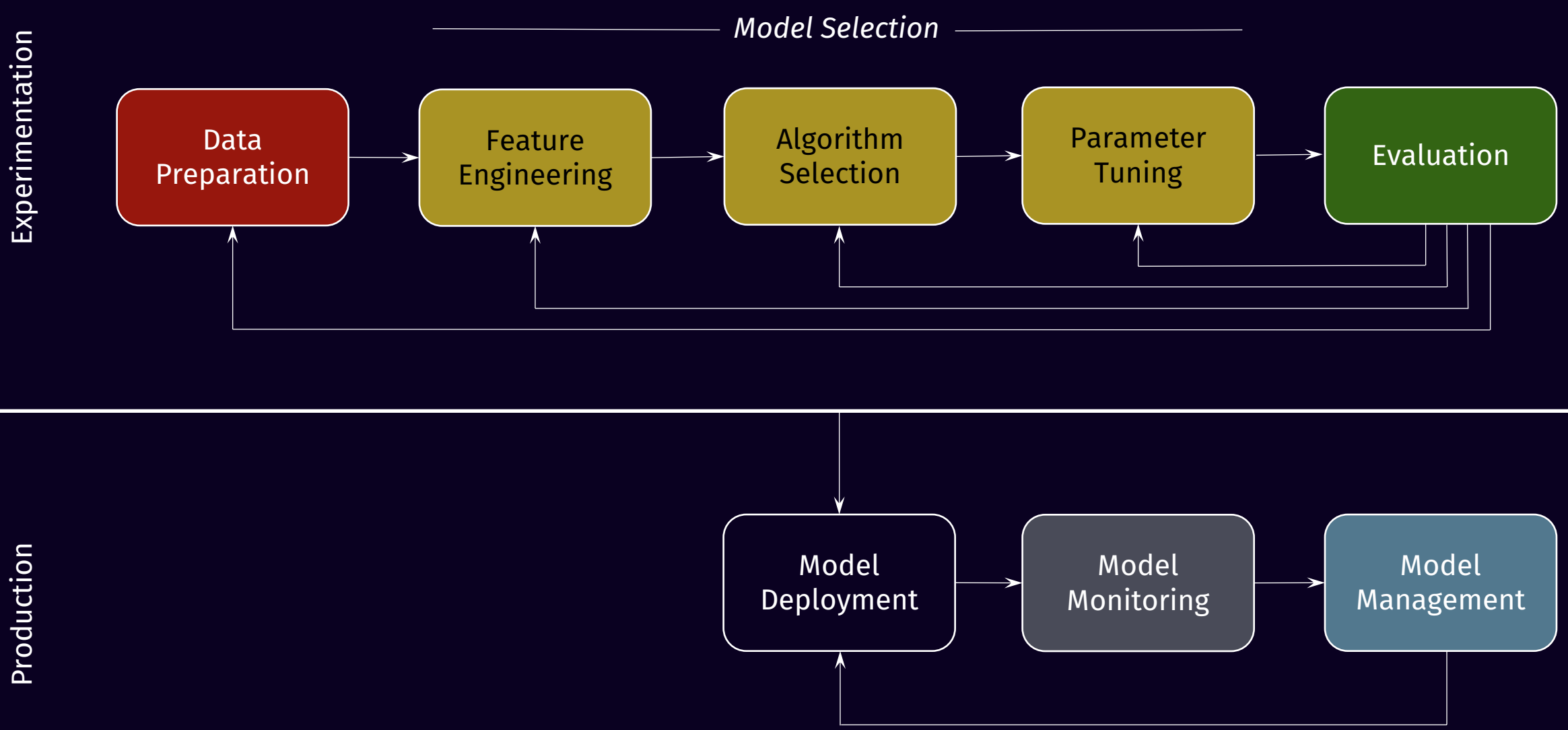
machine learning conference

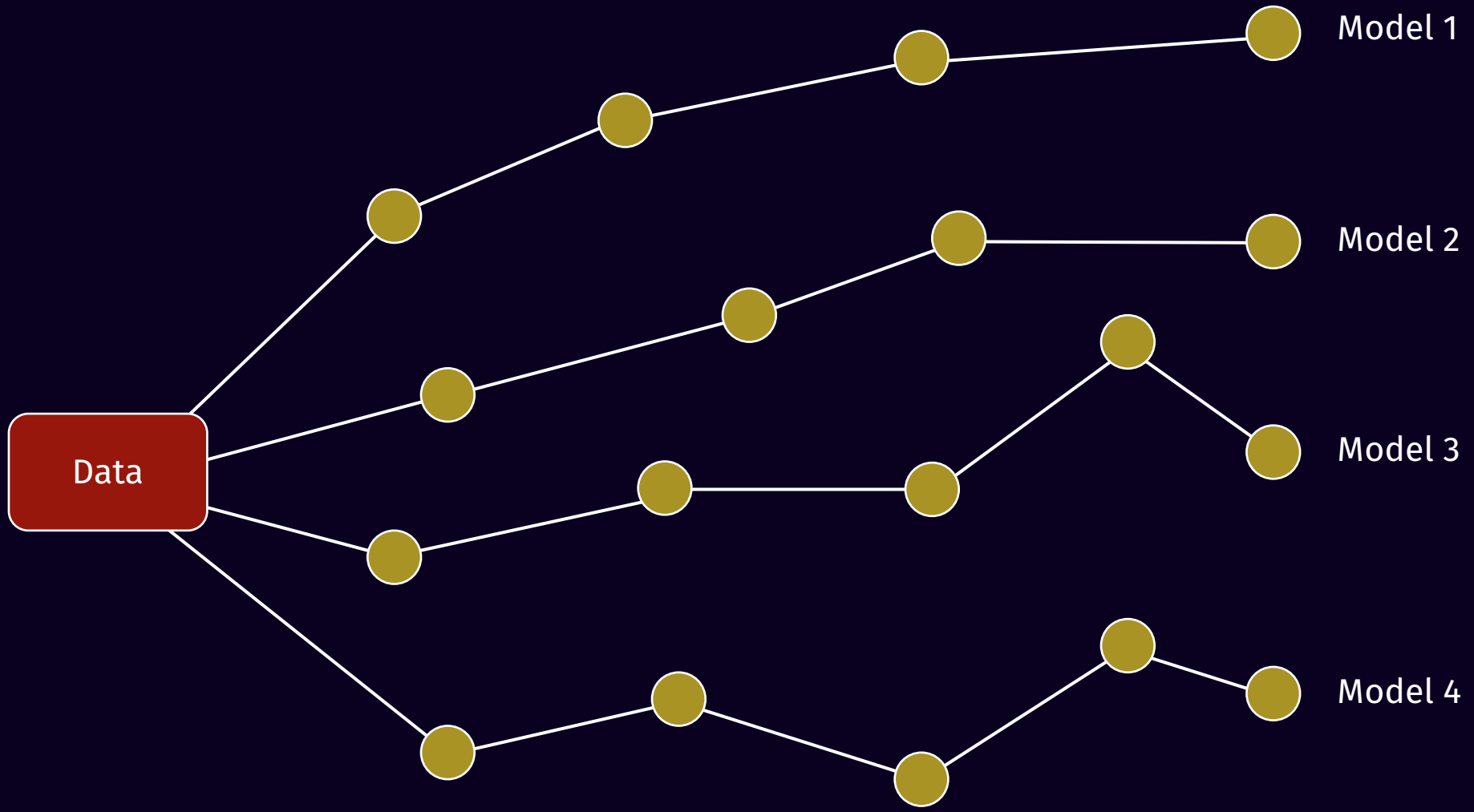
Towards Automated Tracking of Machine Learning Experiments

