



EdgeExecutor

The new option to run
anywhere



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Airflow EdgeExecutor – Where we came from...

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

The screenshot shows a web page titled "AIP-69 Remote Executor" under the "Seiten / ... / Completed" section. The page was created by Jens Scheffler and last updated on April 19, 2024. A yellow warning box at the top states: "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", and "Nächste Version anzeigen". The "Status" section contains a table with the following data:

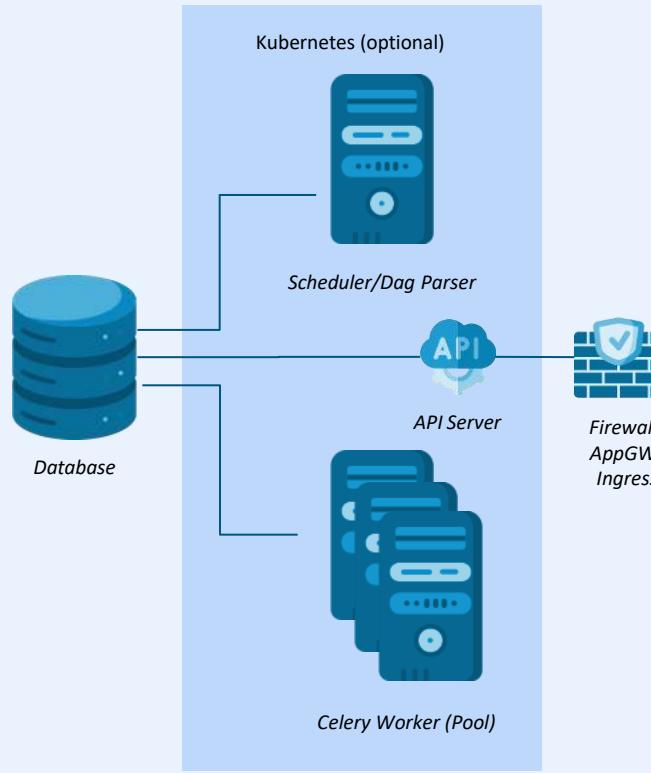
State	Draft
Discussion Thread	https://lists.apache.org/thread/8hlitm9brdxqyf8jyw1syrb11hi52k5
Vote Thread	
Vote Result Thread	

The left sidebar includes links to "Seiten", "File lists", "Airflow Improvement Proposals", "Airflow 3 Workstreams", "Airflow 3.0", "Archives", "SEITENHIERARCHIE", "Airflow 3.0", "Airflow 3.x", "Airflow Improvement Proposals", and "Abandoned or Replaced".

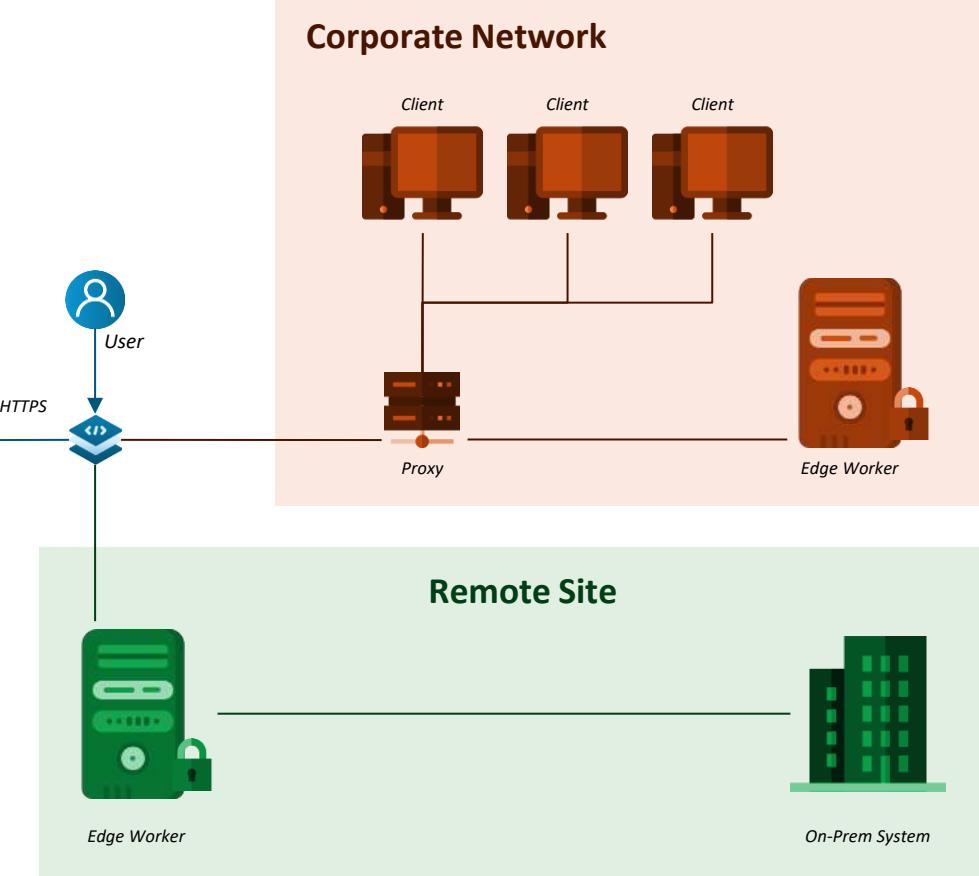
- Big support by Airflow community
- Contributed to Airflow 3 as major release → Task SDK

