From PoC to Prod: Operationalization of machine learning

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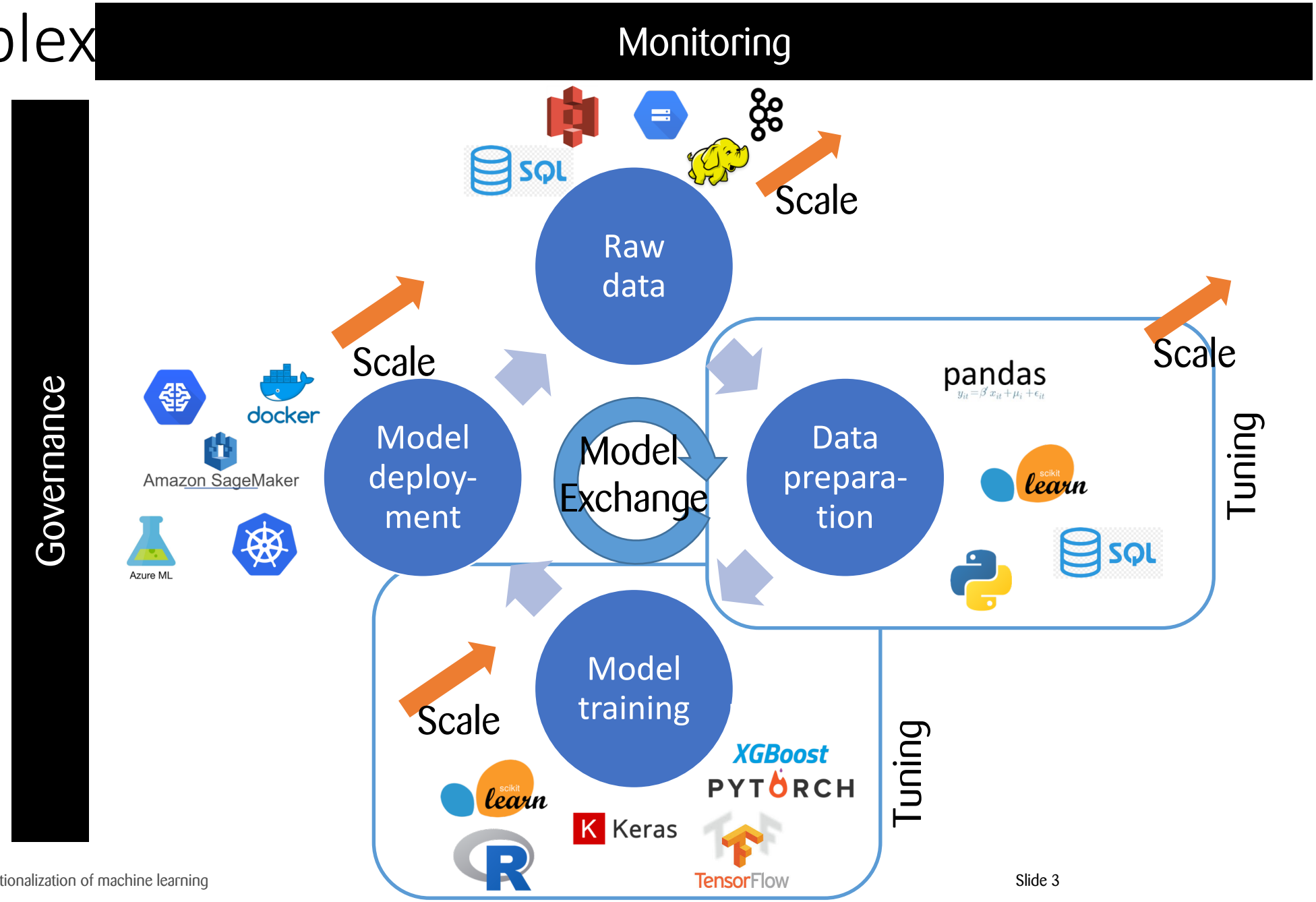
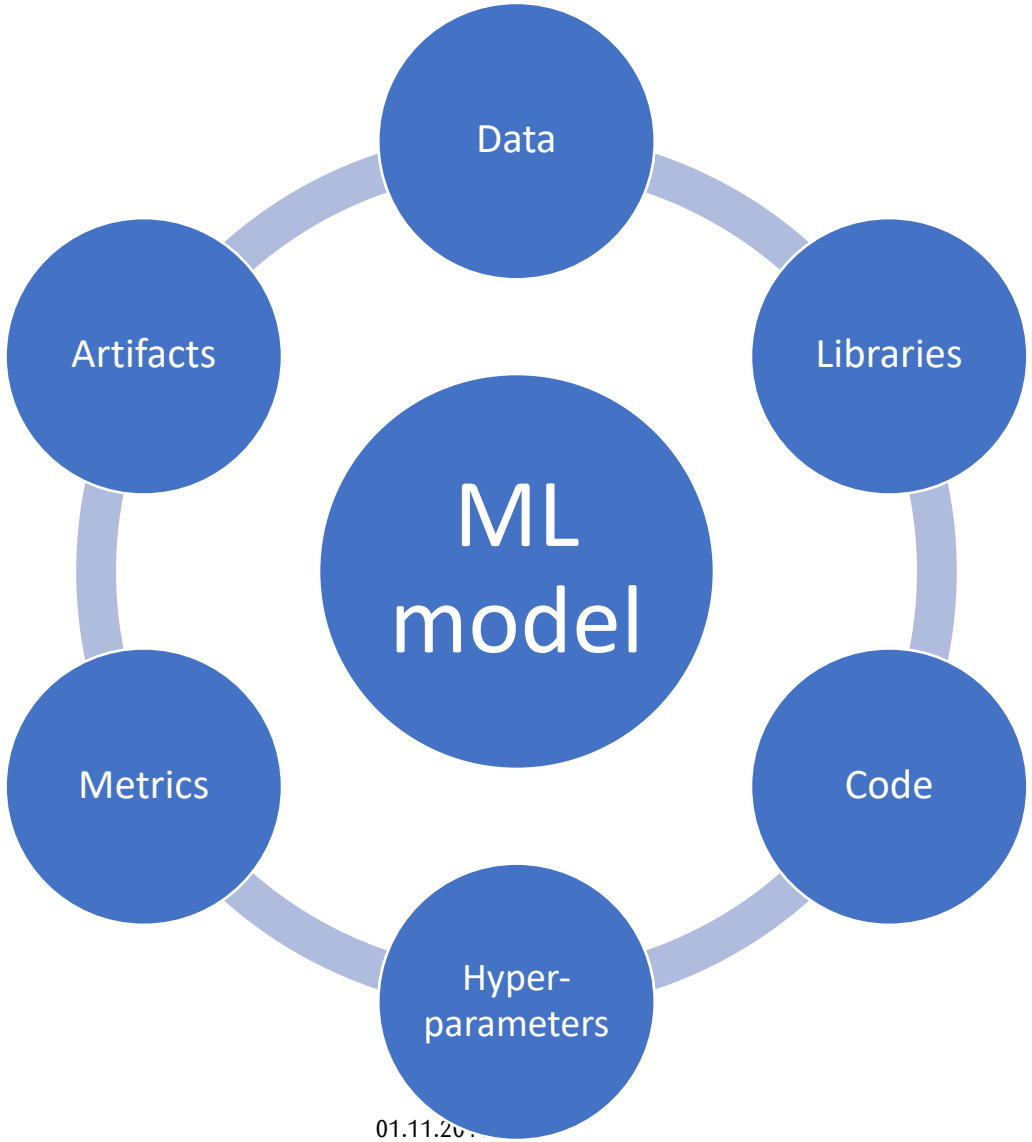
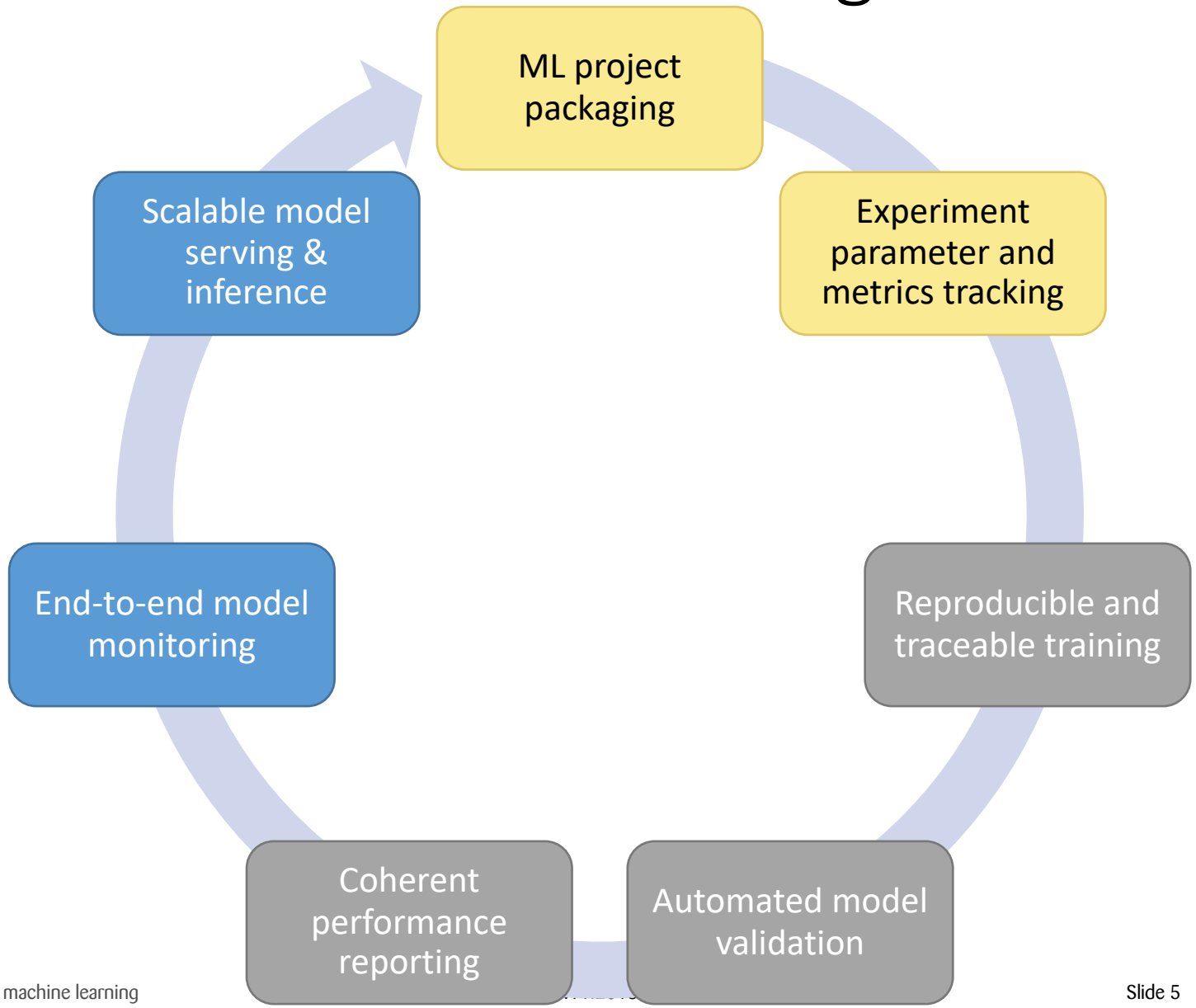
Complex