Joos-Hendrik Boese | Johannes Kirschnick | Thoralf Klein | **Stephan Seufert**

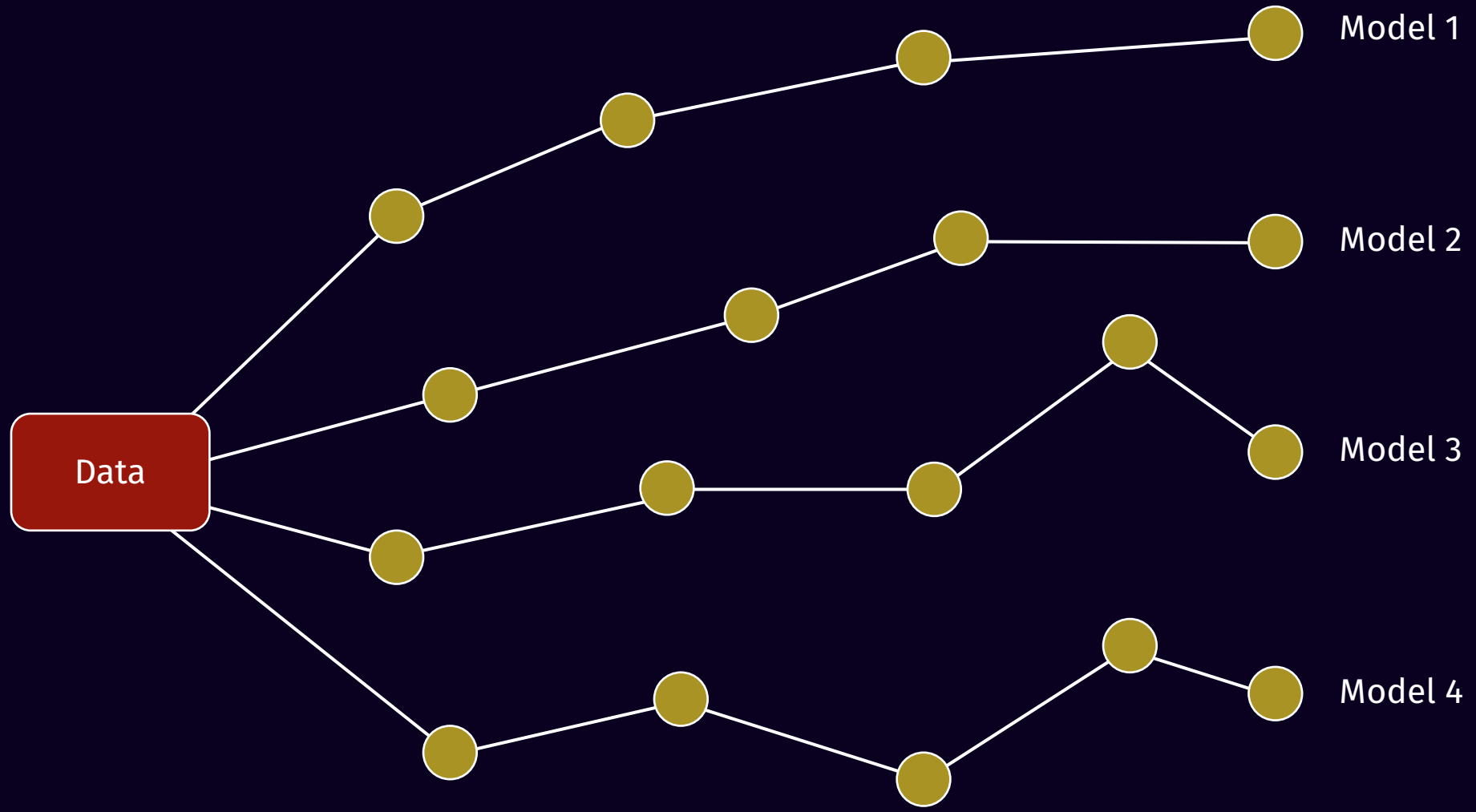
Ryck ExperimentTracker | Core AI



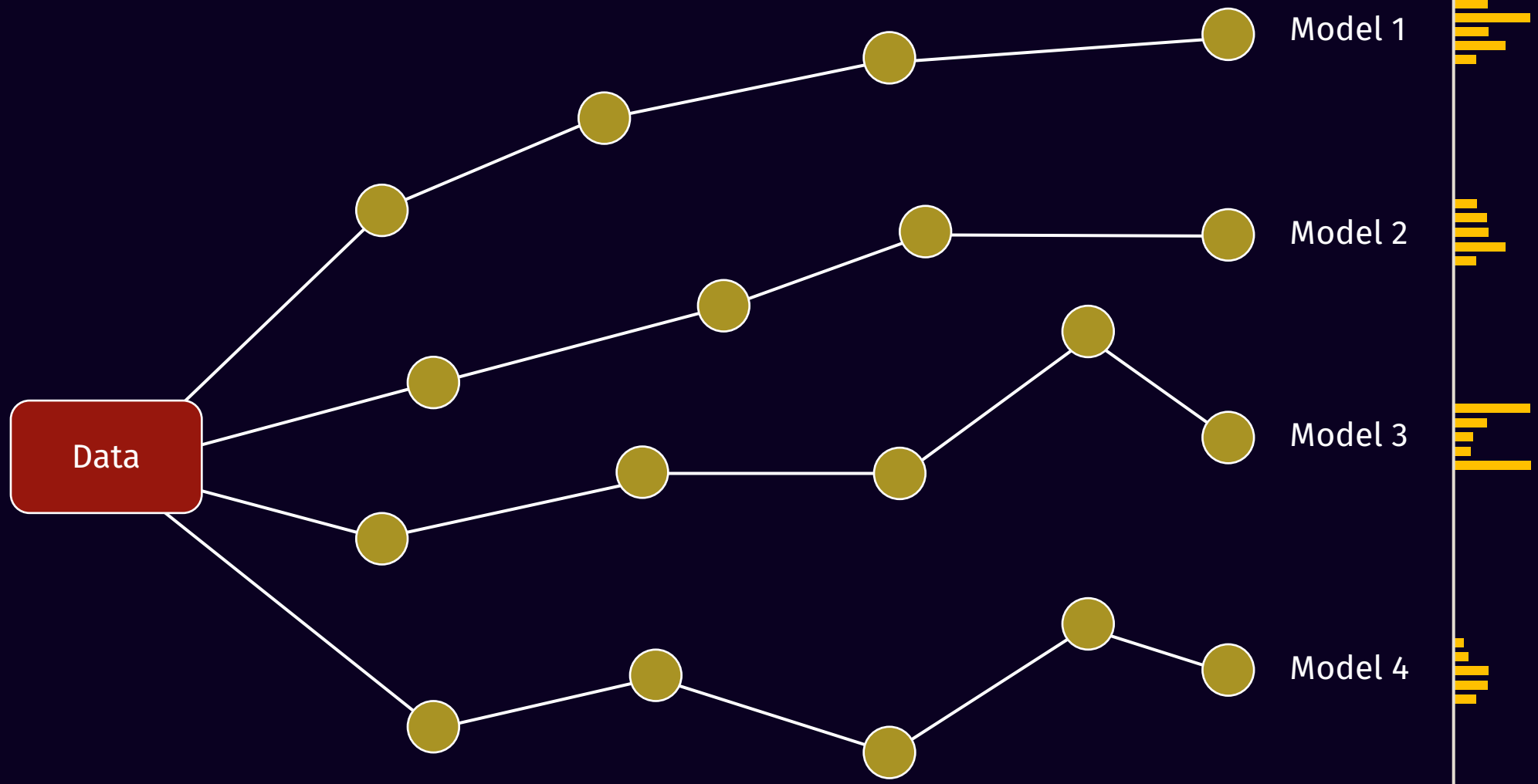
Experimentation



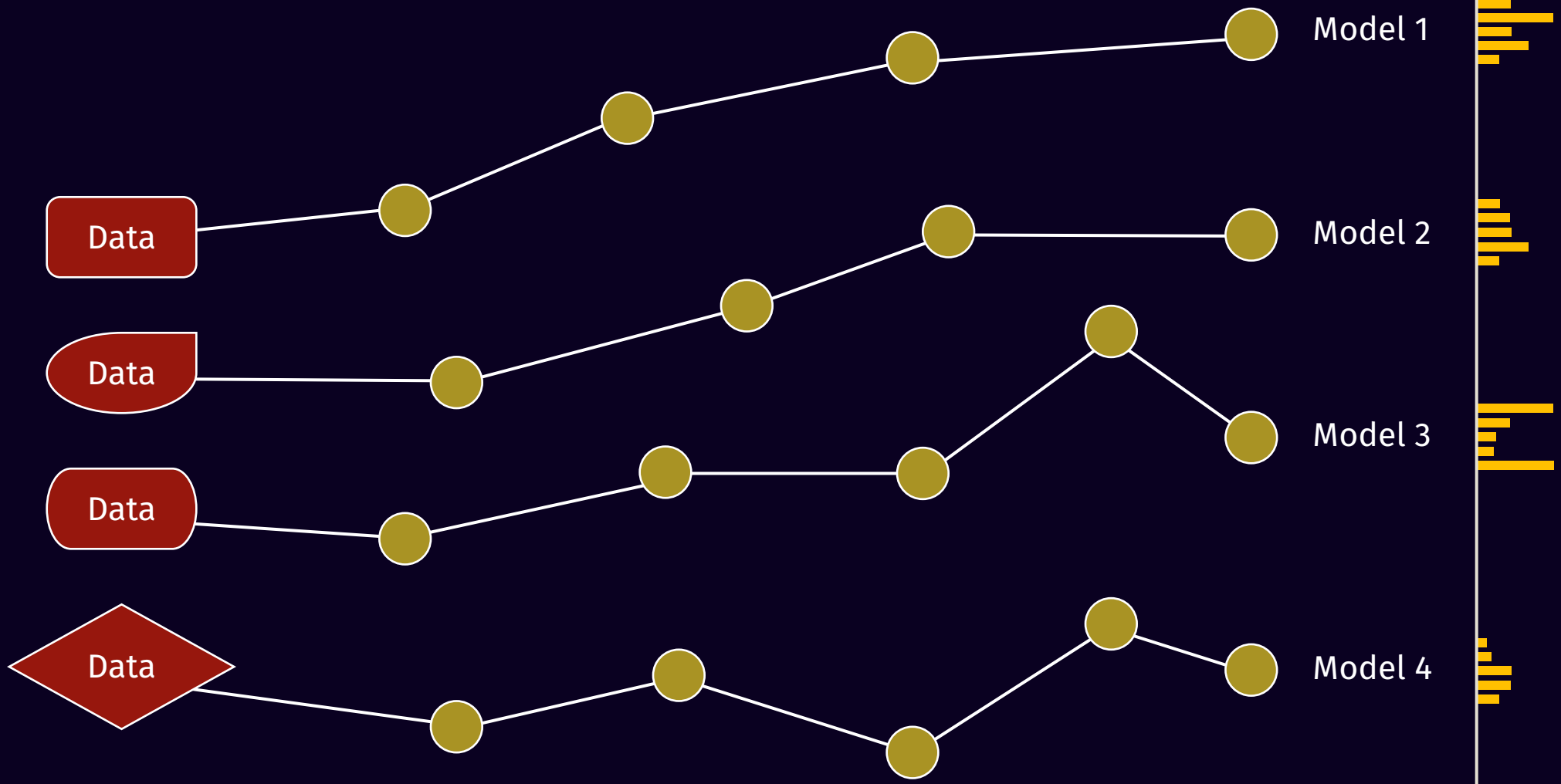
Experimentation



Experimentation



Experimentation



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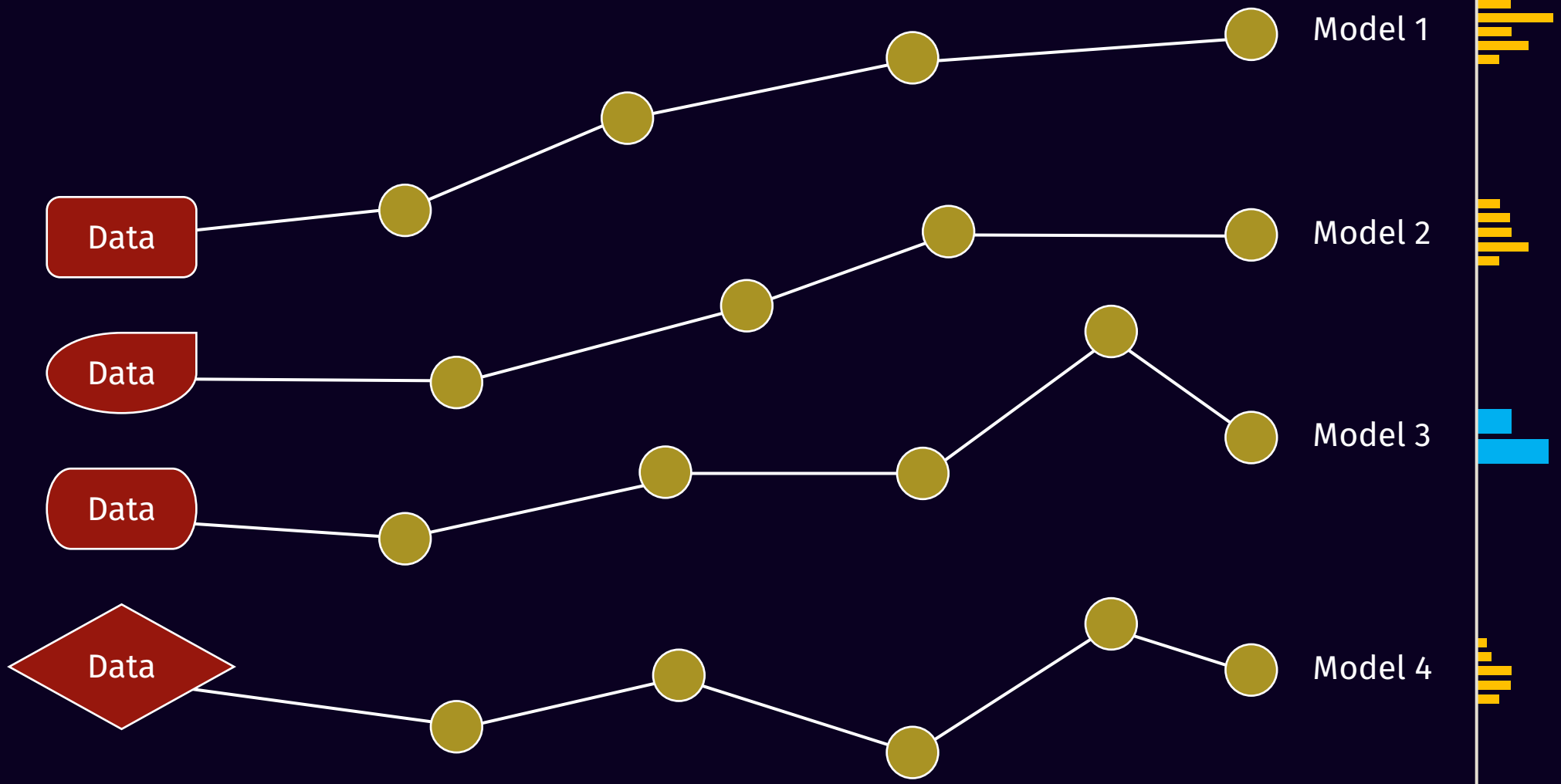
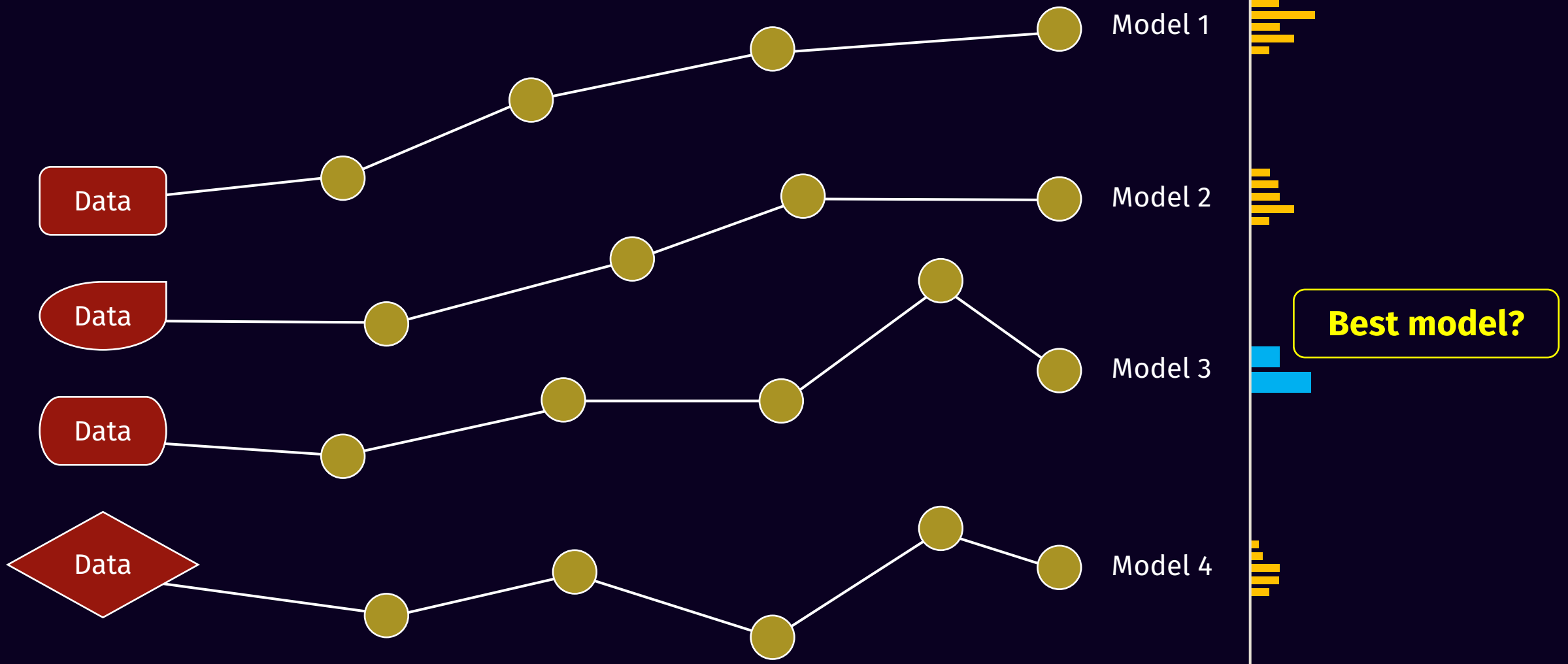
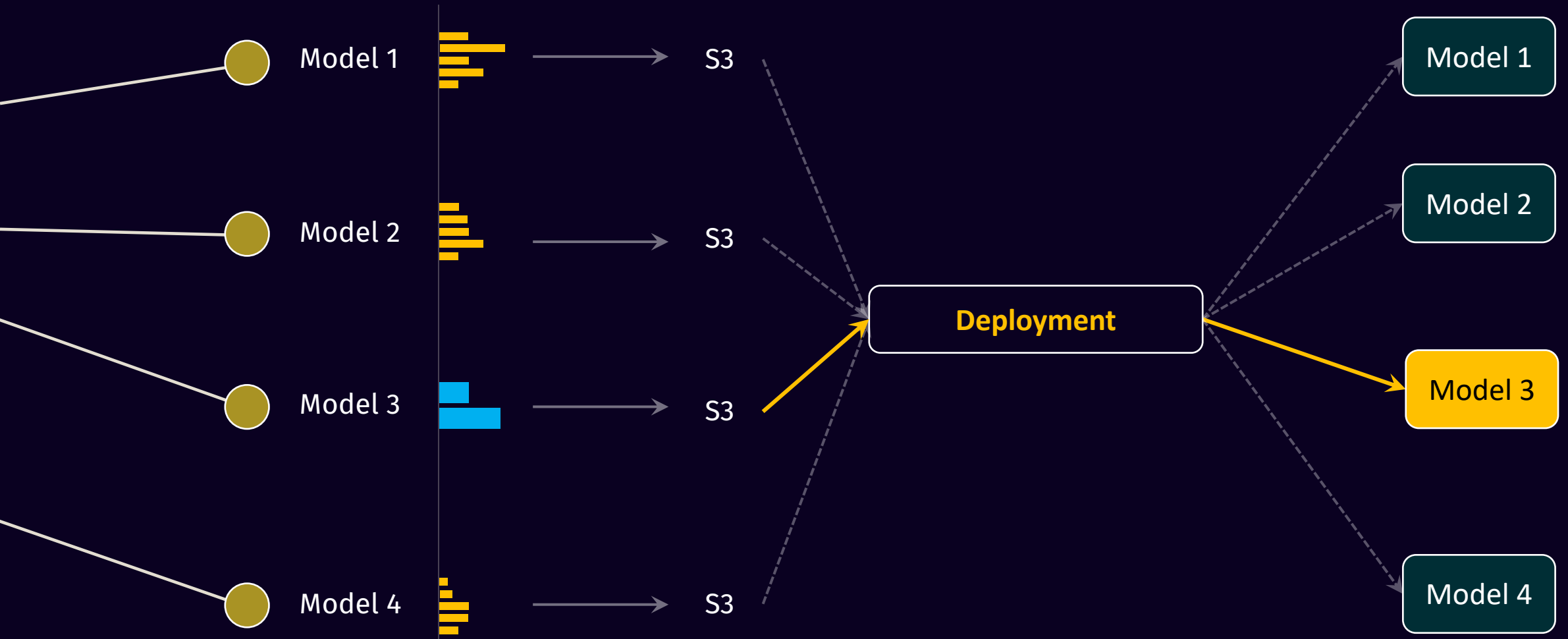


