



EdgeExecutor

The new option to run
anywhere



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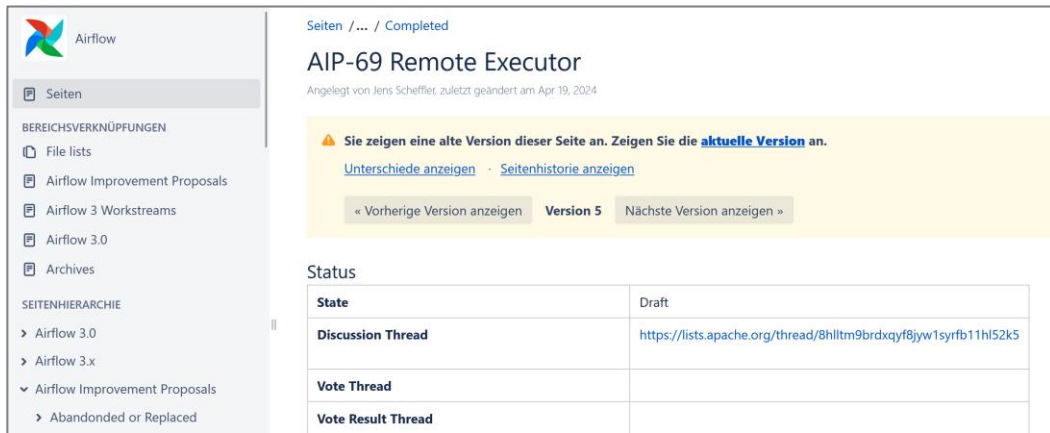


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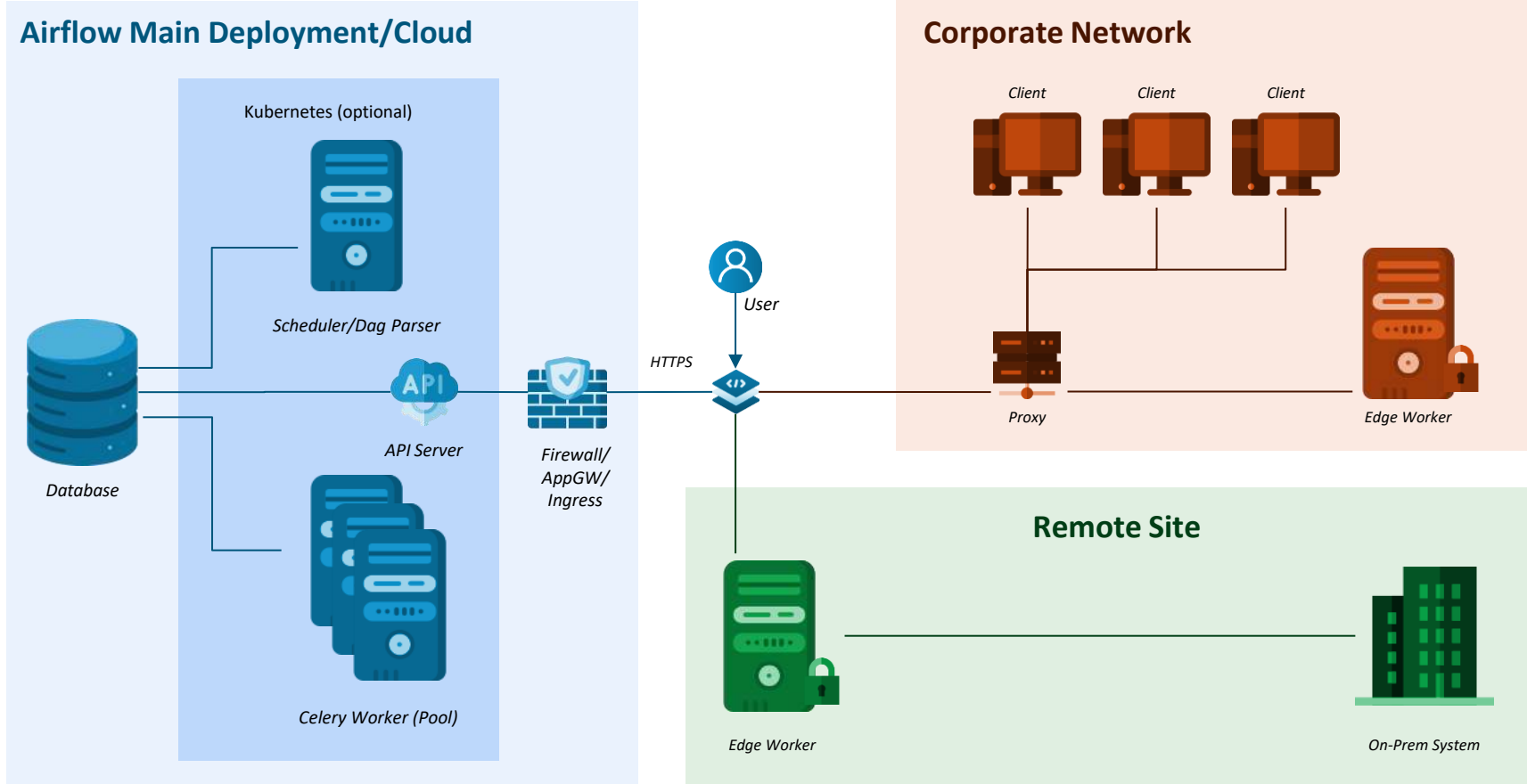
Airflow EdgeExecutor – Where we came from...