Monitoring
Governance
Raw data
Scale
Model deploy-ment
Model Exchange
Data prepara-tion
Model training
Tuning
Tuning
Scale
Scale
Scale
pandas
SQL
docker
Amazon SageMaker
Azure ML
scikit learn
XGBoost
PYTORCH
Keras
TensorFlow
R

Machine Learning Puzzle Pieces



Productionized Machine Learning



MLflow demo

Experiment tracking in MLFlow

Code: https://github.com/jakeret/mlflowdemo

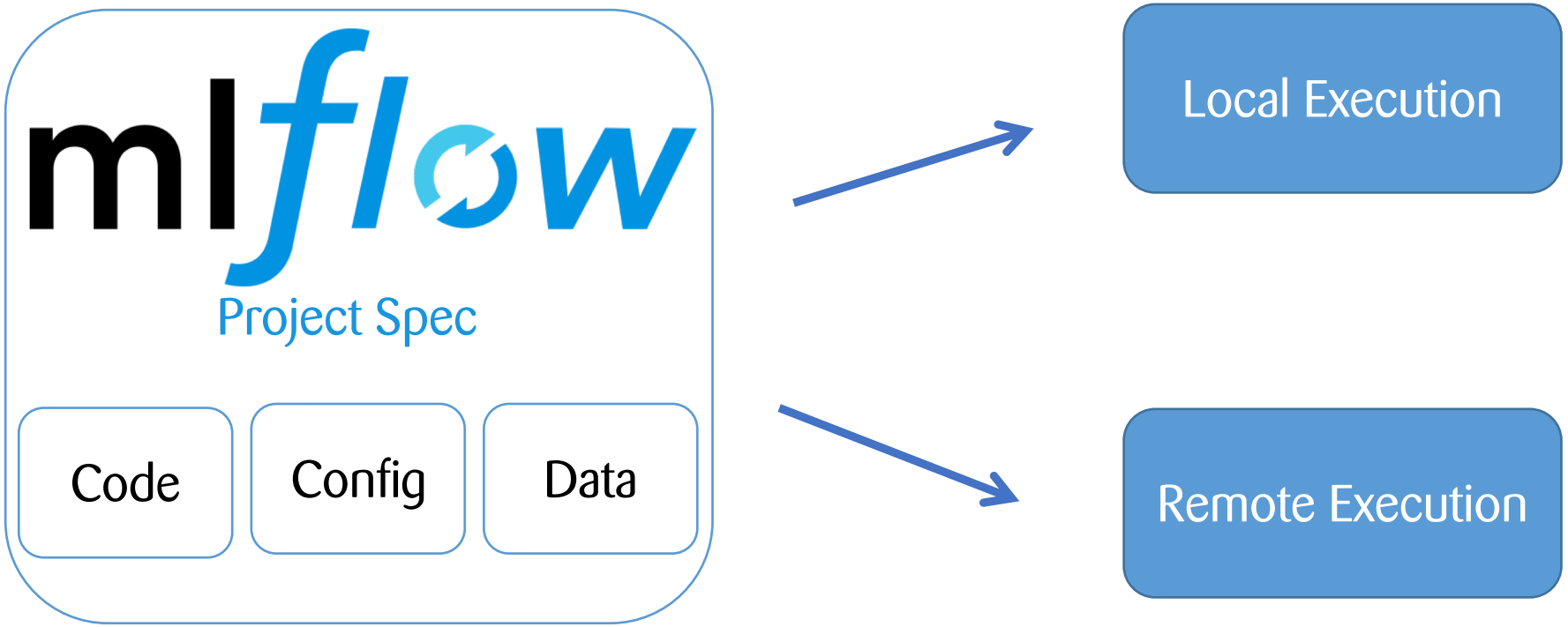
				Parameters				Metrics
Date	User	Source	Version	classifier	accuracy	f1 ▼	mean_fit_time	mean_score_time
2018-08-17 12:52:31	joak	param_search.py	a160af	XGBClassifier	0.997	0.972	112.5	1.526
2018-08-20 10:47:29	joak	param_search.py	a160af	LogisticRegression	0.995	0.961	15.86	1.506
2018-08-17 11:46:31	joak	param_search.py	a160af	RandomForestClassifier	0.992	0.922	78.61	21.25
2018-08-20 08:54:30	joak	param_search.py	a160af	SVC	0.983	0.878	11.03	10.71
2018-08-17 12:17:07	joak	param_search.py	a160af	ExtraTreesClassifier	0.966	0.602	84.41	49.77