Experimentation



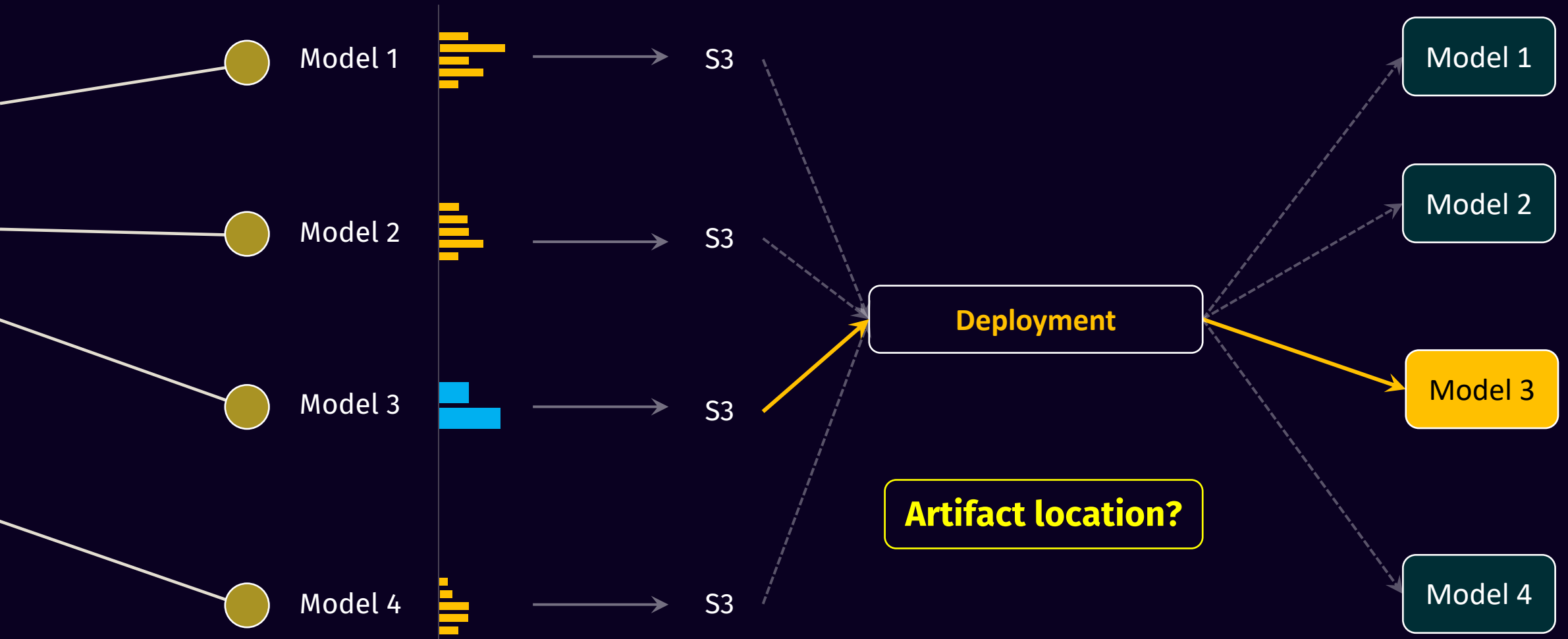
Experimentation

Production



Experimentation

Production



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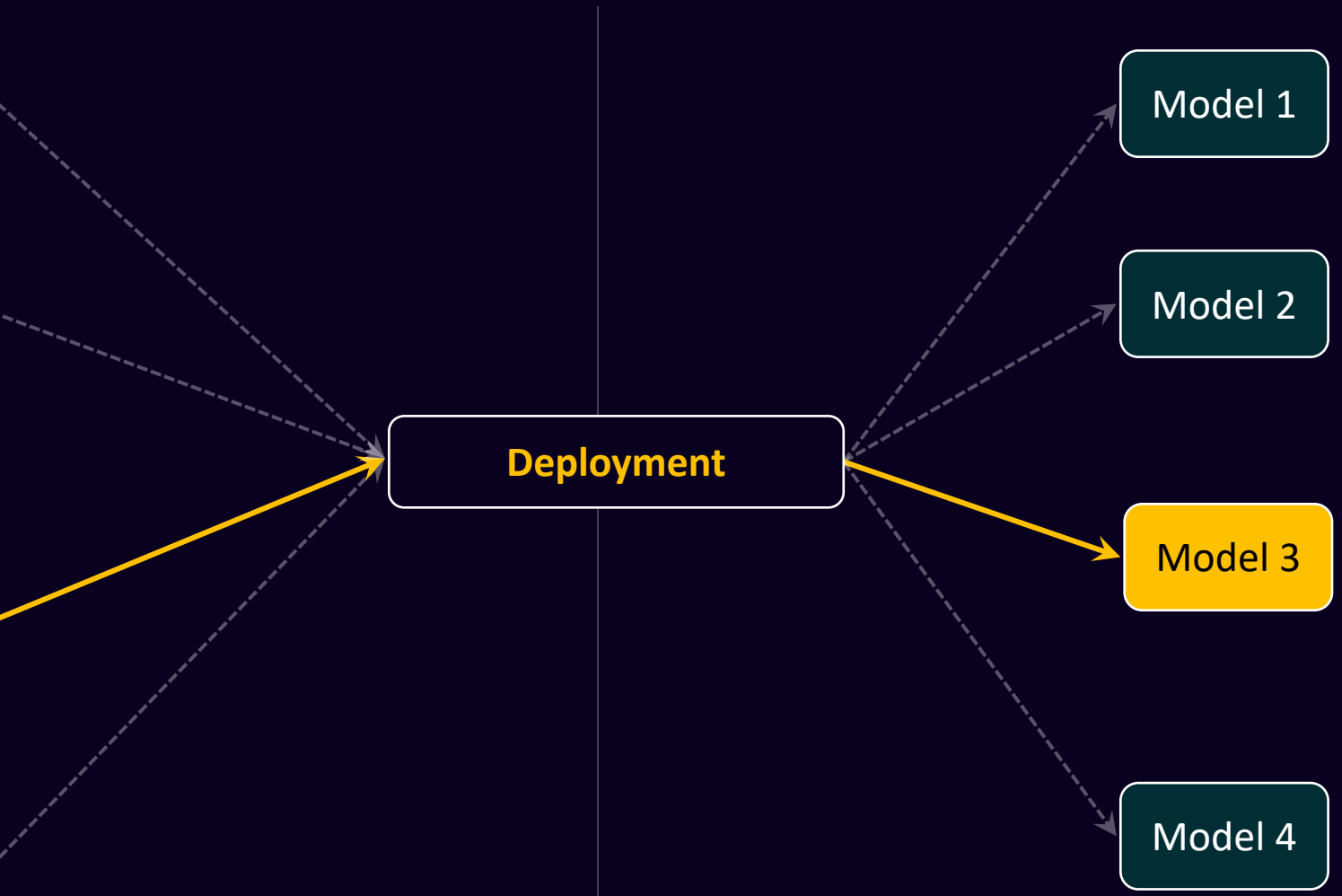
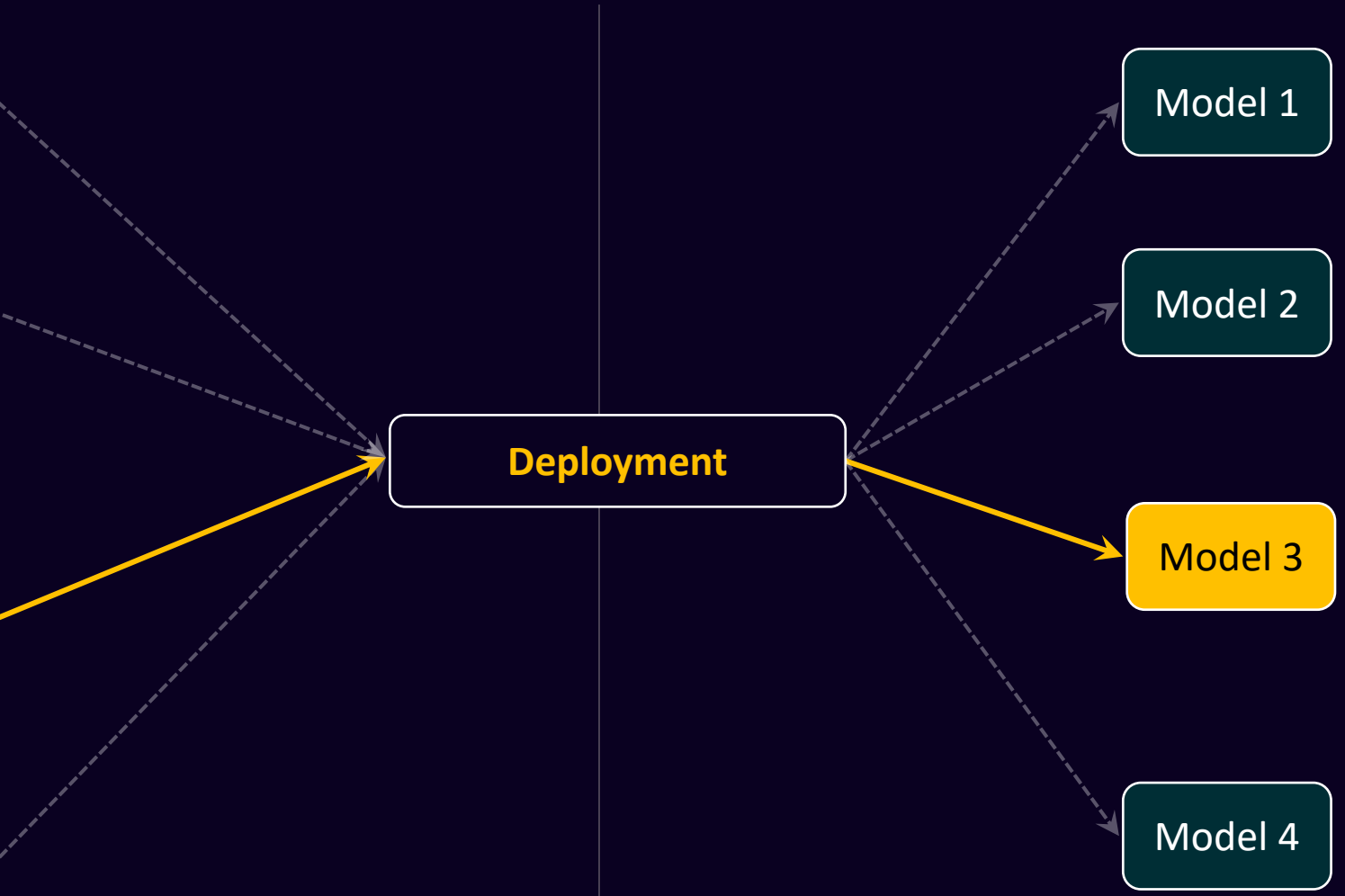
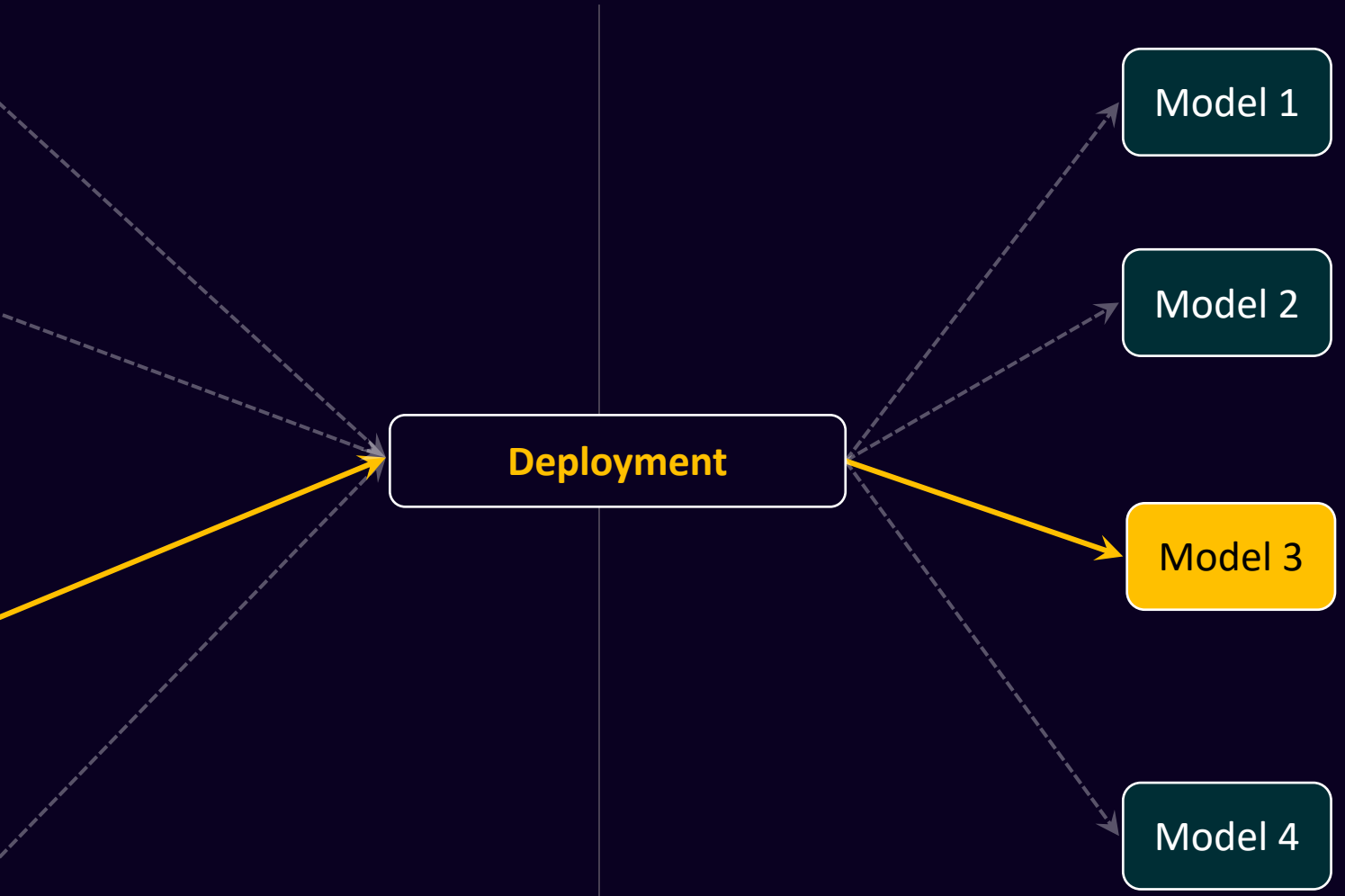


Production



Which model is currently deployed?

Production

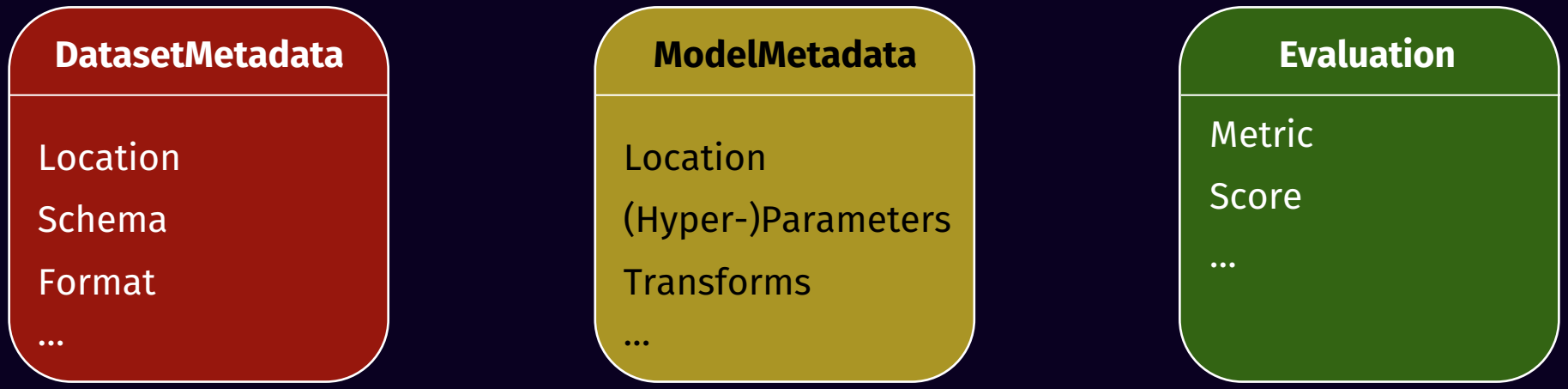


Which model is currently deployed?

Which model was deployed at time X?

