!
	offline	arctis	5 months ago	1 hour ago	0	<ul style="list-style-type: none"><li>airflow_version: 3.1.0</li><li>edge_provider_version: 1.3.1</li><li>concurrency: 8</li><li>free_concurrency: 8</li></ul>	[2025-09-27 20:05] - admin put node into maintenance mode Comment: Moved to production, yeah!

A blue callout box points to the 'Queues' column with the text: "Assign tasks to specific groups of Edge workers". Another blue callout box points to the 'Operations' column with the text: "Manage Edge workers directly from Web UI".

# Edge Worker user interface – Airflow 3.1++



The screenshot shows the Airflow 3.1+ user interface with the Edge Worker sidebar selected. The main view displays a table of Edge Jobs.

Dag ID	Run ID	Task ID	Map Index	Try Number	State	Queue	Queued DTTM
integration_test	summit_2025-10-07	my_setup	-	1	queued	default	3 seconds ago
integration_test	summit_2025-10-07	docker_task	-	1	queued	default	3 seconds ago
integration_test	summit_2025-10-07	docker_operator_task	-	1	queued	default	3 seconds ago

# Monitoring of Edge Workers

- EdgeExecutor exposes metrics to StatsD – for example:
  - Connection status
  - Maintenance status
  - Active jobs
- Can be used to monitor uptime and usage of Edge Workers
- Using Prometheus and Grafana you can easily build dashboards and set up alert rules



Grafana dashboard to visualize EdgeExecutor metrics as timeline

When to use  
EdgeExecutor

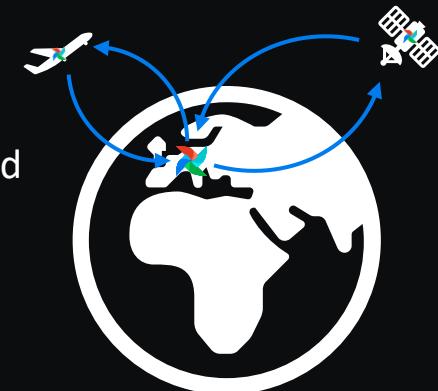
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# Features of EdgeExecutor

- Only requires an *outbound* HTTPS connection
  - Can be run anywhere
  - Robust connectivity even with instable network connection
- Edge workers can be managed from Airflow Web UI
  - Feature to temporarily disable individual Edge workers using “maintenance mode”
- Seamlessly integrated in Airflow
  - Can be used like any other Executor in Airflow
  - EdgeExecutor available since Airflow 3.0, UI plugin since 3.1
- Lean setup
  - Edge3 provider package has a small set of dependencies

# Use cases for EdgeExecutor

- Cost savings
  - Run heavy workload where it runs most cost-efficiently
  - Avoid costly transfers of large amounts of data
- Legal requirements
  - Data which must not leave a specific location
- Special hardware requirements
  - Run jobs on special hardware that you cannot use in public cloud
- Running jobs in **very** remote locations
  - Just because you can 😎



# Usage of Edge Worker @ Bosch

- Used to orchestrate software tests on special hardware for Automated Driving
- Edge Worker running in production since more than 12 months
- More than 90 Edge workers connected to a single Airflow instance



# Outlook

- UI Beautifications
- Facilitate deployment of Edge Executor (e.g. using Docker Compose)
- Individual authentication of Edge Workers (possibly using mTLS?)
- Load tests / Scaling Improvements
- Running Edge worker on Windows

# Questions?



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Let's stay in touch:



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