Edge Executor

Airflow Main Deployment/Cloud

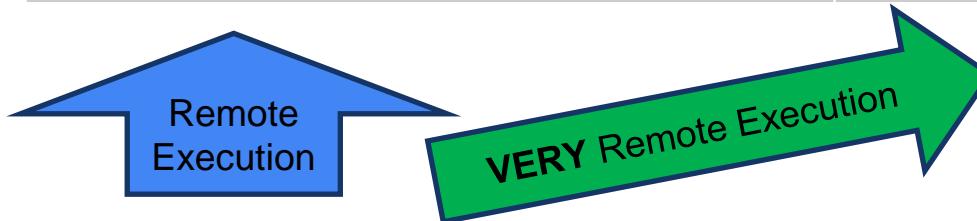


Corporate Network



Remote Execution – Which Options do you have?

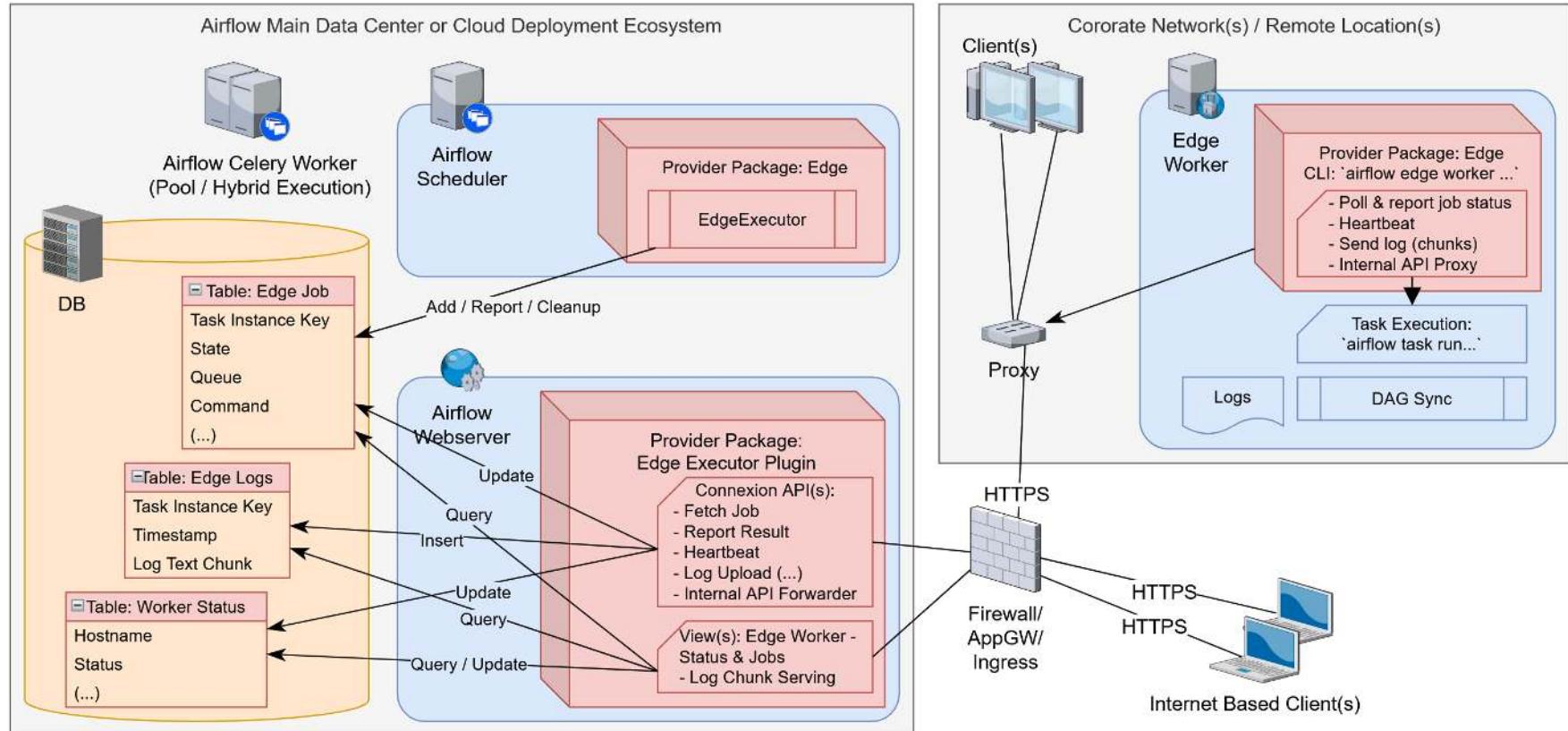
Option to Run Remote Tasks	Impact / Limitations
Use SshOperator	Need to allow inbound TCP on your remote site