ExperimentTracker

Metadata Schema (excerpt)



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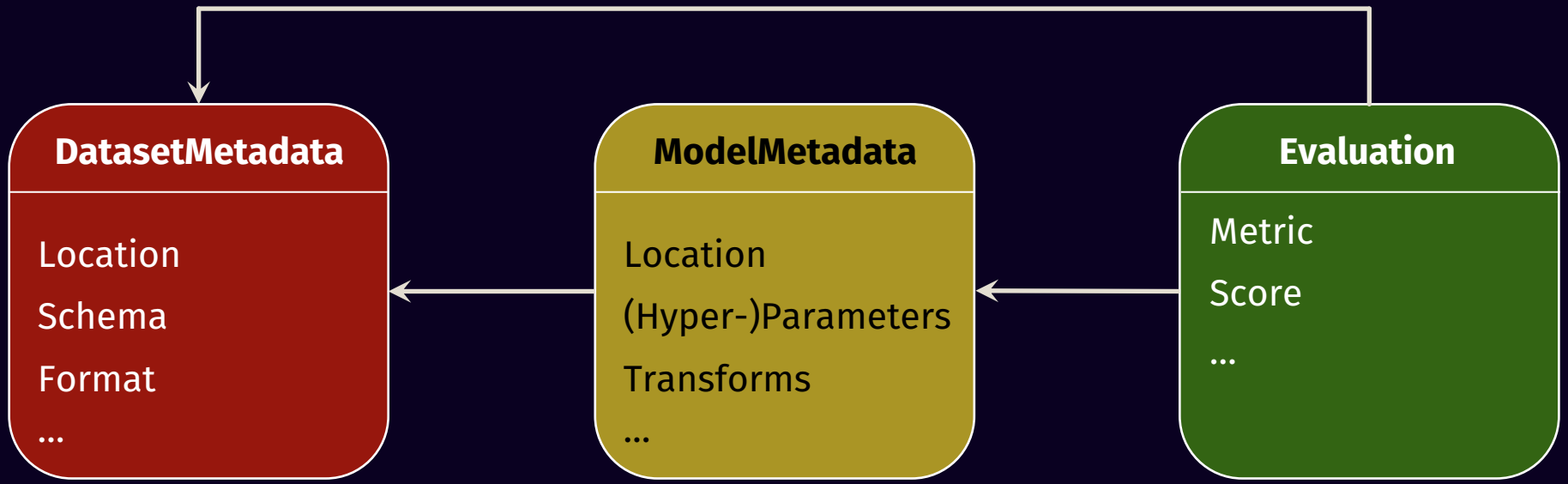

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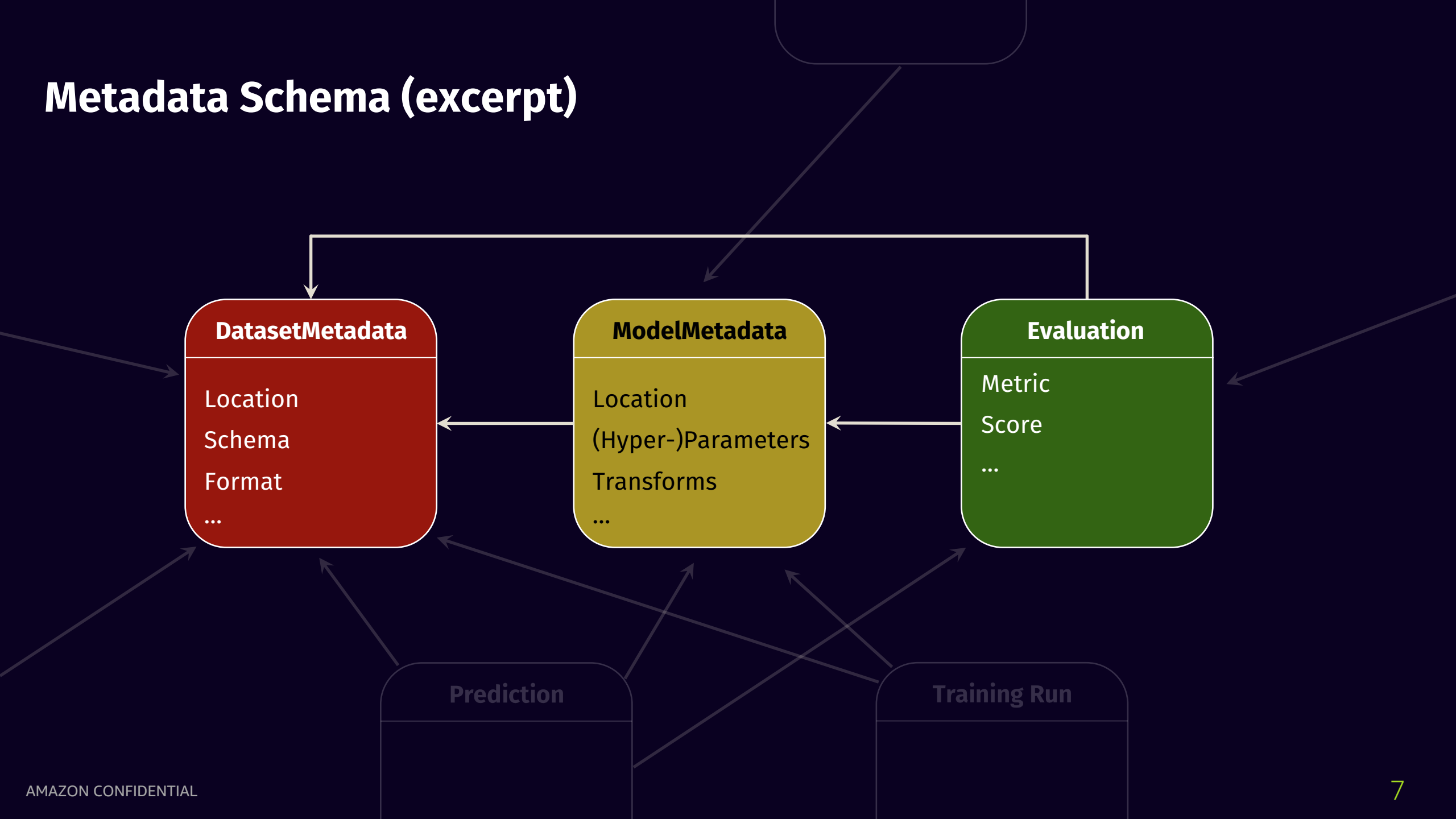
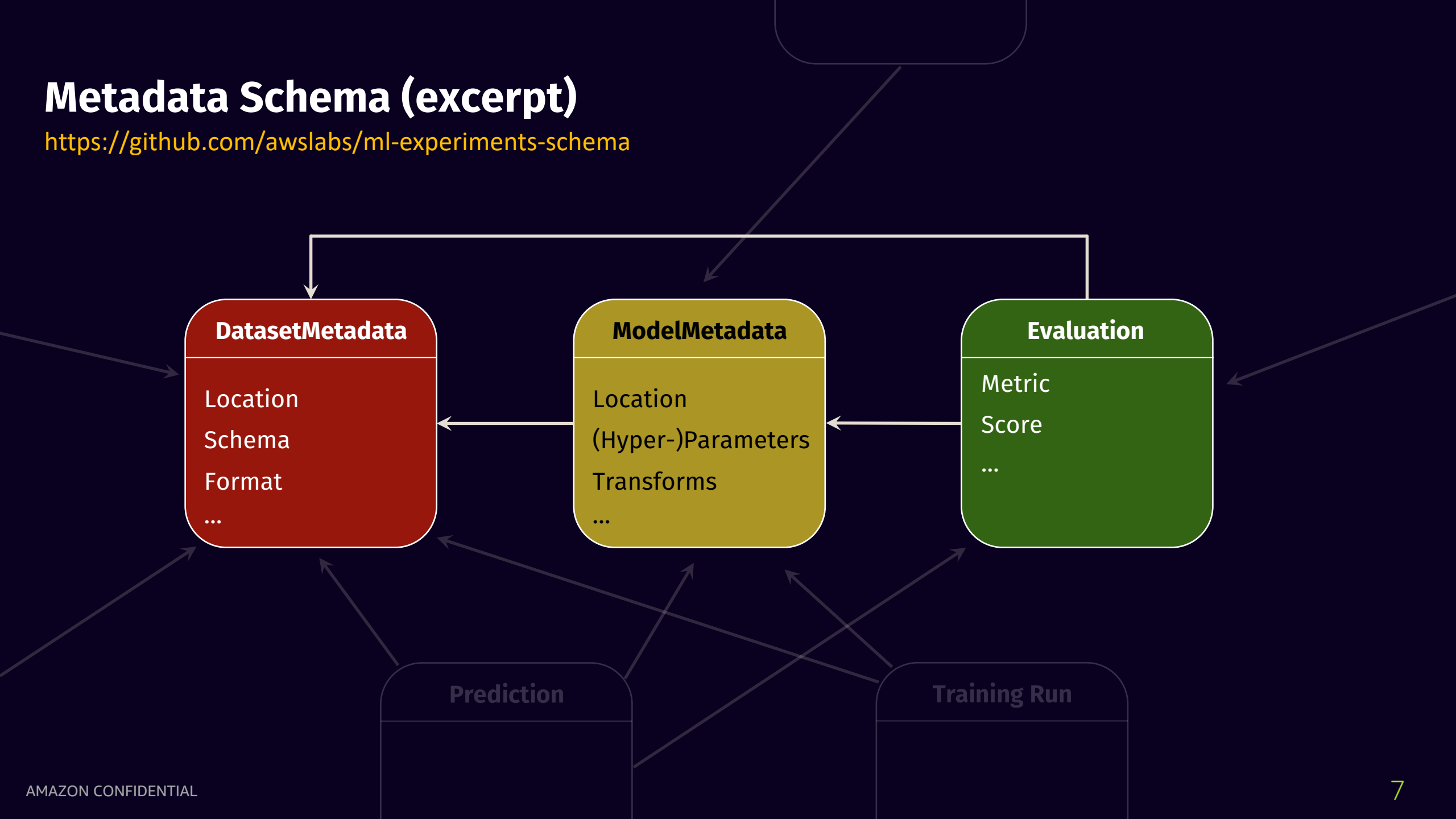


Metadata Schema (excerpt)

https://github.com/awslabs/ml-experiments-schema



Automated Metadata Extraction

```
val df: DataFrame = …



val pipeline: Pipeline = …

val model: PipelineModel = pipeline.fit(df)
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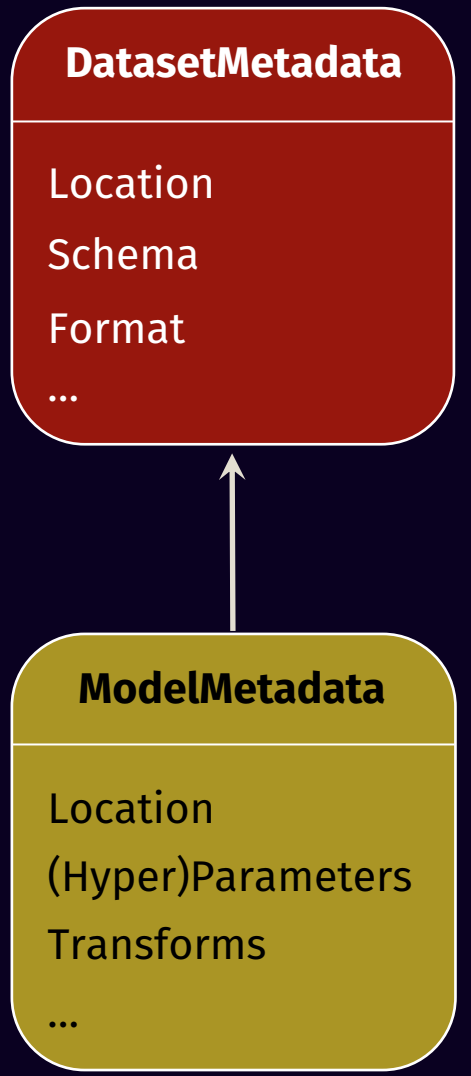

Automated Metadata Extraction

```
val df: DataFrame = …

tracker.trackDataset(df)