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



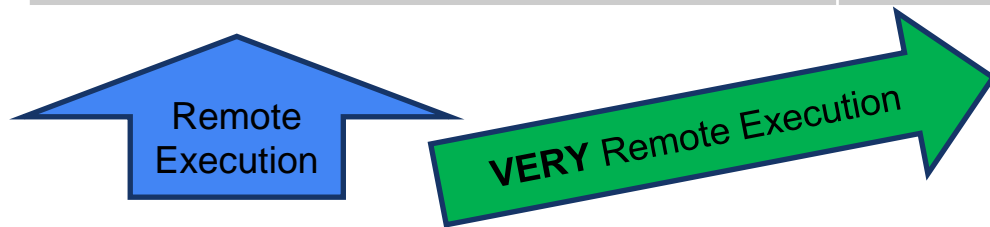
- Big support by Airflow community
- Contributed to Airflow 3 as major release → Task SDK

Edge Executor



Remote Execution – Which Options do you have?

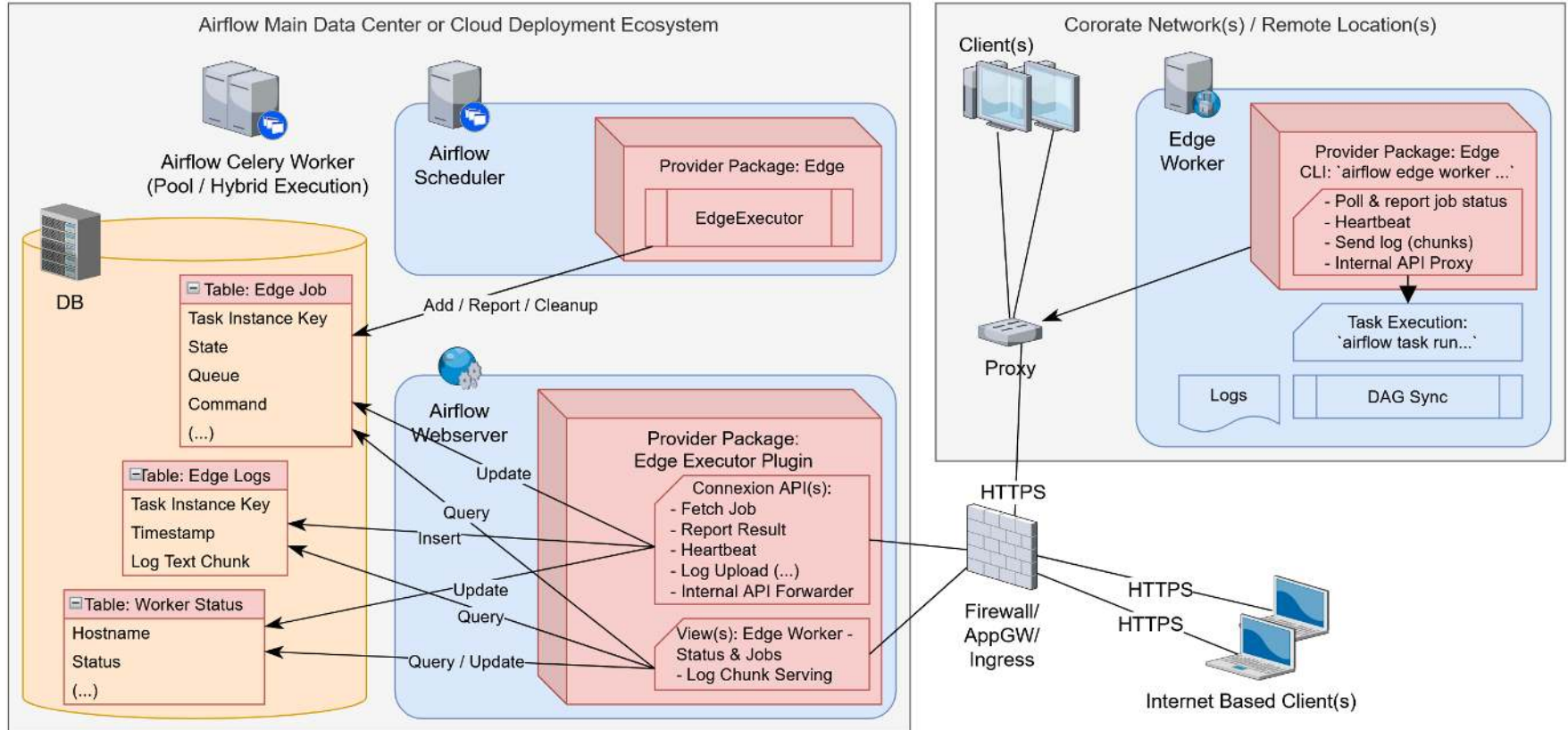
Option to Run Remote Tasks	Impact / Limitations
Use SshOperator	Need to allow inbound TCP on your remote site
Use Kubernetes[PodOperator Executor]	Requires inbound HTTPS and K8s Deployment
Connect Worker via VPN	Requires VPN+Endpoint, Instable, Low Performance (Chatty)
Connect Worker via HTTP Tunnel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

