



When Airflow Meets Kubernetes

An Introduction to MLOps

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Code and References

<https://tinyurl.com/datahour-mlops-airflow>



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- **International Tech Speaker**
 - KubeCon, PyCon*, EuroPython, GeoPython, Geekle, etc.
- **Distinguished Guest Lecturer and Tech Panelist**
- **Conference Organizer**
 - EuroPython, GeoPython, PyCon*, etc.
- **Represented India at reputed International Hackathons**
- **Publications at International Journals**
- **ALL STACK DEVELOPER**
- **Mentor**

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Flow of the Talk

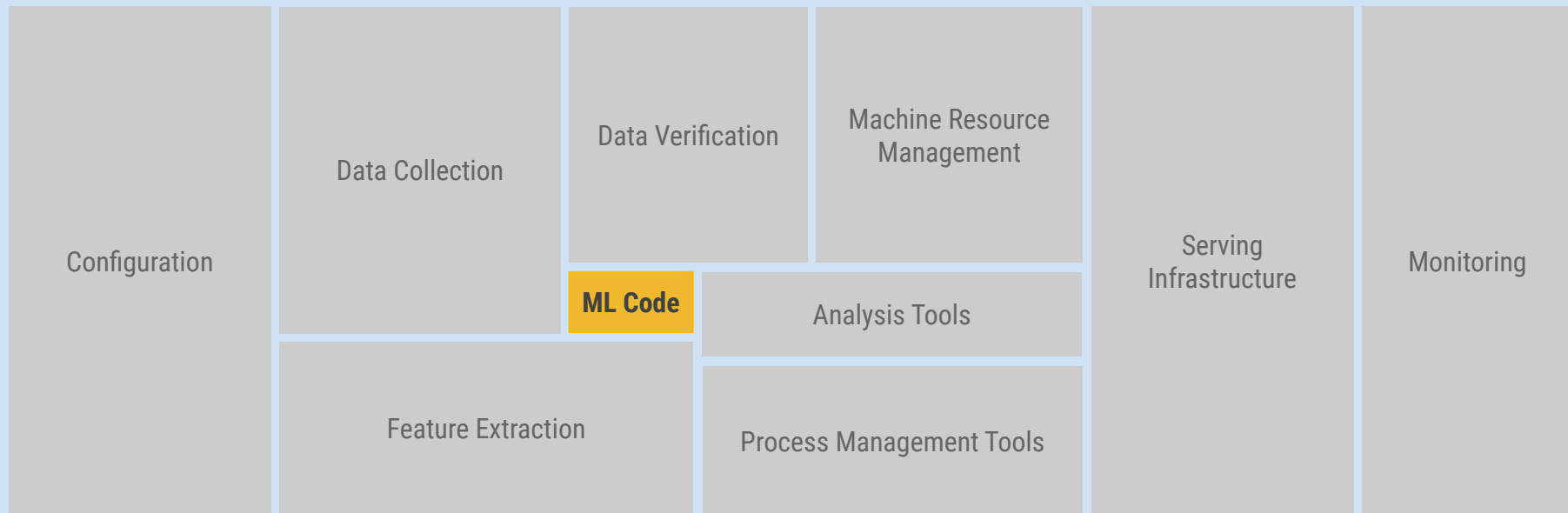
- The Need for MLOps
- Basics of MLOps
- Orchestration Frameworks
- Introduction to Airflow
- Airflow on Kubernetes
- Demo

The Need for MLOps



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A Production Solution Requires Much More than just “ML Code”