val pipeline: Pipeline = …

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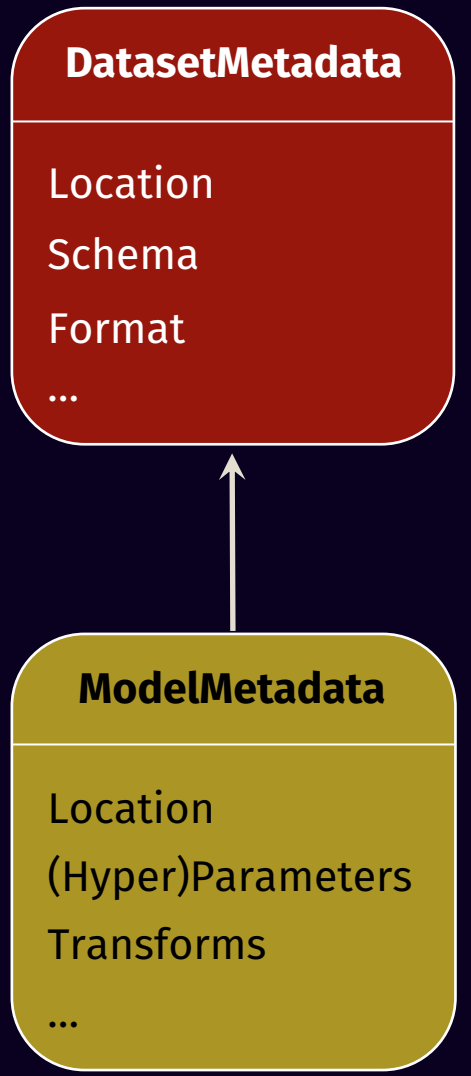
tracker.trackModel(model)
```



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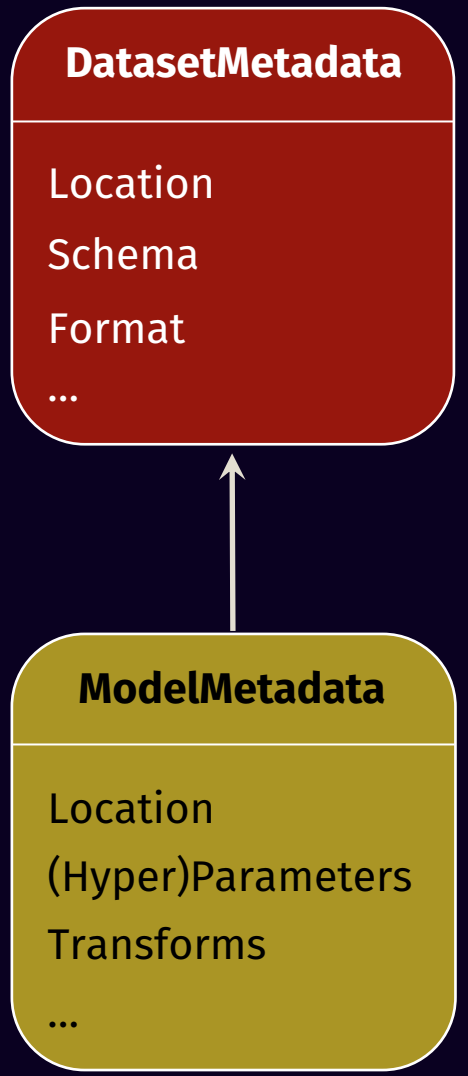
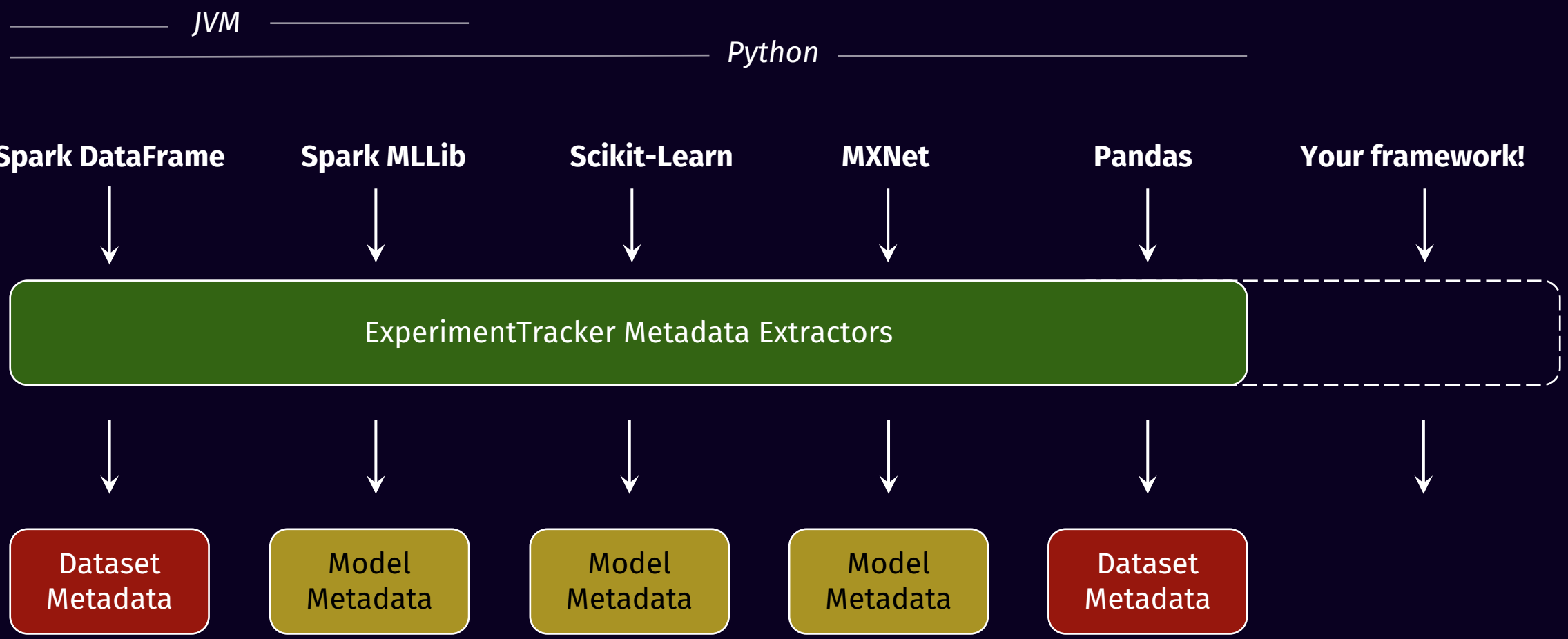
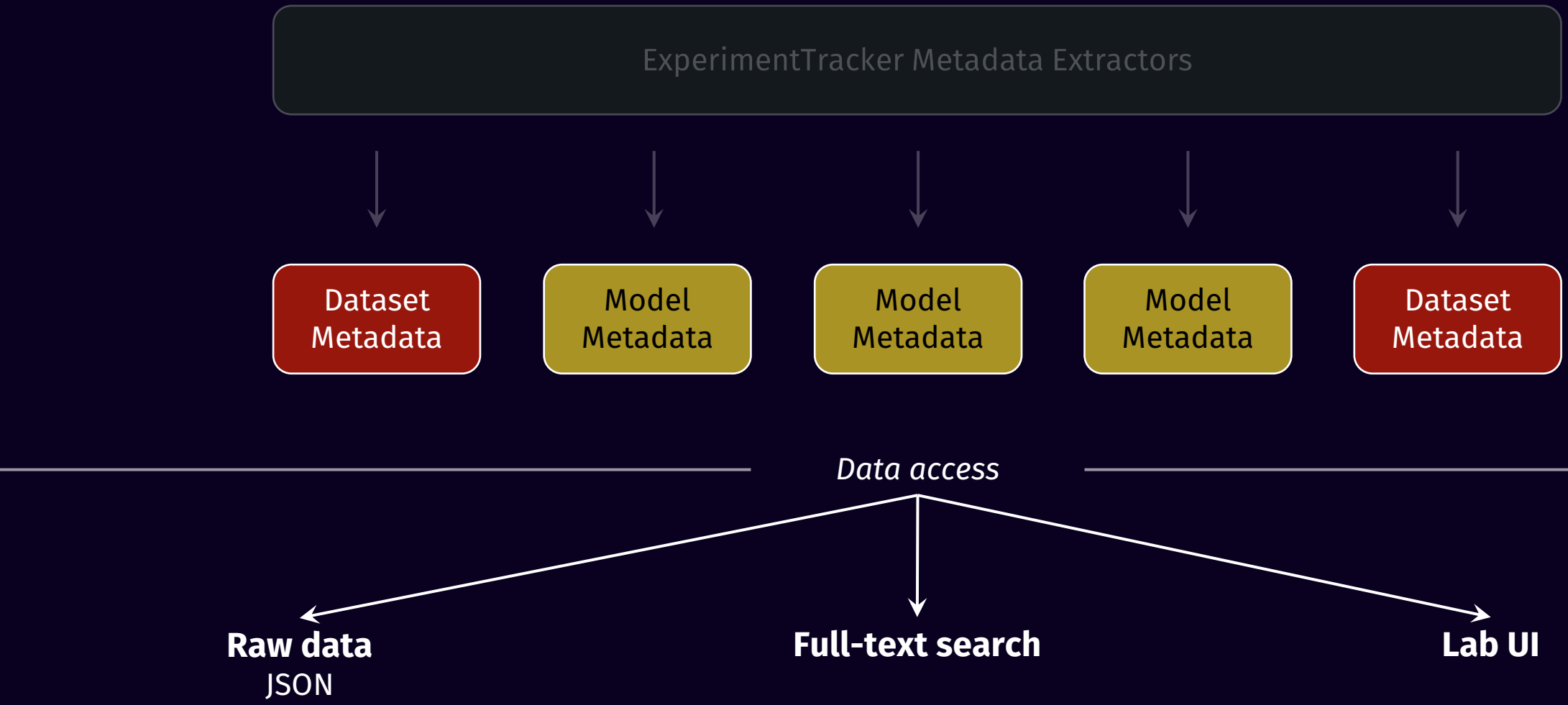


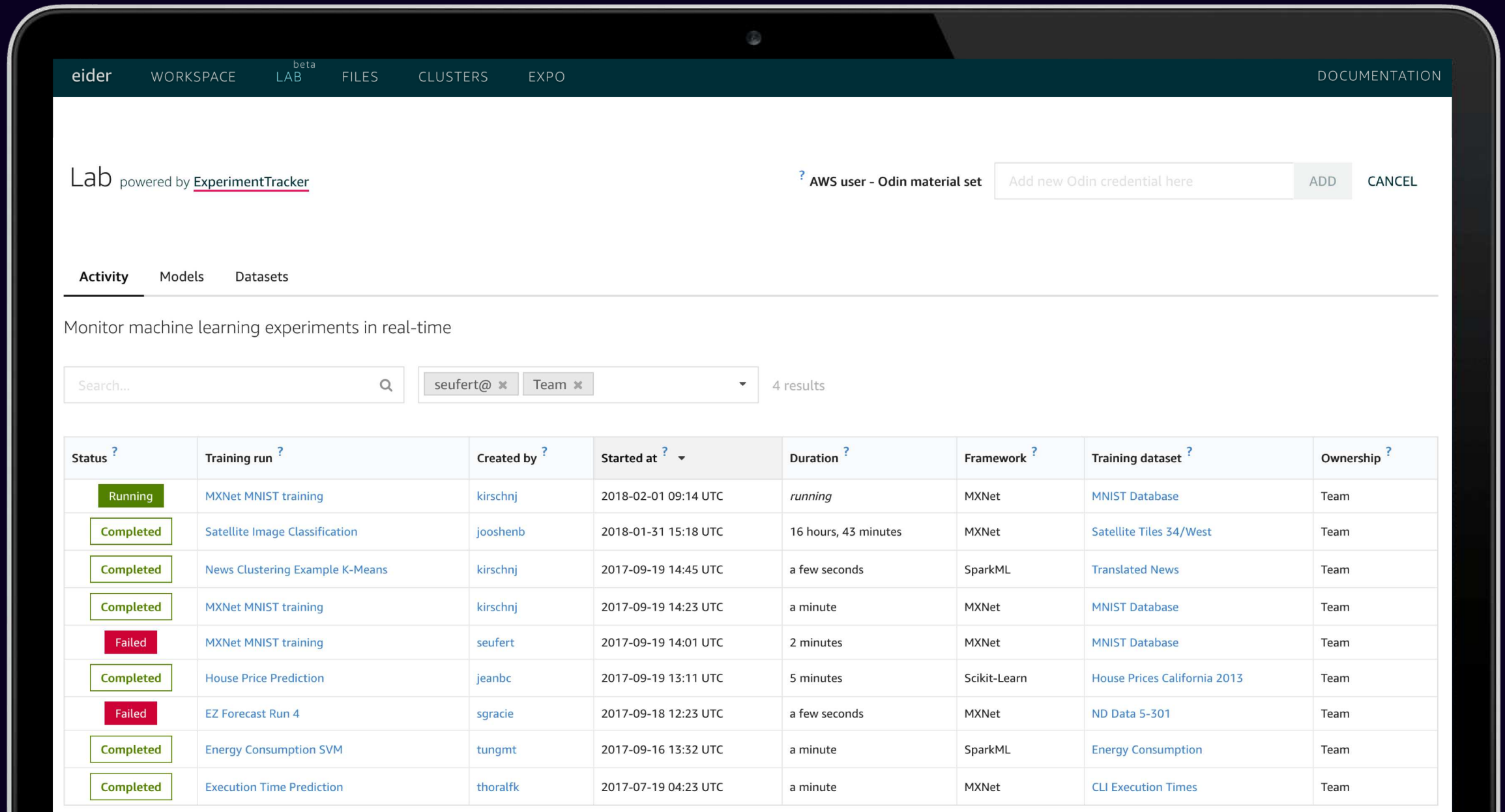
Automated Metadata Extraction



Data Access


ExperimentTracker Metadata Extractors
Dataset Metadata
Model Metadata
Model Metadata
Model Metadata
Dataset Metadata
Data access
Raw data
JSON
Full-text search
Lab UI

Browse experiments



Monitor model training

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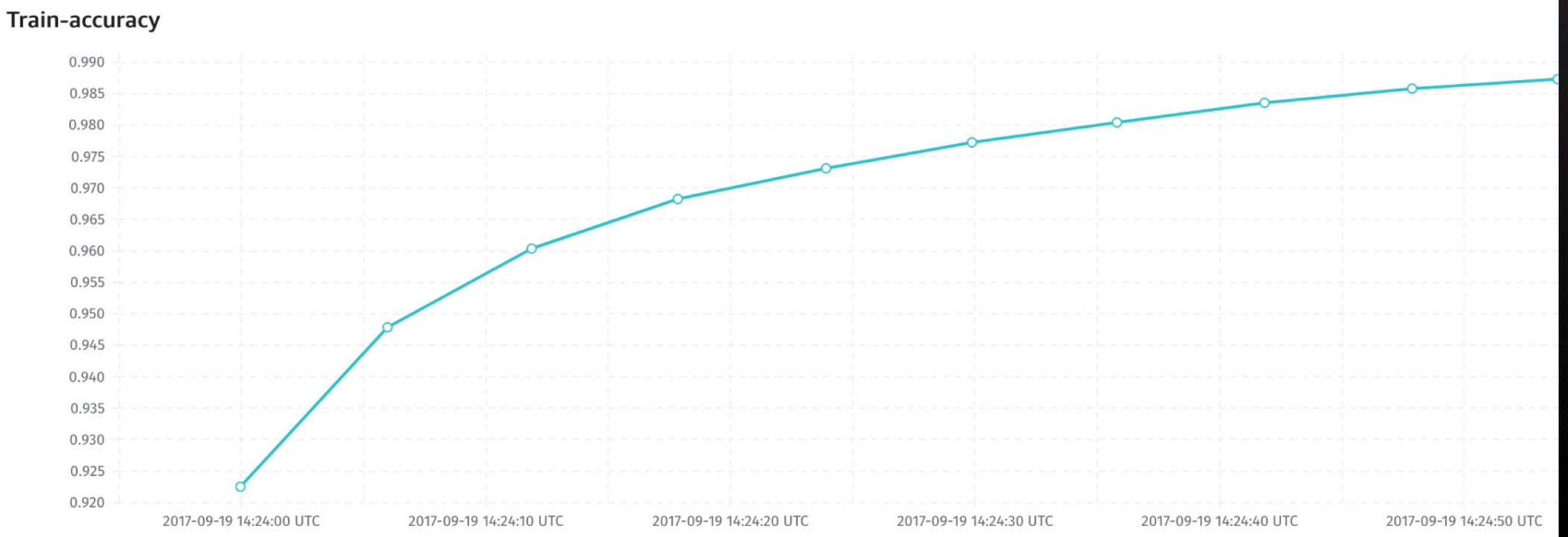
BACK

Training run: MXNet MNIST training

Training Run Info | Training Progress | Source

Train Accuracy



Epoch	Timestamp	Value
0	2017-09-19 14:23:59:993 UTC	0.92241