Use Kubernetes[PodOperator Executor]	Requires inbound HTTPS and K8s Deployment
Connect Worker via VPN	Requires VPN+Endpoint, Instable, Low Performance (Chatty)
Connect Worker via HTTP Tunnel	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

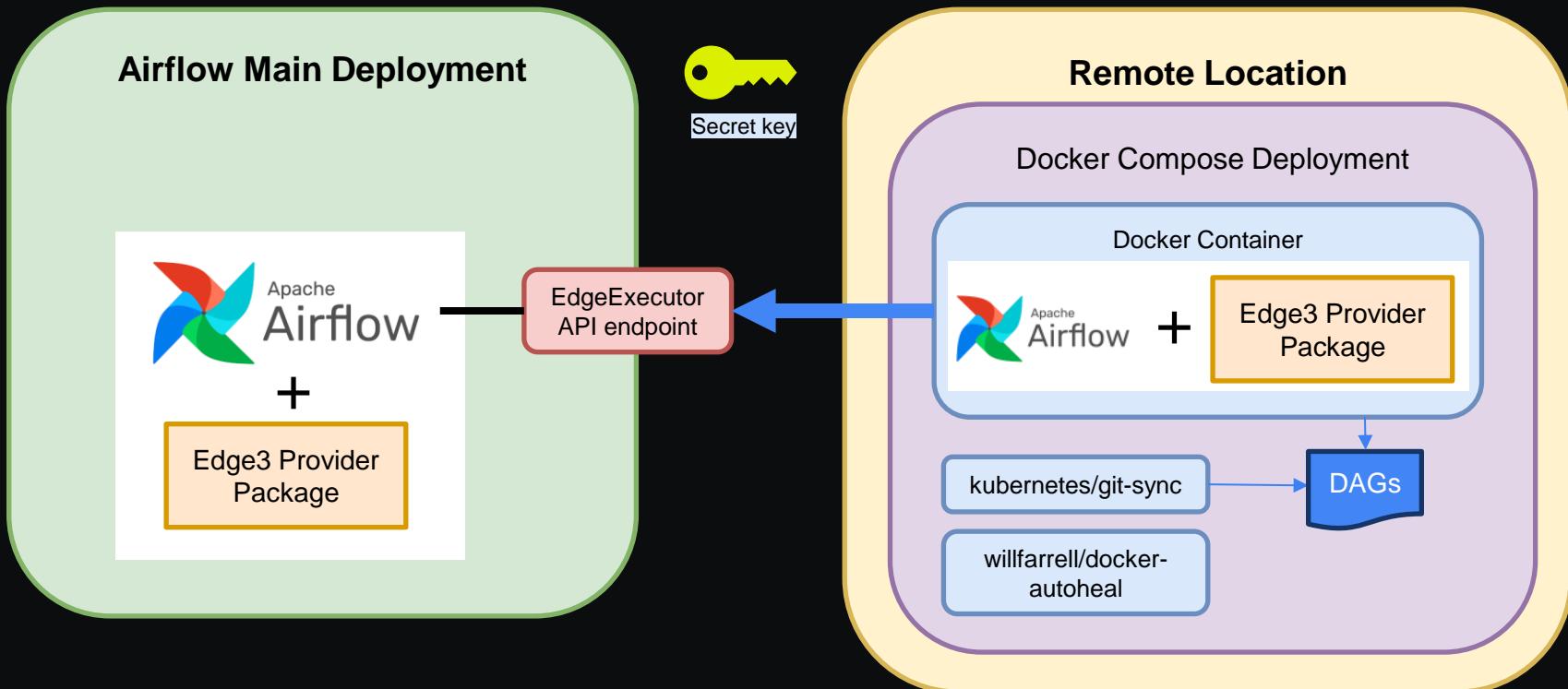
EdgeExecutor – How does it work?