Science gears toward research and Engineering gears toward production

Operational Excellence

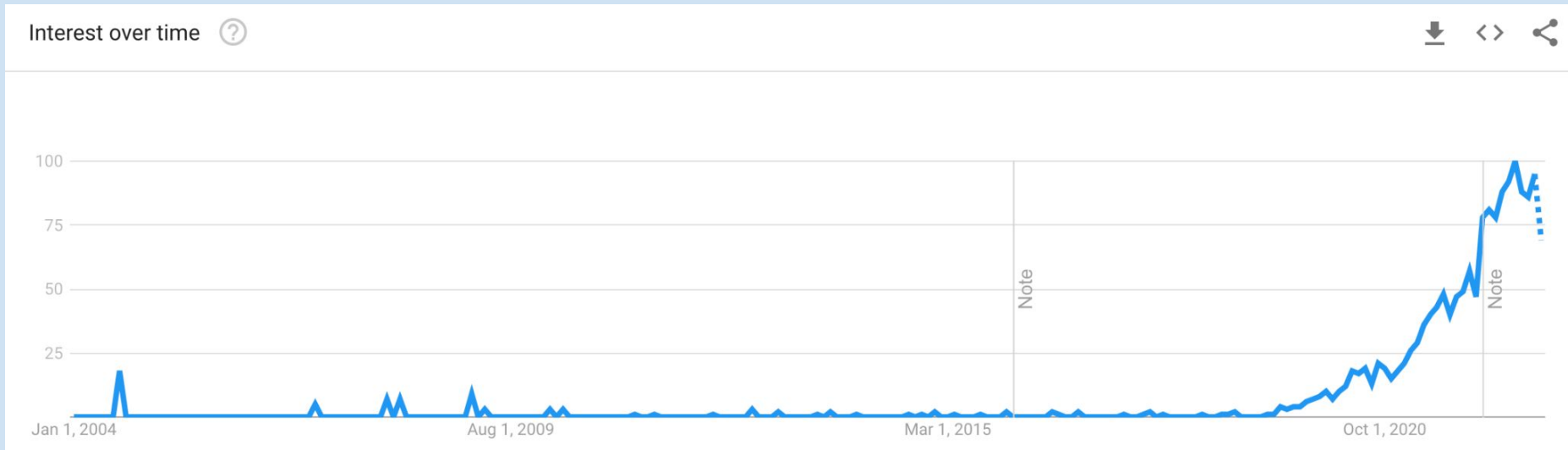
Multiple teams using multiple tools trying to build multiple models

Data Scientists are building Notebooks which rarely make to production

Large backlog of models waiting to be deployed; by the time they hit the release stage, data and requirements change

No standard way to test, monitor, reuse, audit, and maintain the models; No well established Lifecycle or Governance

Google Trend for “MLOps”



What's required for ML/AI Projects?