Inspect artifacts

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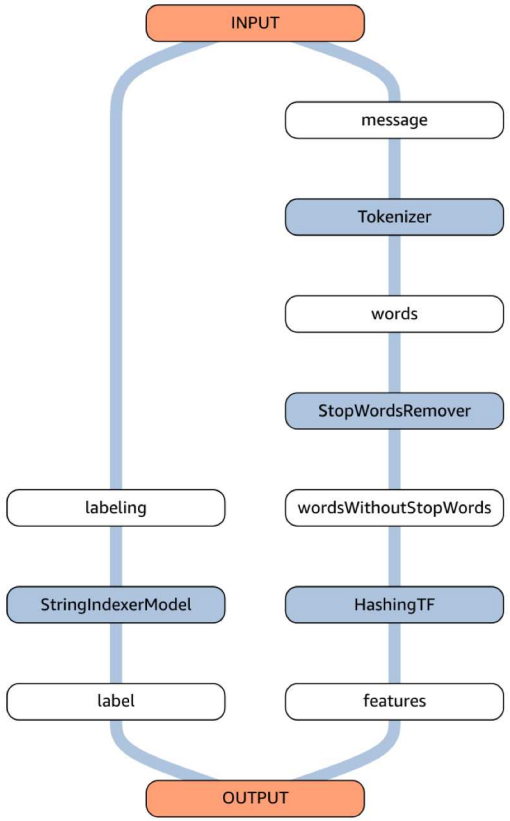
BACK

Model: SMS Spam Classification (Logistic Regression)

Model Info | Hyperparameters | Pipeline | Evaluations | Source



Transform details

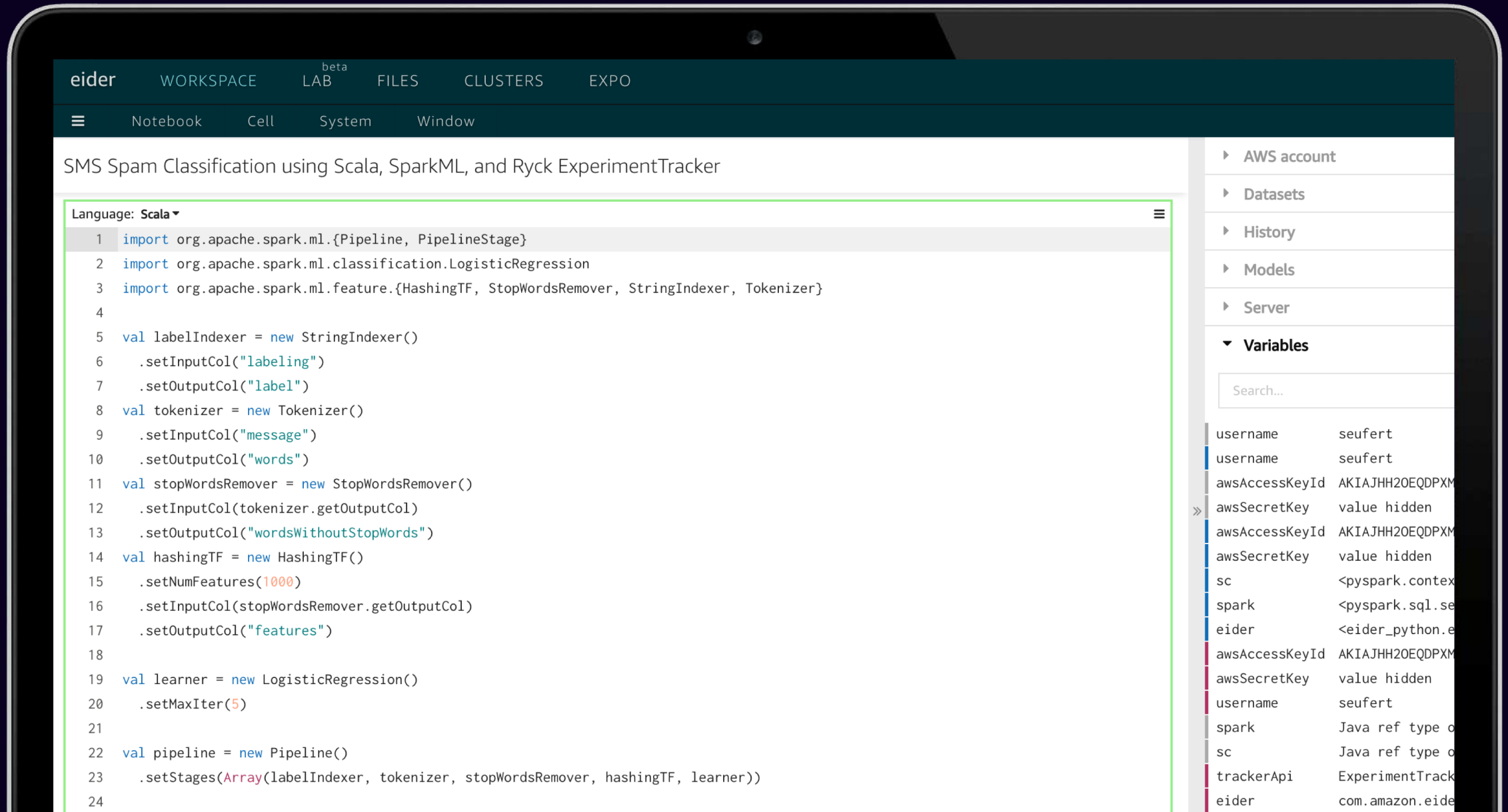
Id	89a07589-5cc6-4022-a109-3824e0100124
Name	HashingTF
Framework	

Transform parameters

Parameter	Value
numFeatures	1000
binary	false

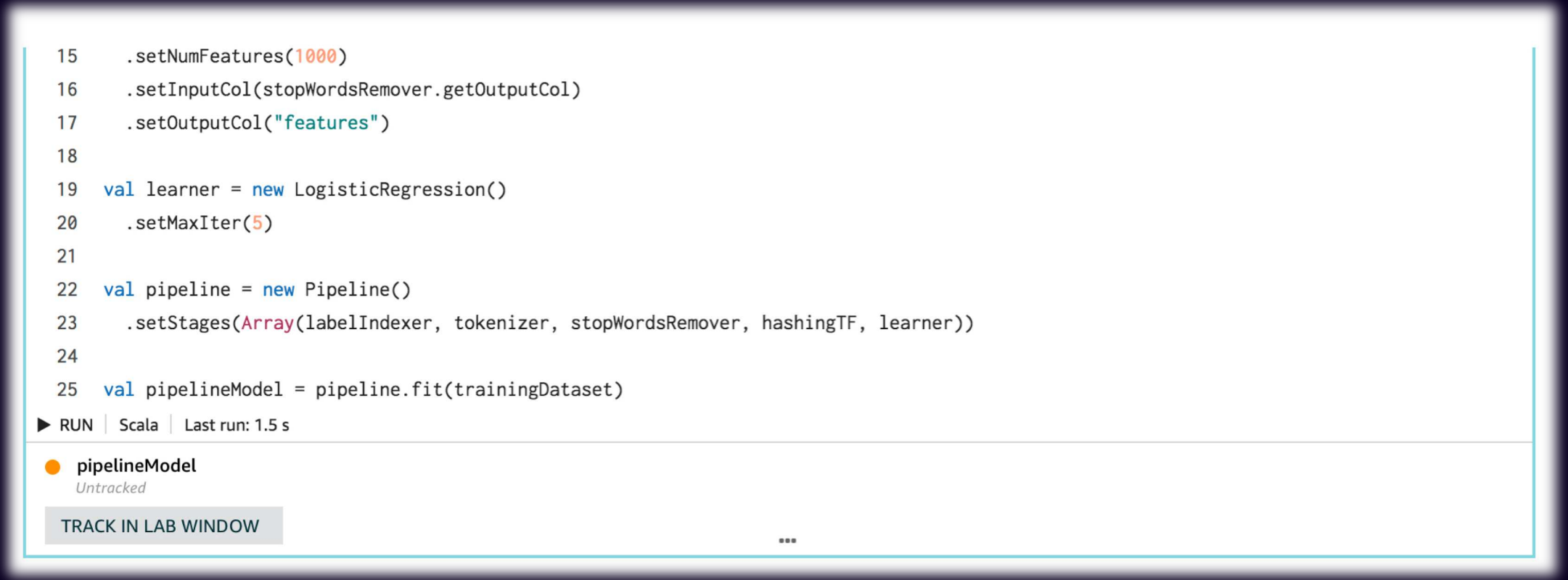
1. Interactive Tracking

Eider Workspace Integration



Eider: Interactive Tracking

New design – coming soon



Eider: Interactive Tracking

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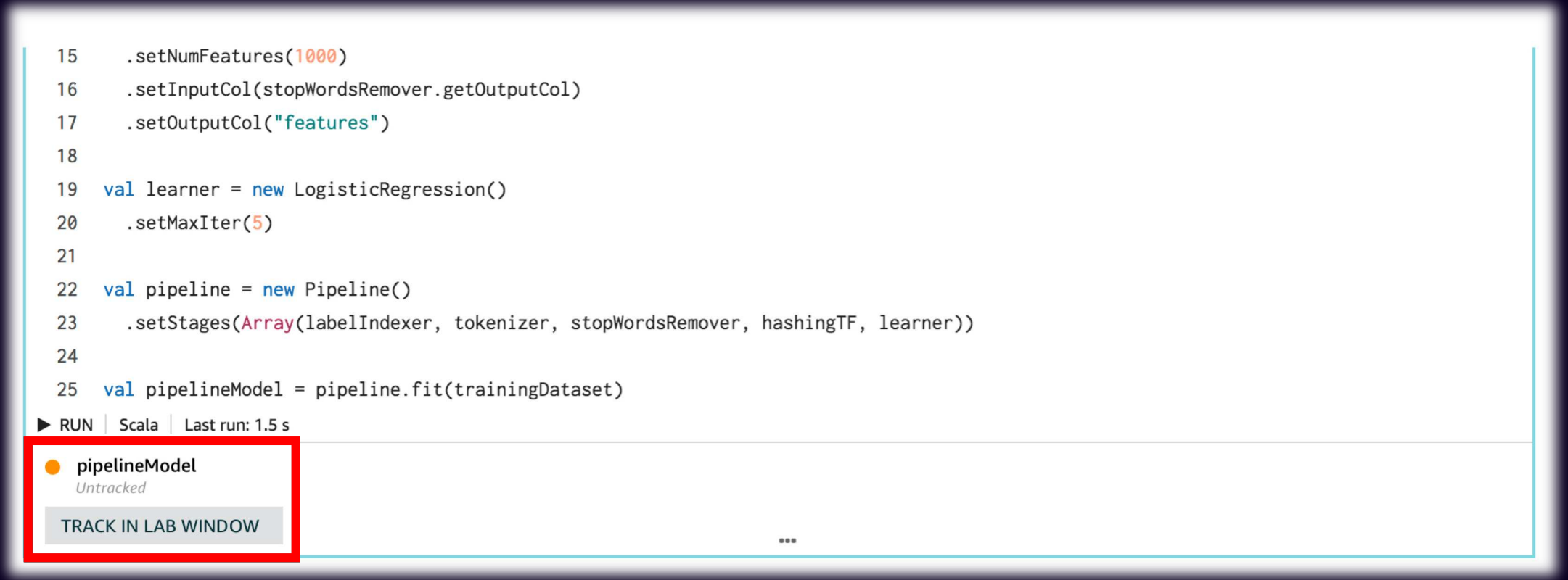

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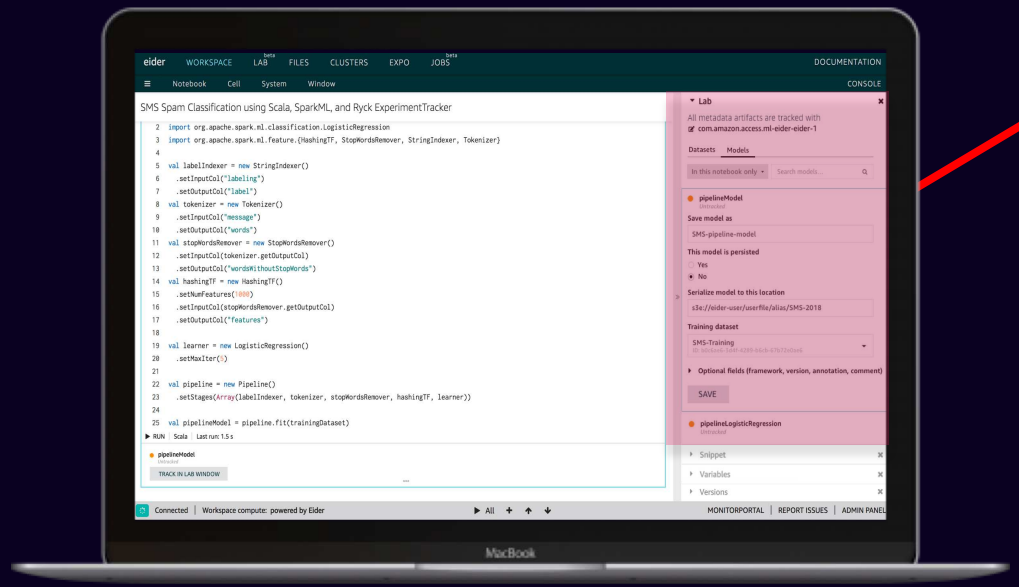

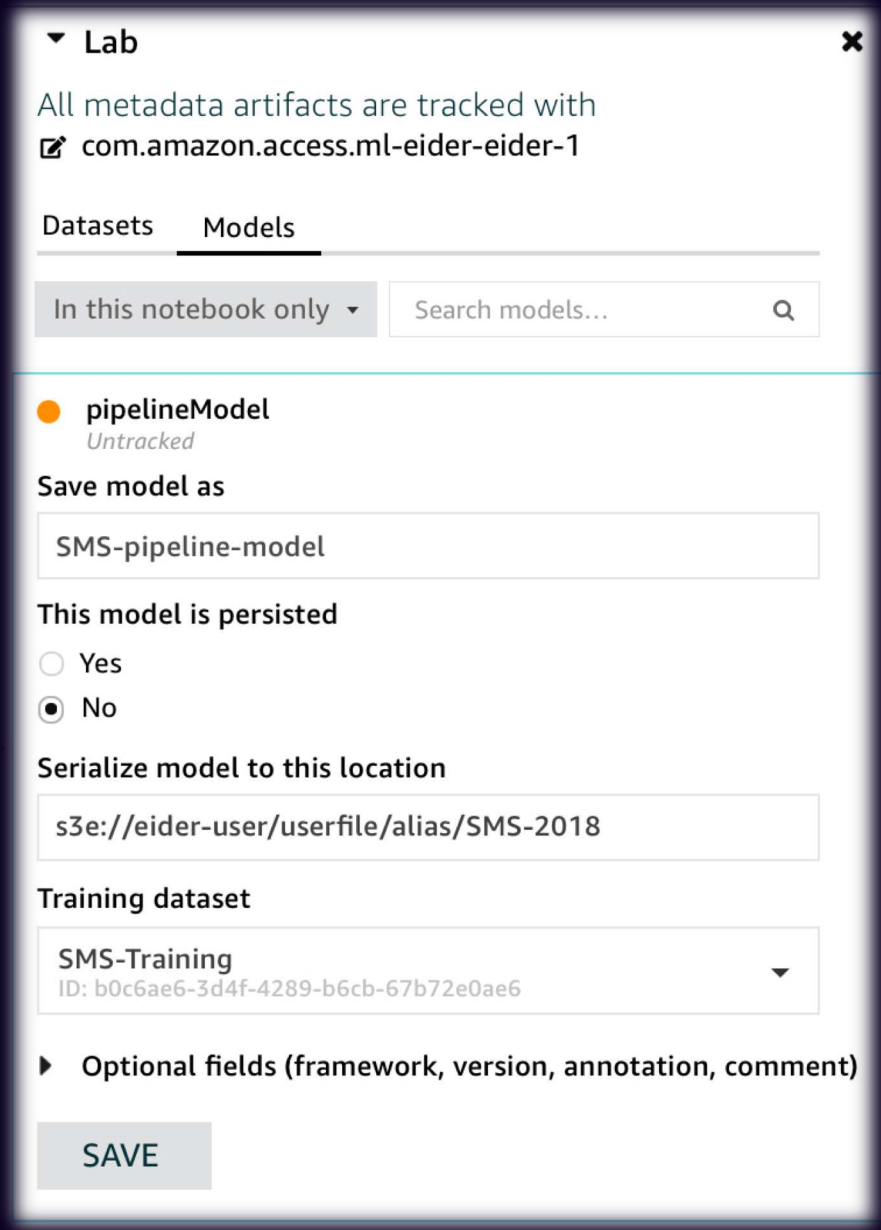

2. Log Analysis

Logexp: Non-Intrusive Experiment Tracking