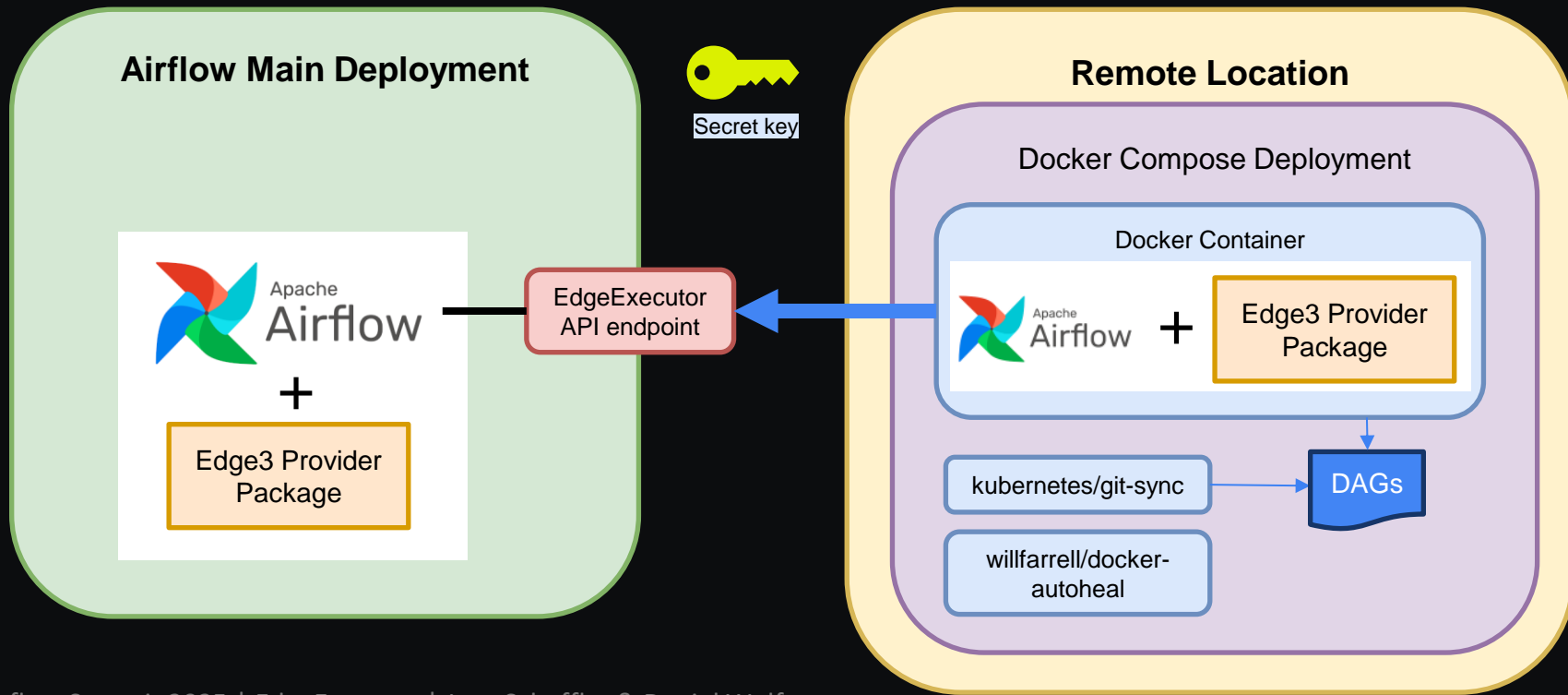
EdgeExecutor – How does it work?