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Cloud Native Platforms

Containerized Workloads

Serverless Technology

Specialized Hardware for ML/AI

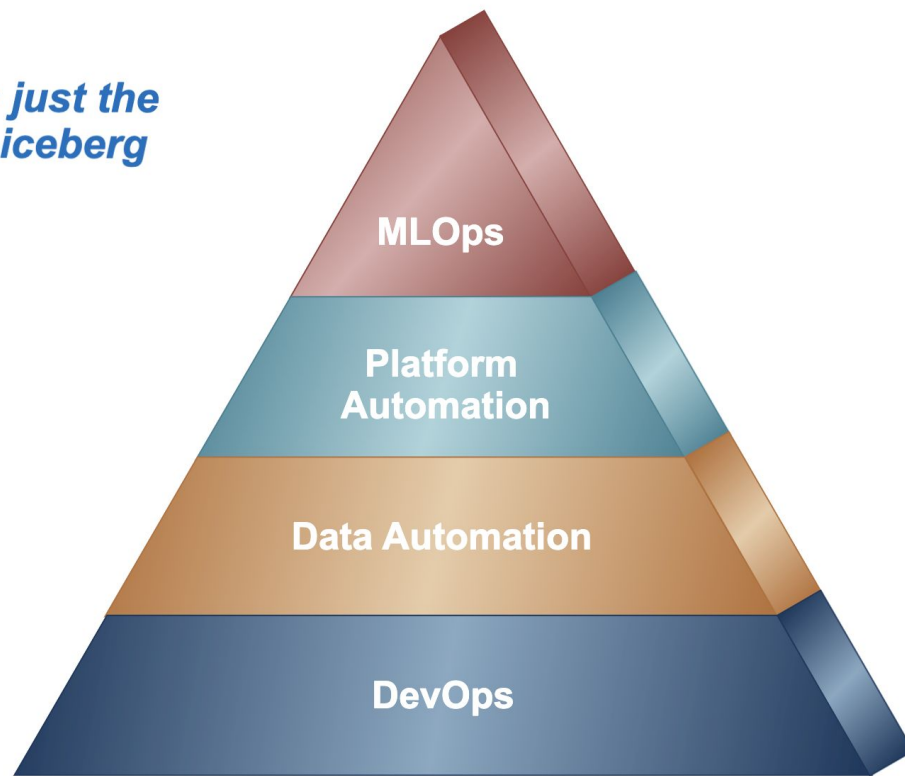
Big Data Platforms and Tools

MLOps

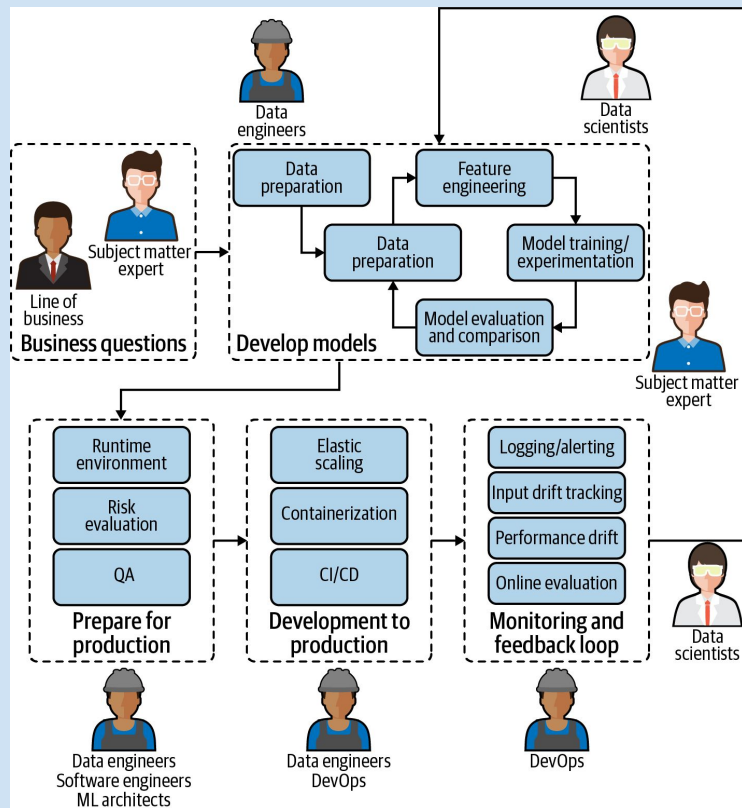


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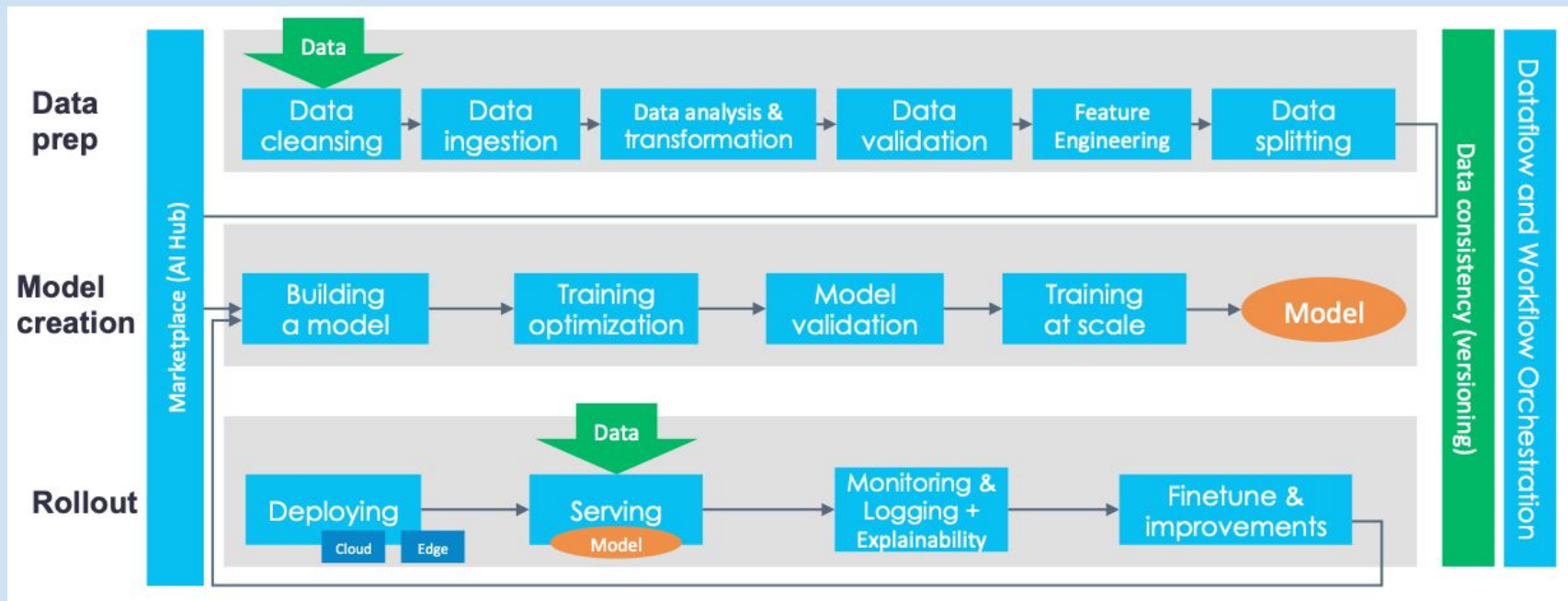
***MLOps is just the
tip of the iceberg***