```
./run-mxnet-experiment.py
```

Logexp: Non-Intrusive Experiment Tracking

```
./run-mxnet-experiment.py

INFO:root:Epoch[0] Batch [100] Speed: 83831.42 samples/sec  accuracy=0.10432
INFO:root:Epoch[0] Batch [200] Speed: 59385.85 samples/sec  accuracy=0.11060
INFO:root:Epoch[0] Batch [300] Speed: 62468.41 samples/sec  accuracy=0.11310
INFO:root:Epoch[0] Batch [400] Speed: 68188.53 samples/sec  accuracy=0.11480
INFO:root:Epoch[0] Batch [500] Speed: 40556.61 samples/sec  accuracy=0.12300
INFO:root:Epoch[0] Train-accuracy=0.300101
INFO:root:Epoch[0] Time cost=1.210
INFO:root:Epoch[0] Validation-accuracy=0.457100
INFO:root:Epoch[1] Batch [100] Speed: 38430.77 samples/sec  accuracy=0.547426
. . .
```

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Information Extraction

Logexp: Non-Intrusive Experiment Tracking

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Environment Information

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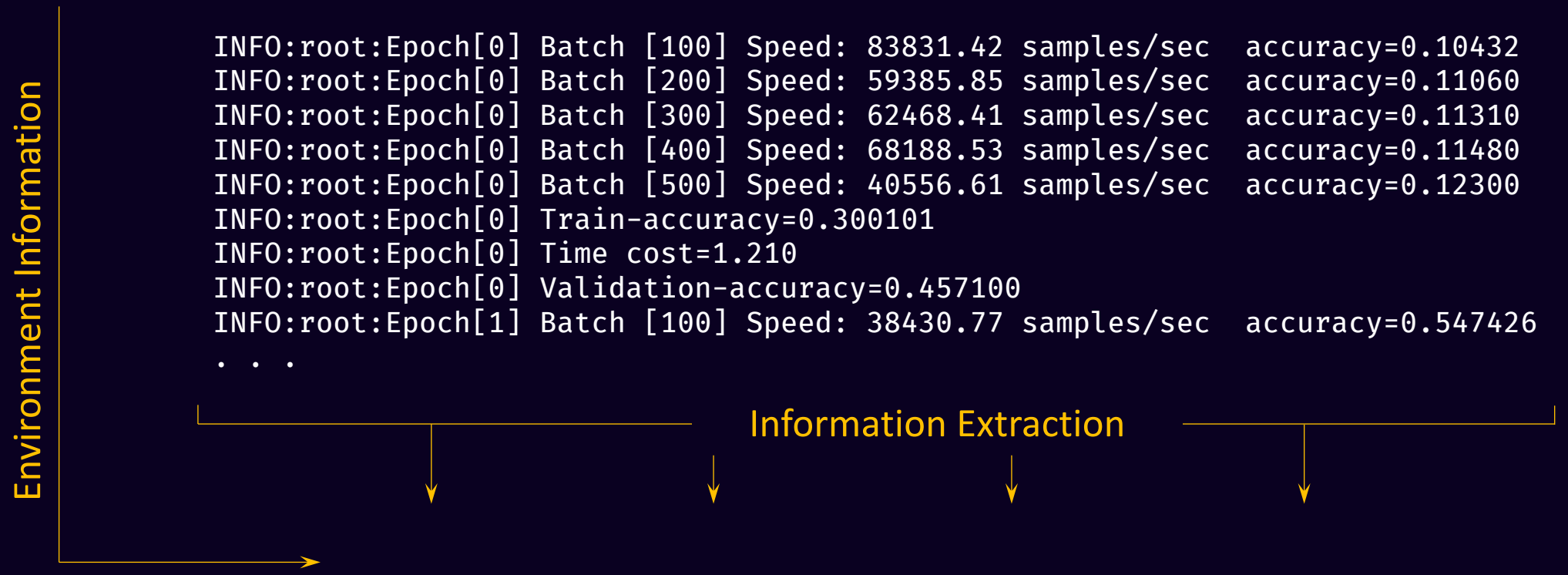

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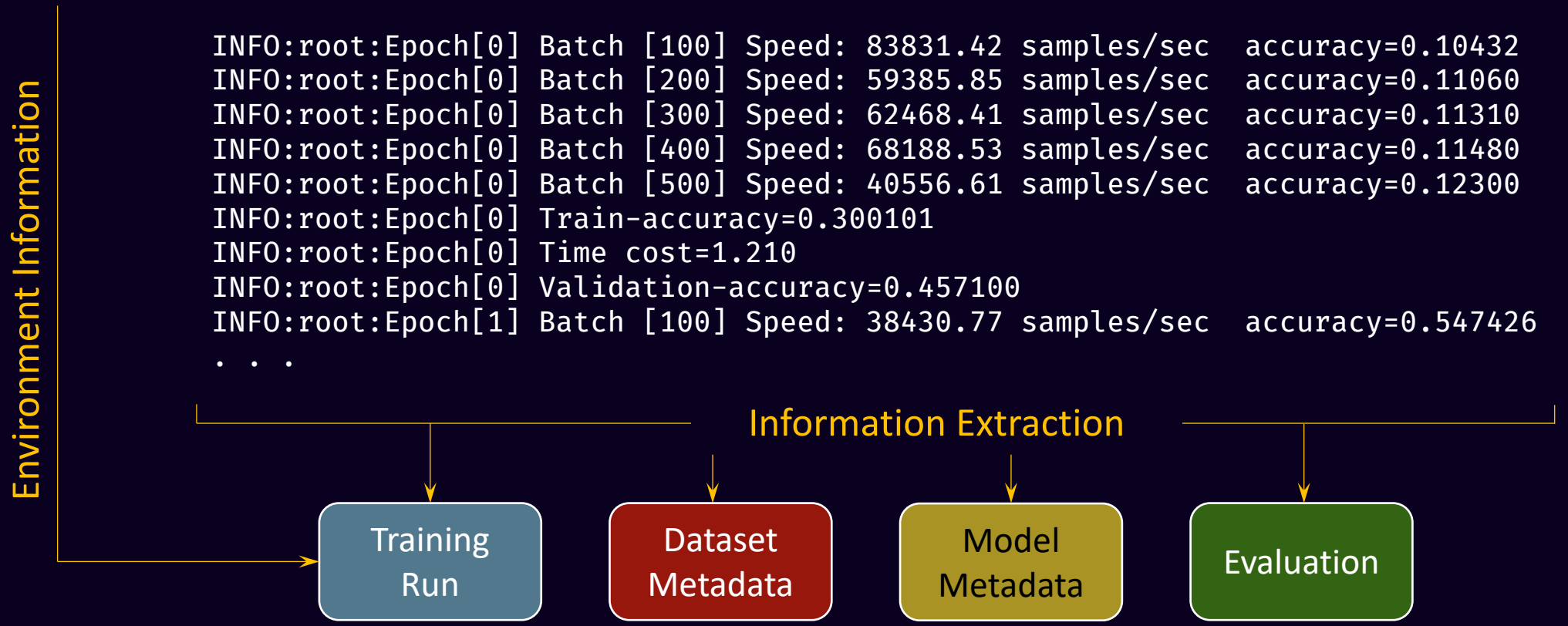

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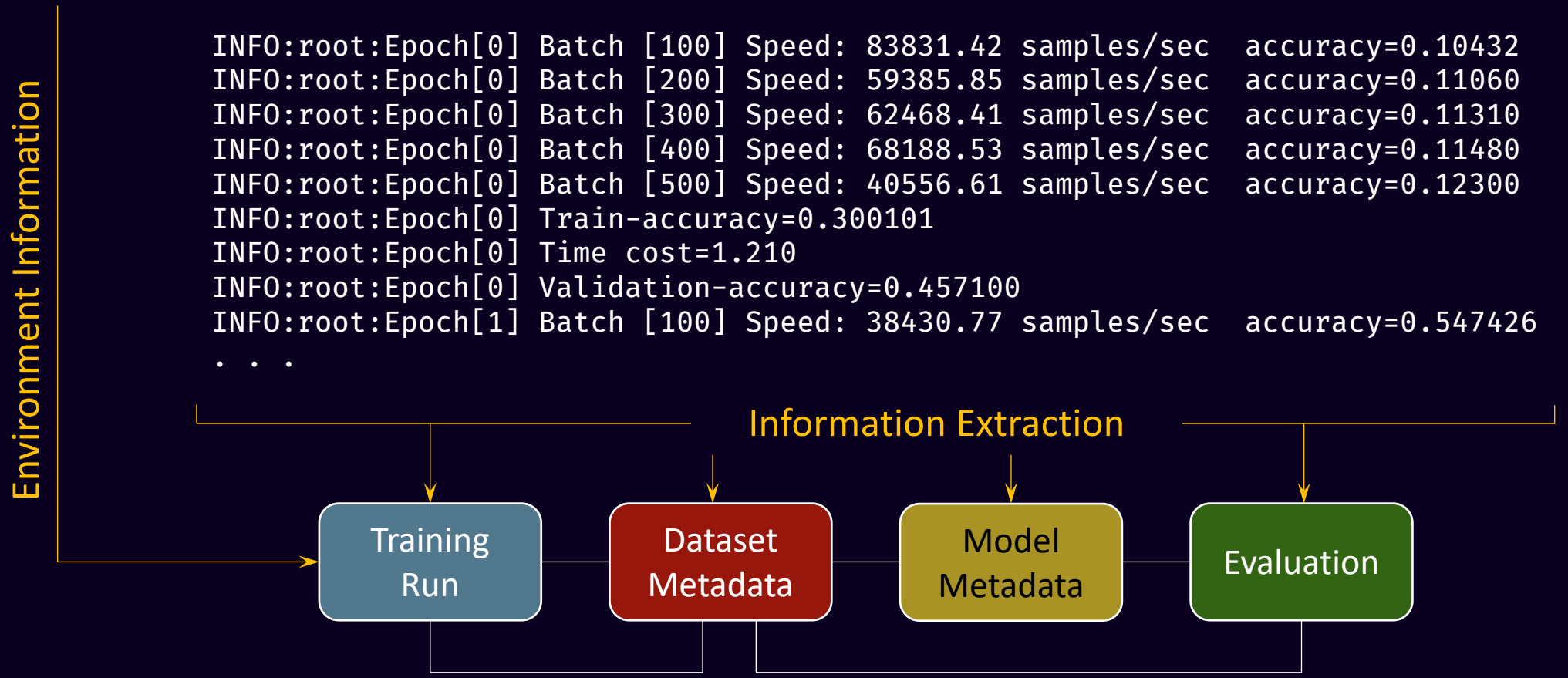

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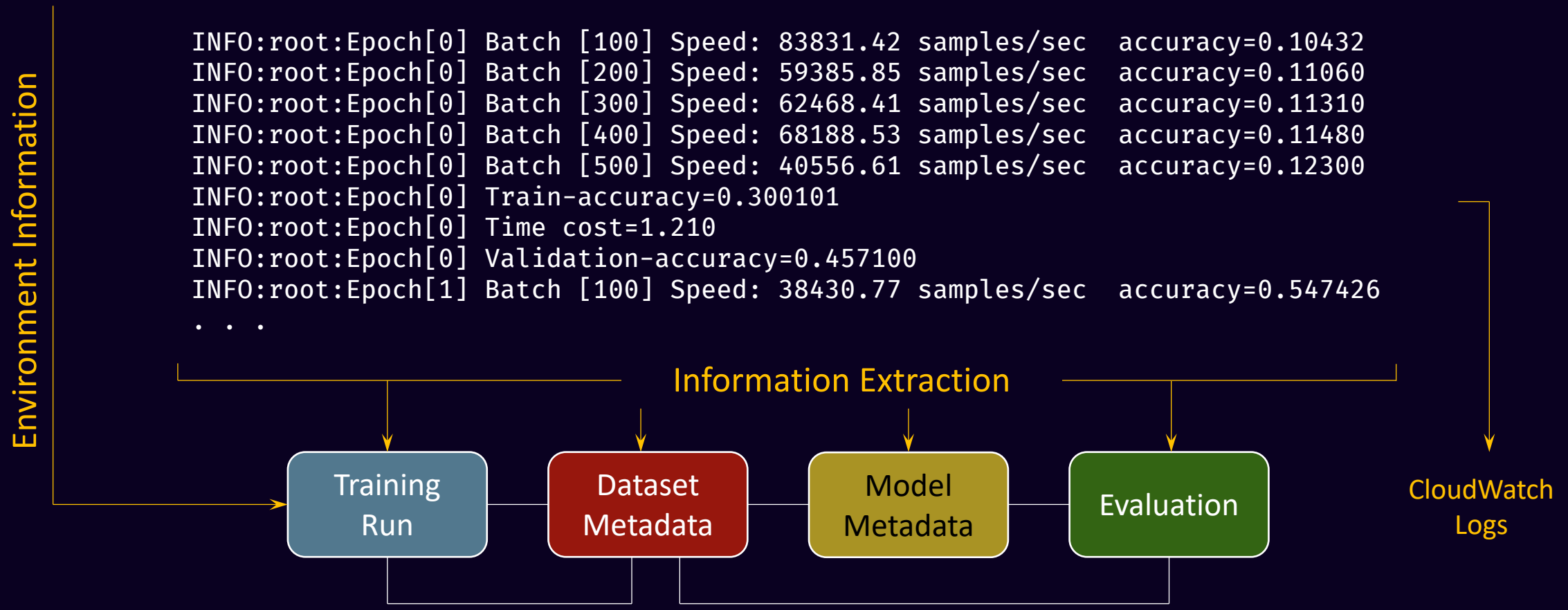


3. Transparent Tracking

Automated Metadata Extraction (Recap)

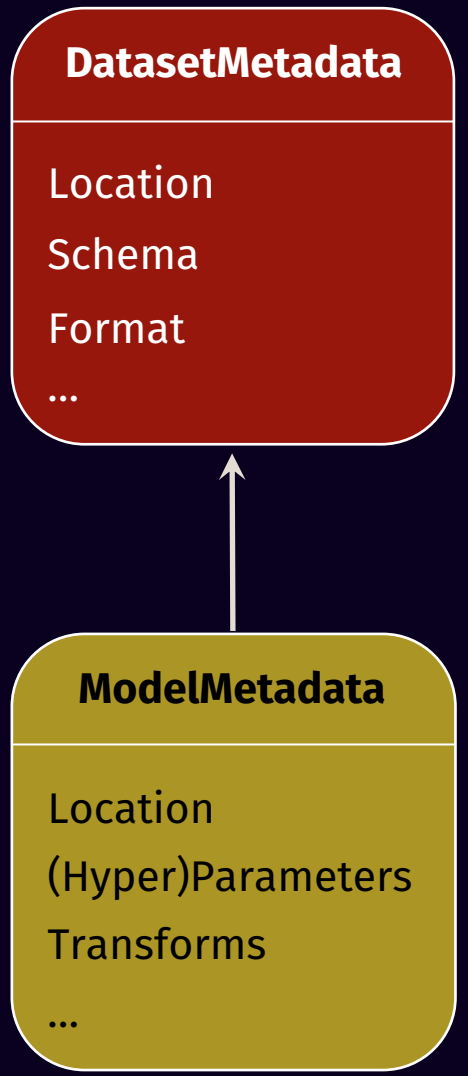
```
val df: DataFrame = …

tracker.trackDataset(df)


val pipeline: Pipeline = …

val model: PipelineModel = pipeline.fit(df)

tracker.trackModel(model)
```



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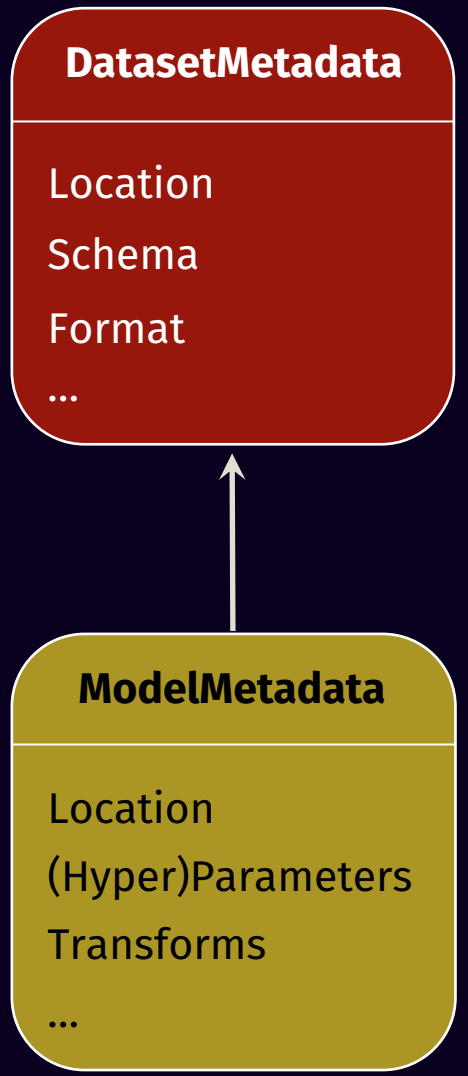

Transparent Tracking - JVM

Transparent Tracking - JVM