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">airflow_version: 3.1.0edge_provider_version: 1.3.1concurrency: 8free_concurrency: 8	[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">airflow_version: 3.1.0edge_provider_version: 1.3.1concurrency: 8free_concurrency: 8	[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">airflow_version: 3.1.0edge_provider_version: 1.3.1concurrency: 8free_concurrency: 8	

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' section with the text: "Manage Edge workers directly from Web UI".

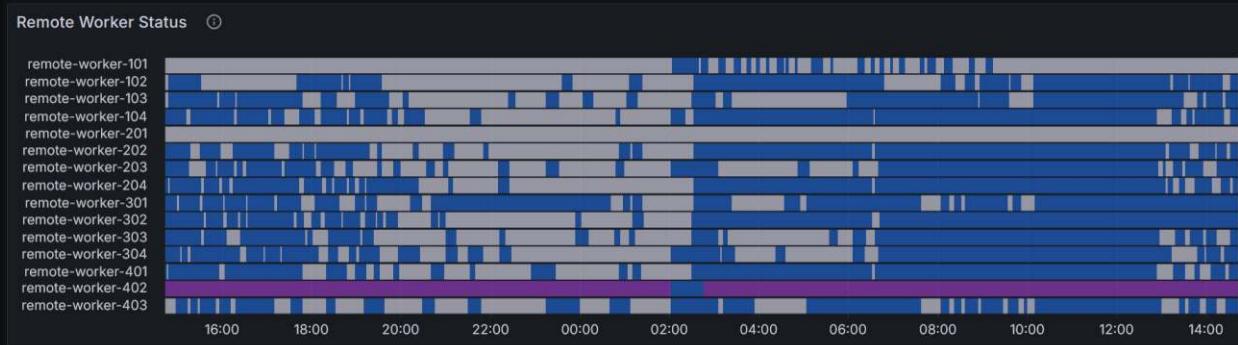
Edge Worker user interface – Airflow 3.1++

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

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

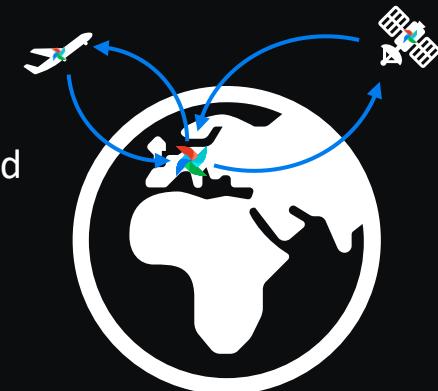
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Features of EdgeExecutor

- 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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