Getting started with
EdgeExecutor










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EdgeExecutor Deployment Example







Edge Worker user interface – Airflow 3.1++

The screenshot displays the 'Edge Worker' section of the Airflow 3.1++ web interface. The left sidebar contains navigation links: Home, Dags, Assets, Browse, and Admin. The 'Admin' link is selected, and a dropdown menu is open, showing options like Variables, Pools, Providers, Plugins, Connections, Config, Edge Worker, and Edge Worker Jobs. The main content area is titled 'Edge Worker' and 'Edge Jobs'. It features a table with columns: Worker Name, State, Queues, First Online, Last Heartbeat, Active Jobs, and System Information. Three workers are listed: 'bosch.ffmpeg.ad-alliance.biz' (idle), 'dev-abt.de.bosch.com' (maintenance mode), and an 'offline' worker. The 'Queues' column for each worker lists the tasks assigned to it: 'production' for the first, 'dev' for the second, and 'arctis' for the third. 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'. The 'Operations' column contains icons for various actions: a green arrow, a red arrow, a red 'X', a red power button, a green checkmark, a red 'X', and a red trash can. A log entry is visible in the 'Operations' column: '[2025-09-27 20:05] - admin put node into maintenance mode Comment: Moved to production, yeah!'.

Worker Name	State	Queues	First Online	Last Heartbeat	Active Jobs	System Information	Operations
bosch.ffmpeg.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	   
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	<p>[2025-09-27 20:05] - admin put node into maintenance mode Comment: Moved to production, yeah!</p>   
	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	

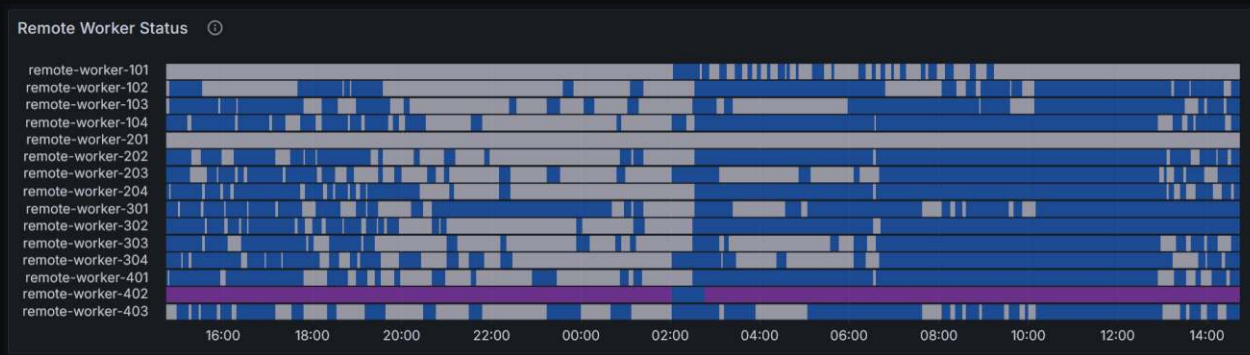
Edge Worker user interface – Airflow 3.1++



<div>Home</div> <div>Dags</div> <div>Assets</div> <div>Browse</div> <div></div>	Edge Worker	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

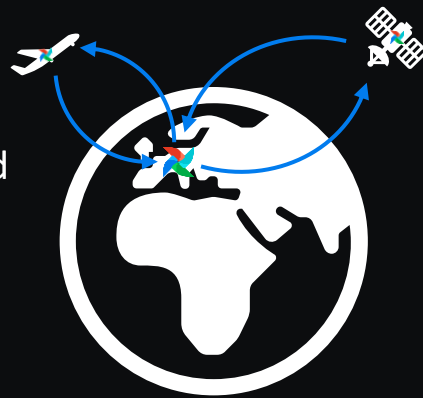
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Features of EdgeExecutor

- 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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