High-level MLOps Workflow



<https://cd.foundation/blog>

Introduction to Airflow



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Open source platform for developing, scheduling, and monitoring batch-oriented workflows

Python-first; supports parameterization using Jinja

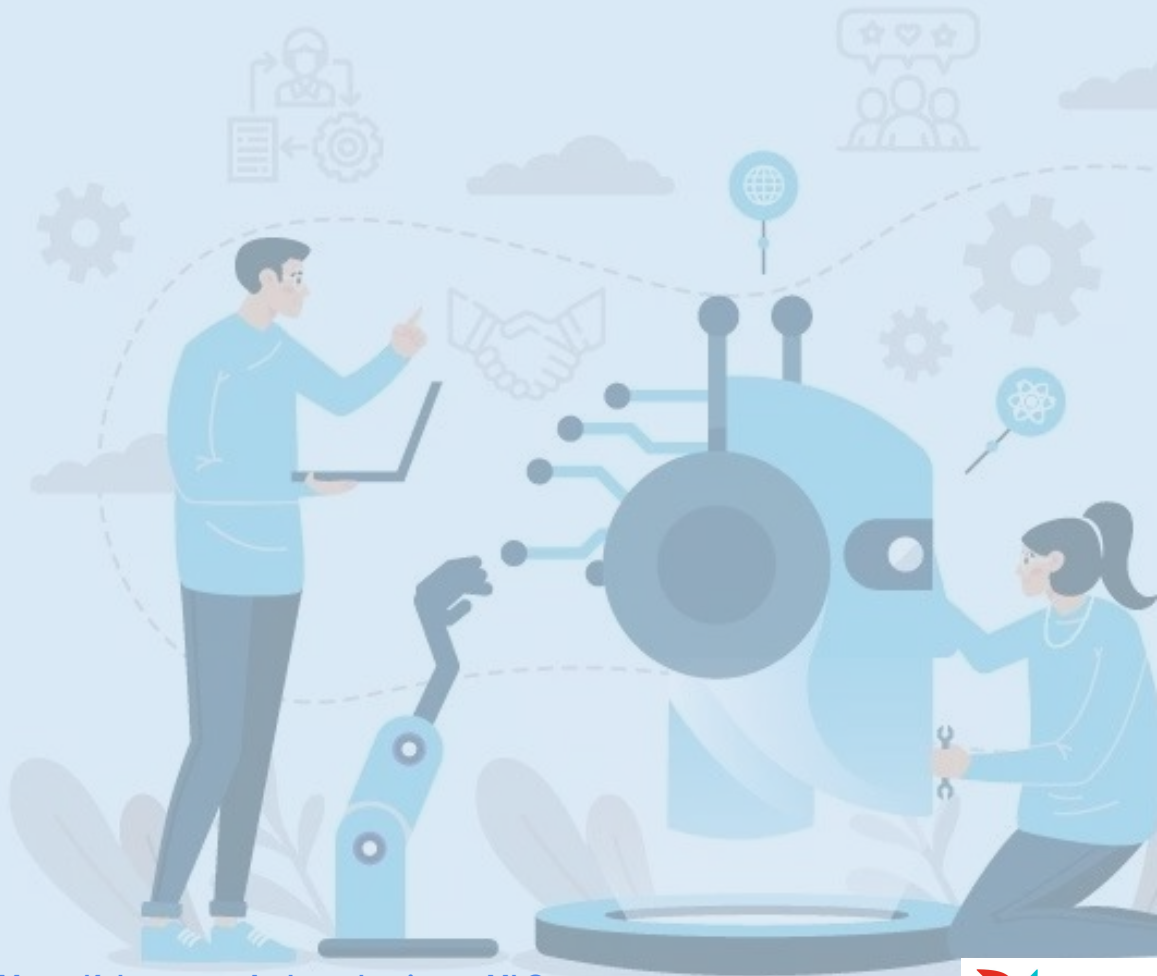
DAG workflows

Extensible with Operators