MLflow Tracking

Centralized, consistent ML run tracking

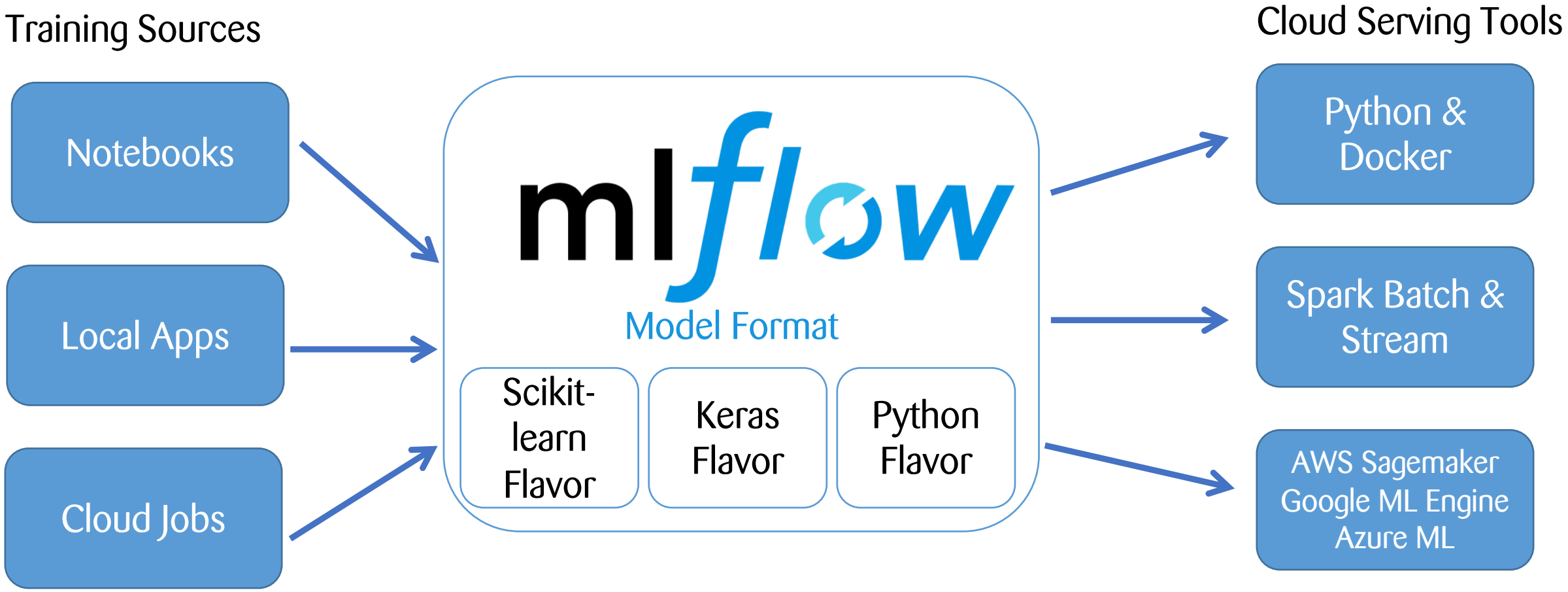
MLflow Project

Reusable and reproducible ML packaging

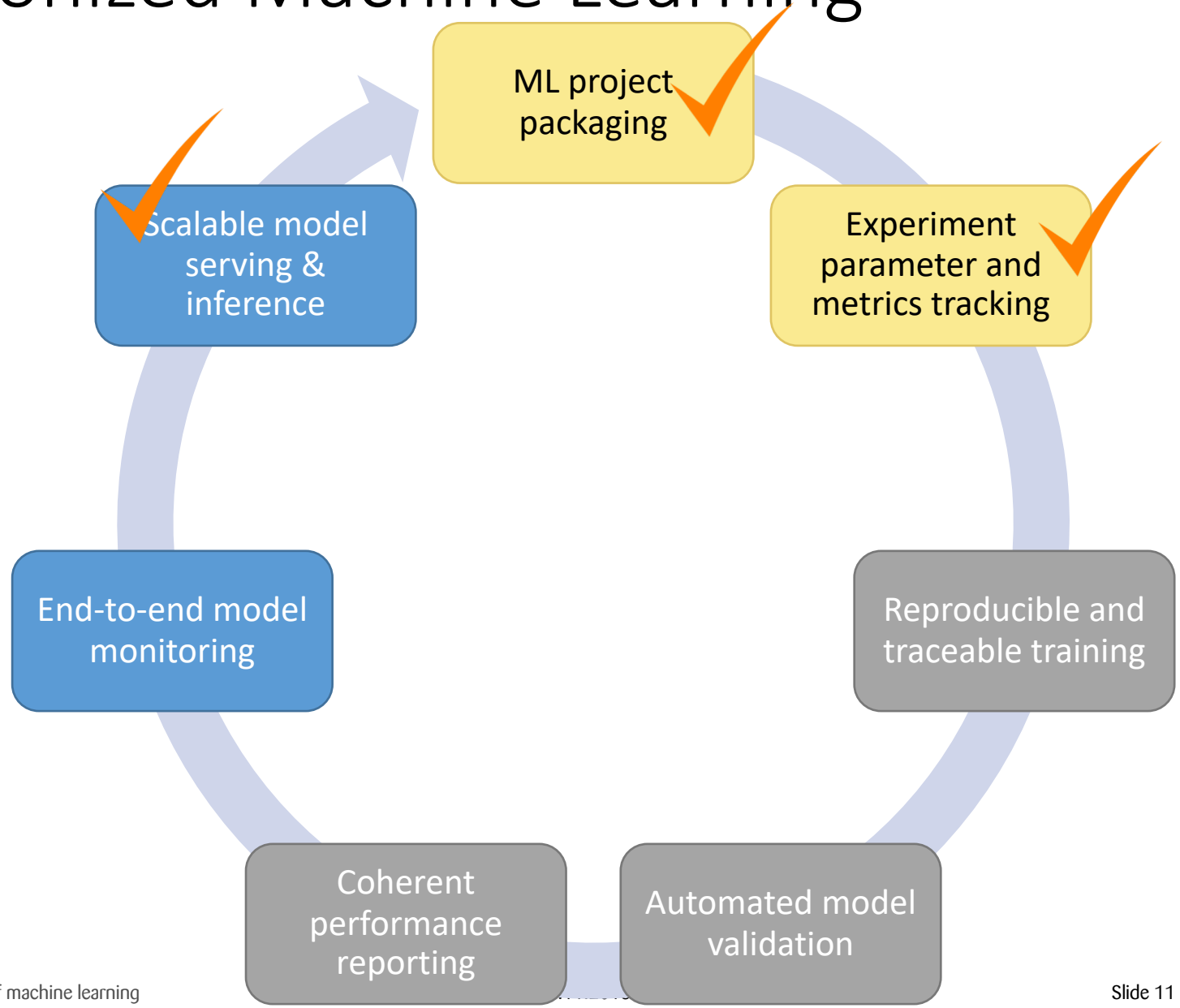


MLflow Models

Standardization of ML model formats

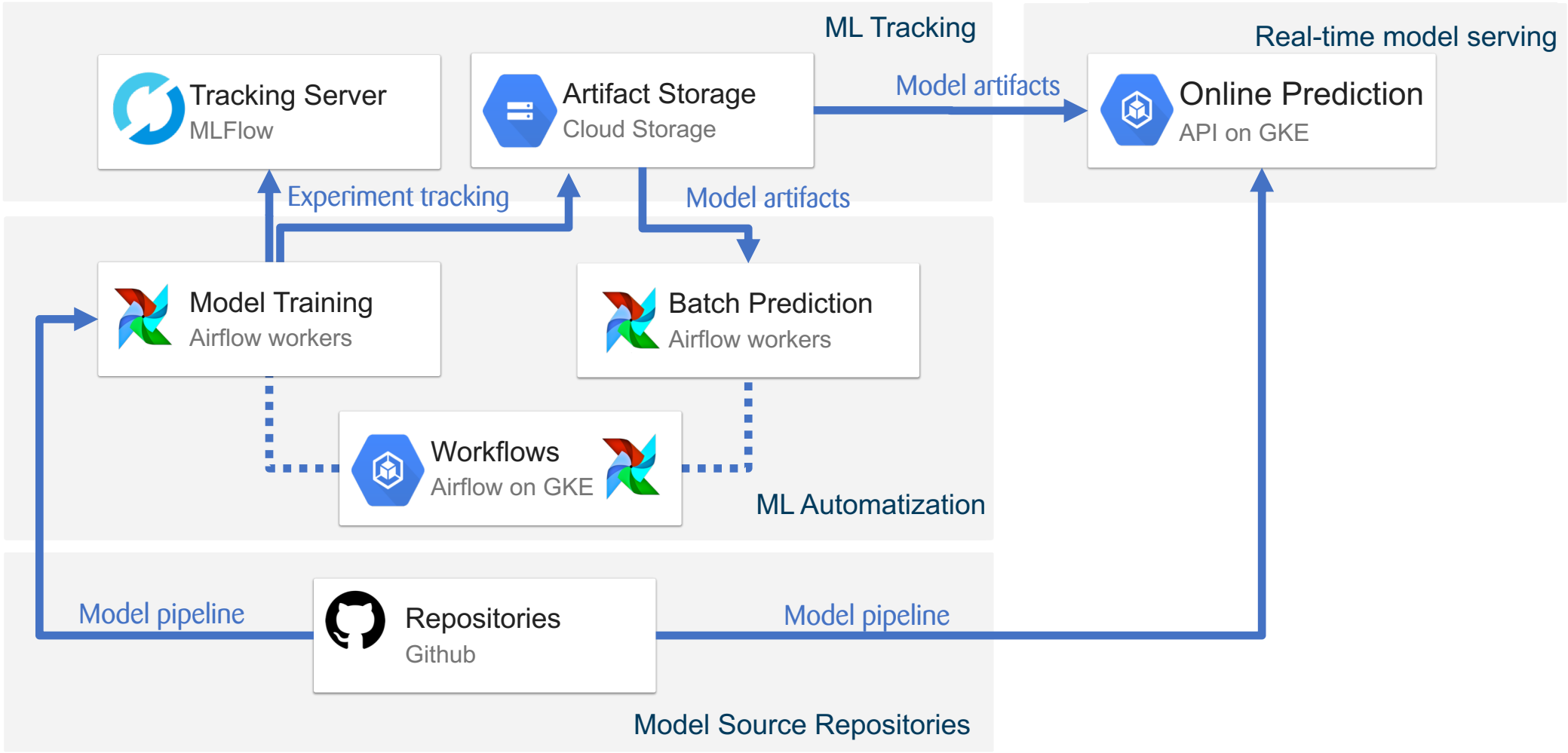