Task Dependency Management, Parallel Execution, and Retries

Monitoring, Logging, Reporting, and Alerting

Airflow Components



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Airflow Webserver

Airflow Scheduler

Airflow Executor

Metastore Database

Airflow Executors



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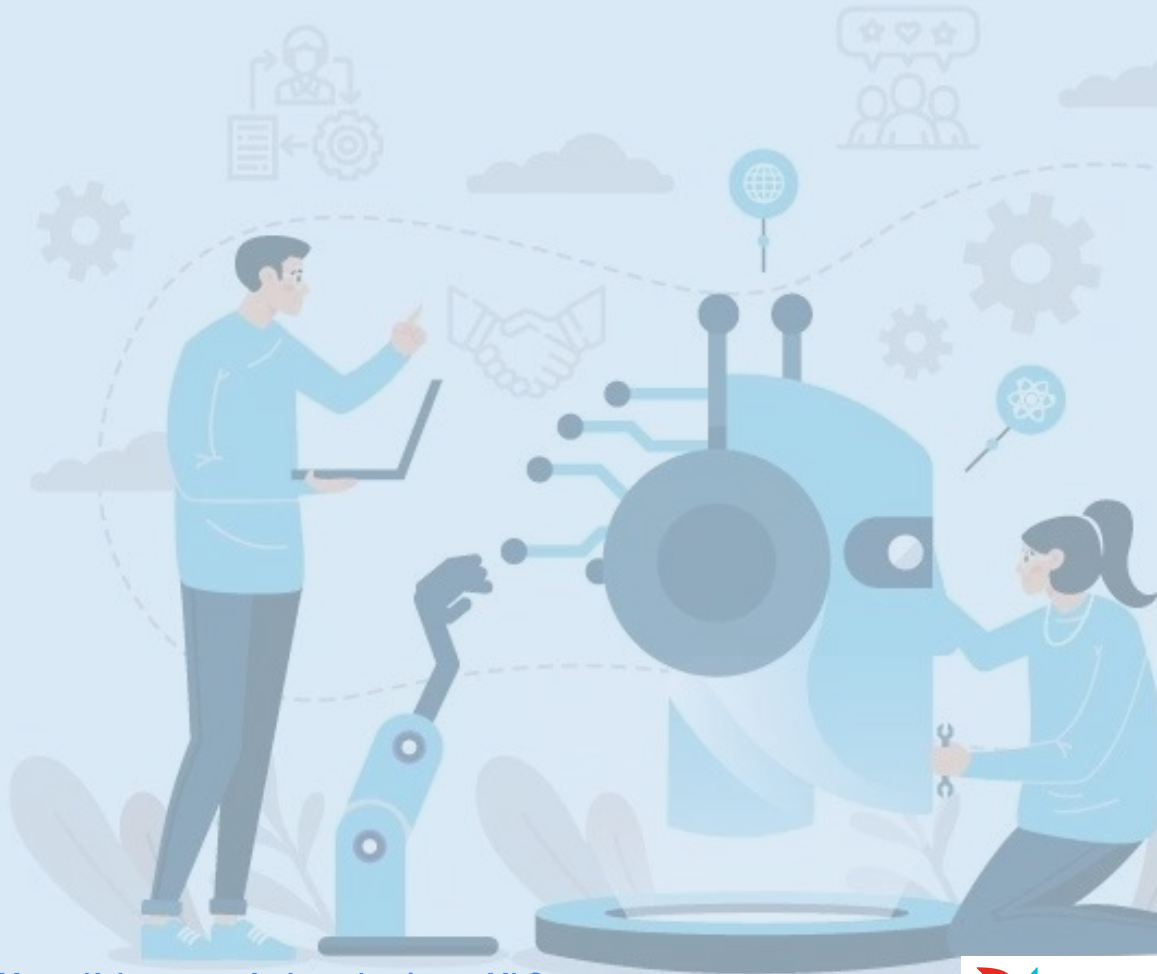
Sequential; no parallelism or concurrency

Local; parallel but local

Celery; production-grade

Kubernetes; production-grade and has Celery variant available as well

Airflow + Kubernetes



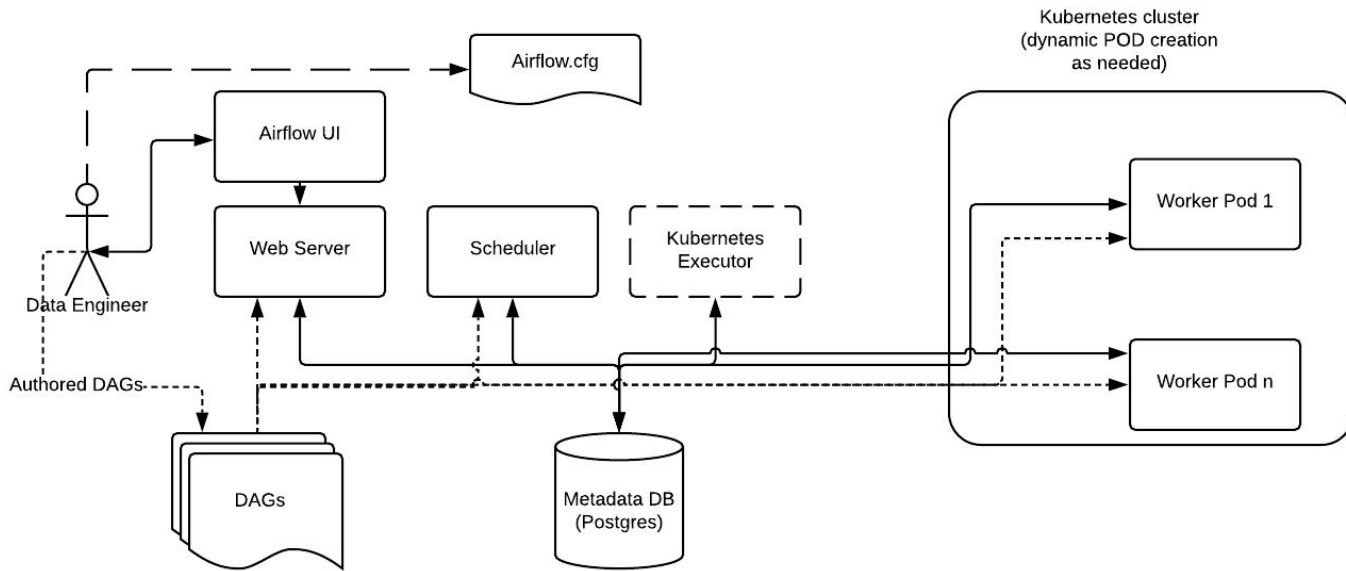
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Kubernetes Pod Operator

Kubernetes Executor

Airflow + KEDA

Kubernetes Executor



Demo



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Thanks
Everyone !

<https://tinyurl.com/datahour-mlops-airflow>



#ApacheAirflow
#Kubernetes
#MLOps
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