Productionized Machine Learning



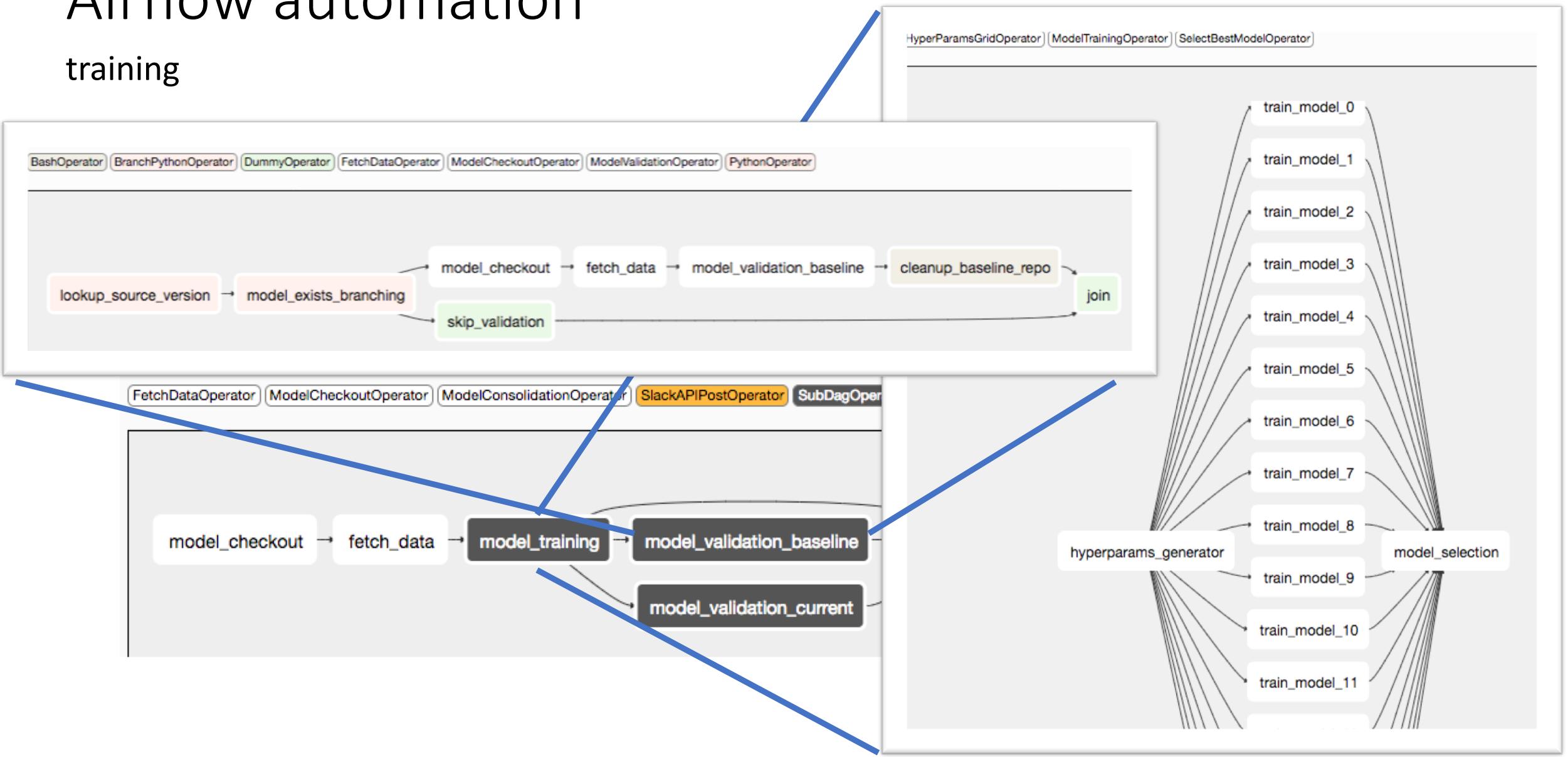
Automation with Airflow

Productionized Machine Learning



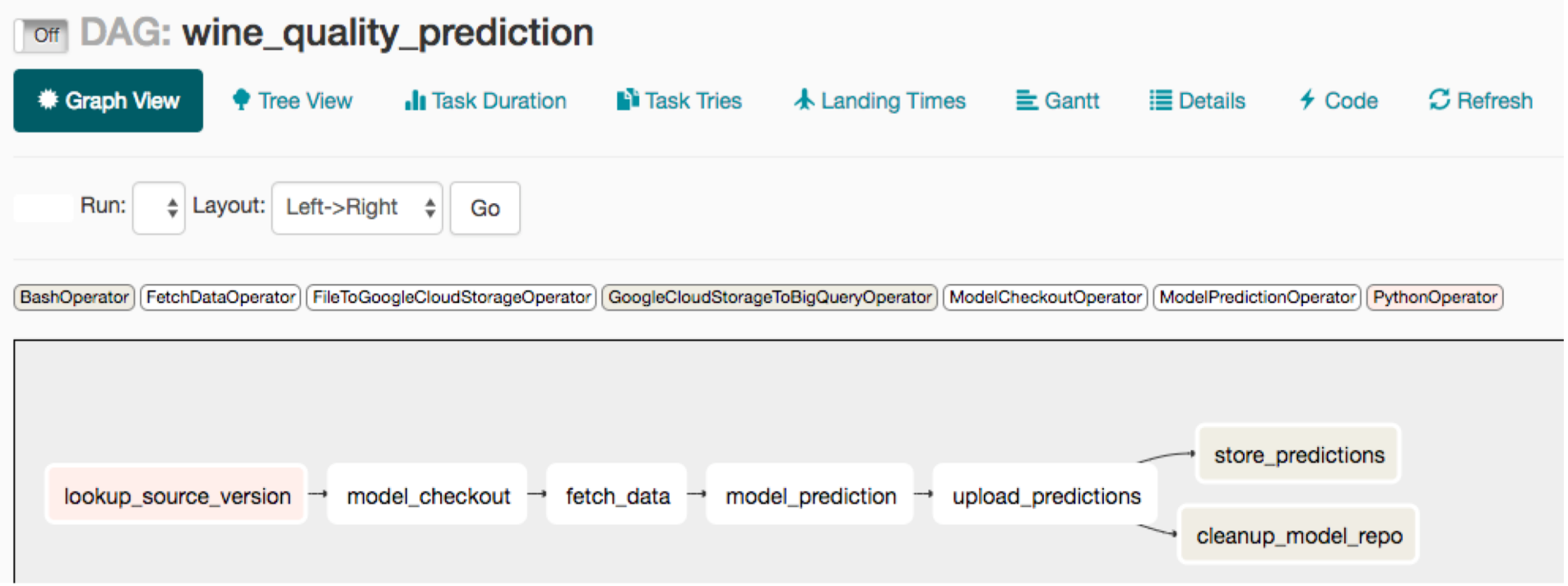
Airflow automation

training

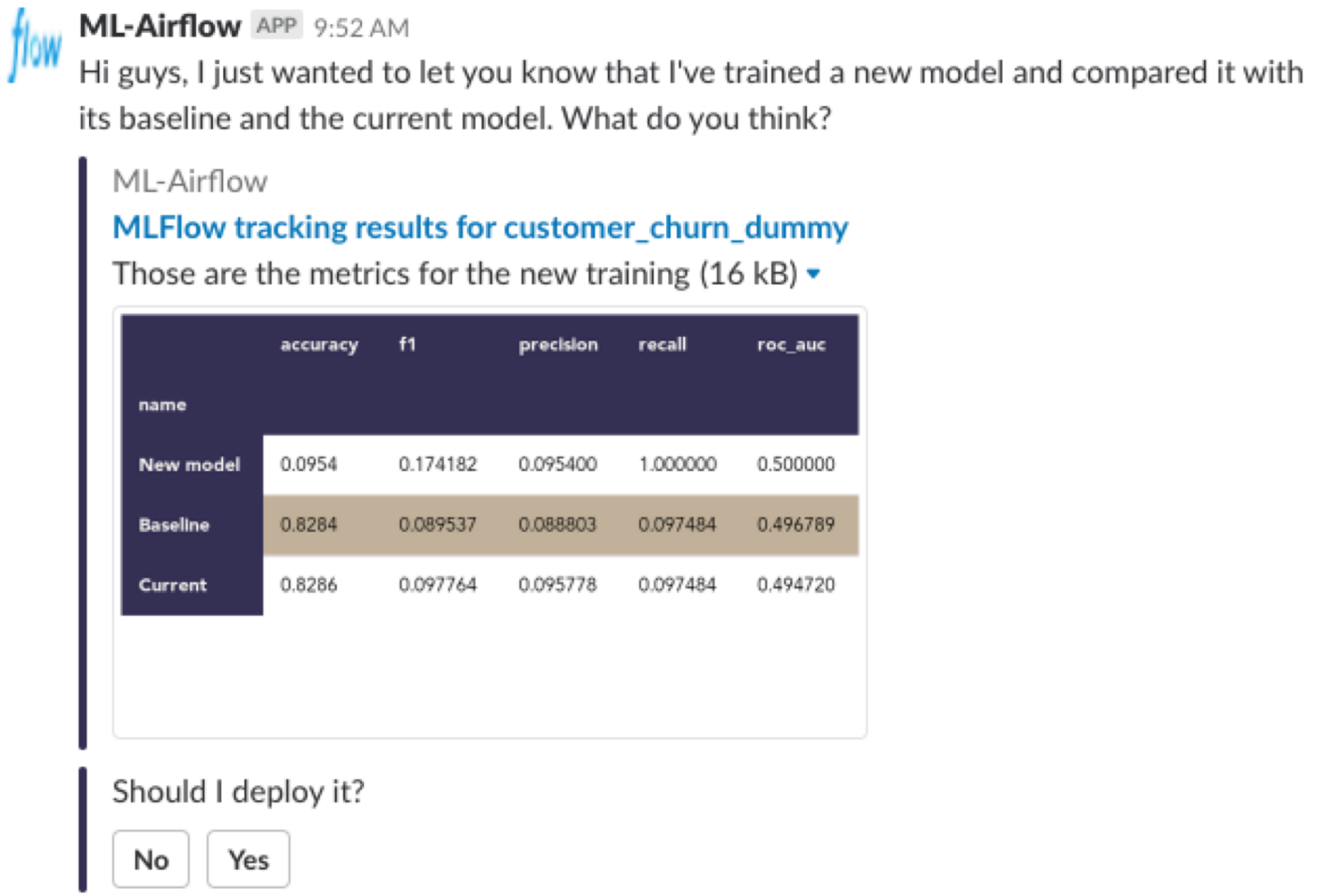


Airflow automation

prediction



Slack notification



ML-Airflow APP 9:52 AM

Hi guys, I just wanted to let you know that I've trained a new model and compared it with its baseline and the current model. What do you think?

ML-Airflow

MLFlow tracking results for customer_churn_dummy

Those are the metrics for the new training (16 kB)

name	accuracy	f1	precision	recall	roc_auc
New model	0.0954	0.174182	0.095400	1.000000	0.500000
Baseline	0.8284	0.089537	0.088803	0.097484	0.496789
Current	0.8286	0.097764	0.095778	0.097484	0.494720

Should I deploy it?

No Yes

Conclusion & Outlook

- Machine Learning operationalization
  - Crucial step to generate business value from ML
  - Python ecosystem is growing and offers powerful tooling
  - FB, Google, Twitter, Uber & Co. have started to publish their concepts and approaches
- Open Points
  - Controlled experimentation (A/B/n)
  - Model staleness / data drift
  - Automated Data Analysis and Validation