```
> java –cp sparkml.jar:… . . .
```

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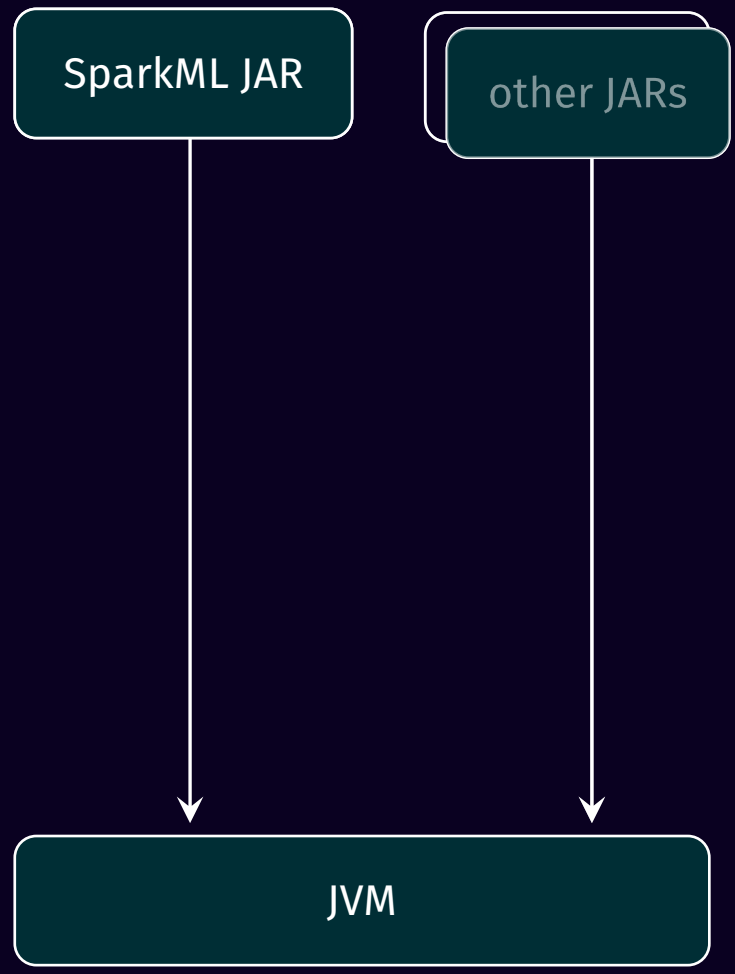

Transparent Tracking - JVM

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```
import org.apache.spark.ml.Pipeline

val df: DataFrame = …


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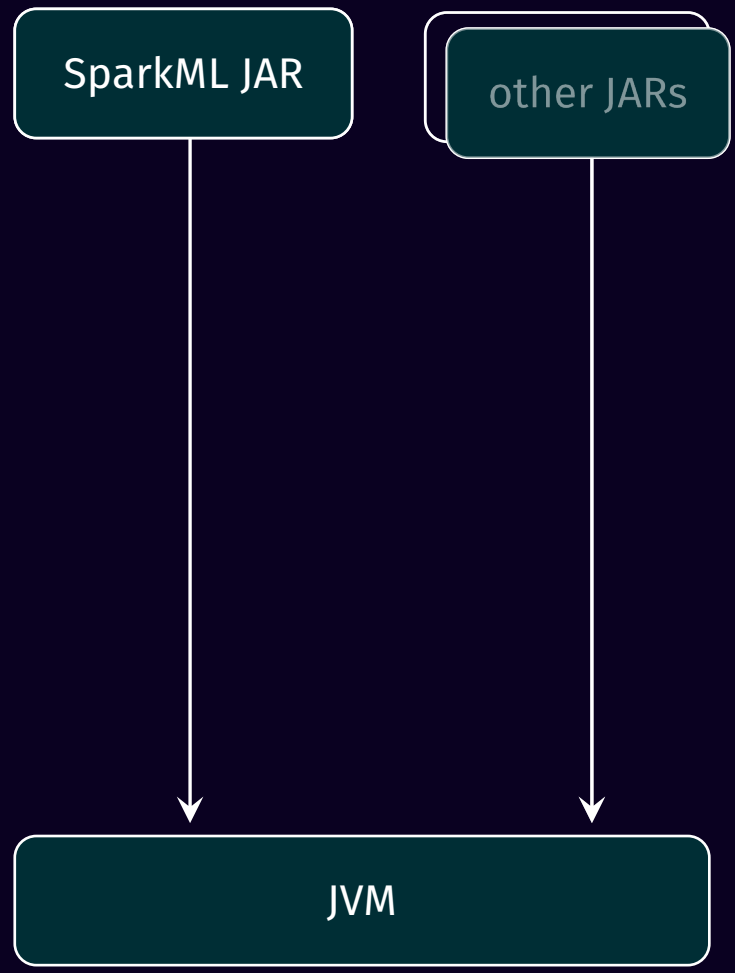

Transparent Tracking - JVM

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> java -javaagent:tracker.jar -cp sparkml.jar:… . . .
```

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val df: DataFrame = …


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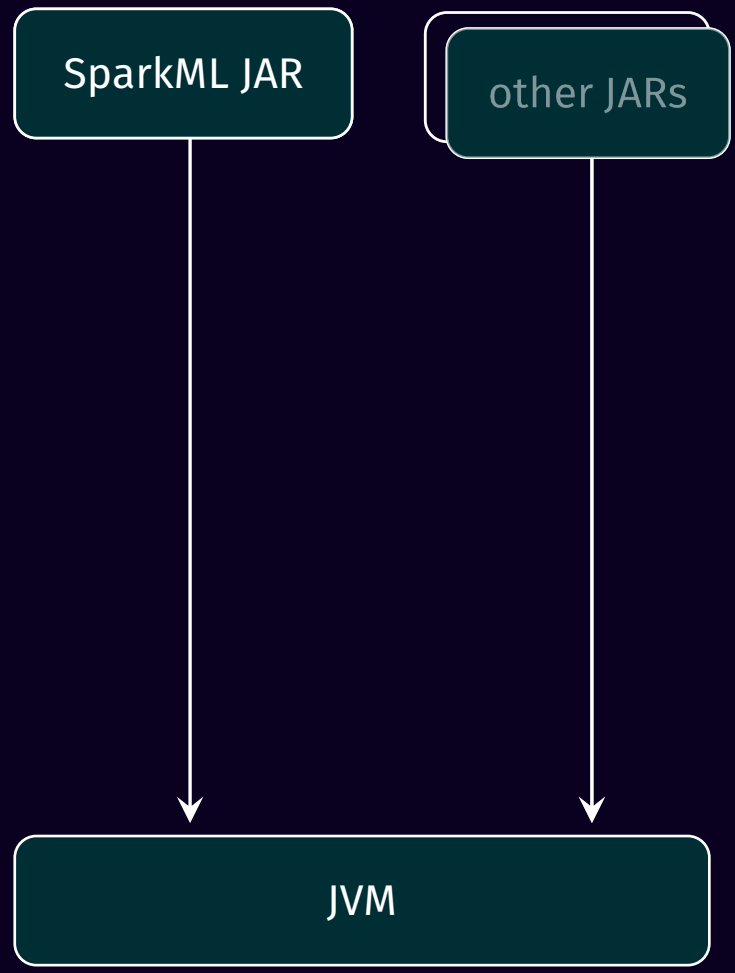

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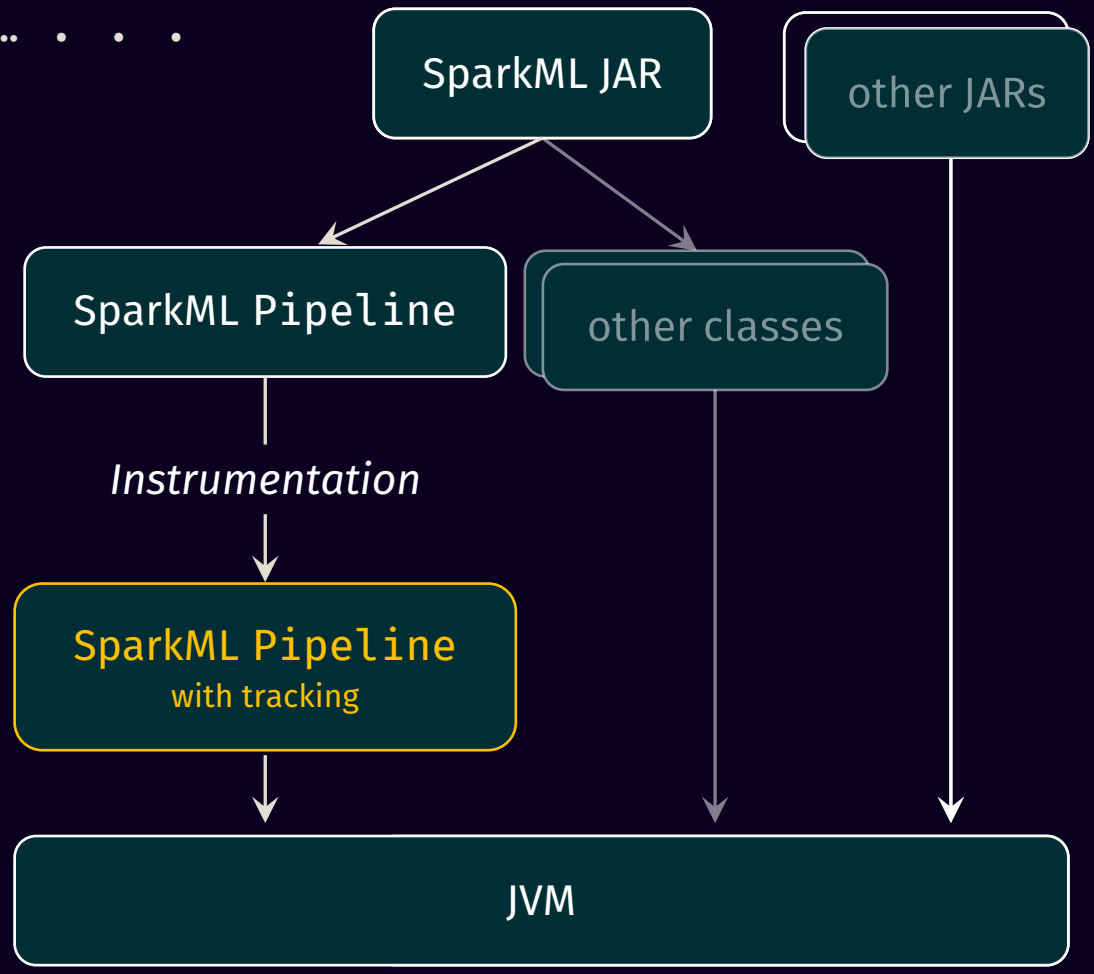

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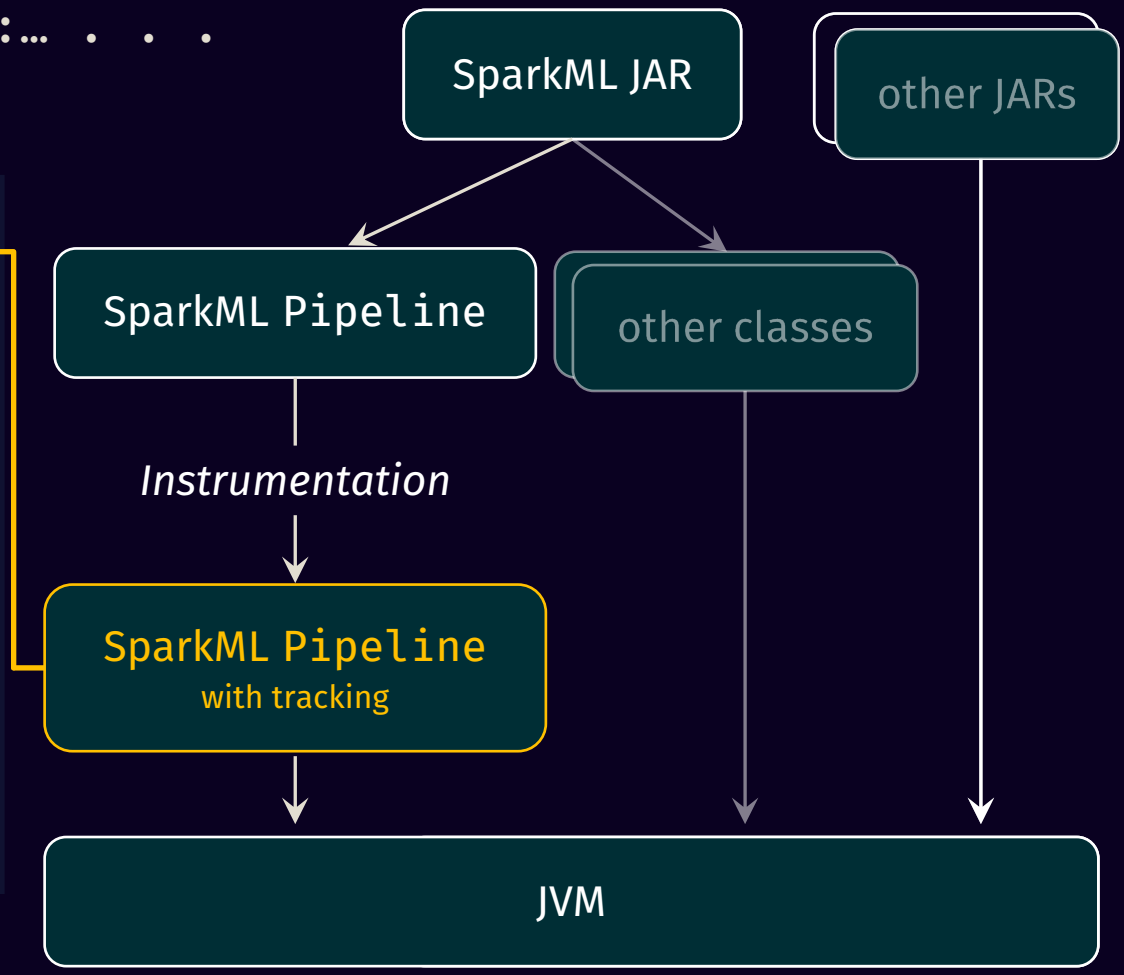

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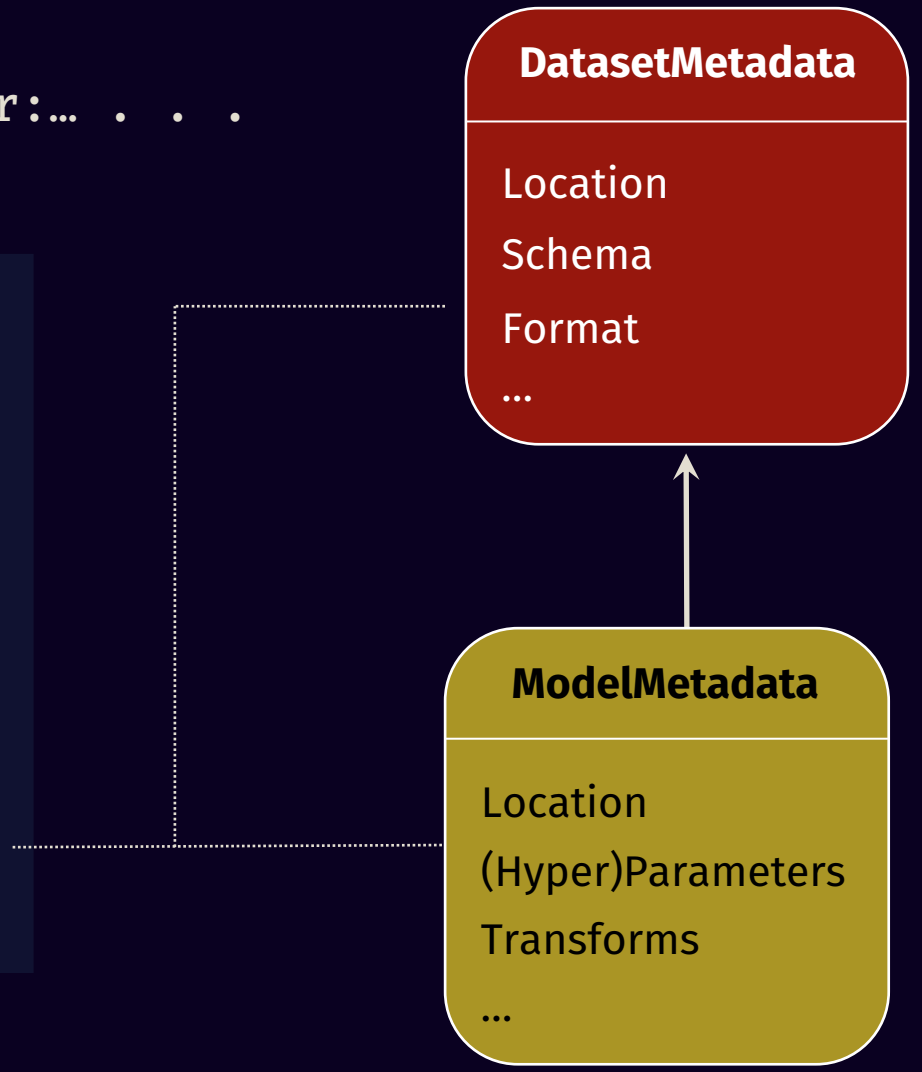
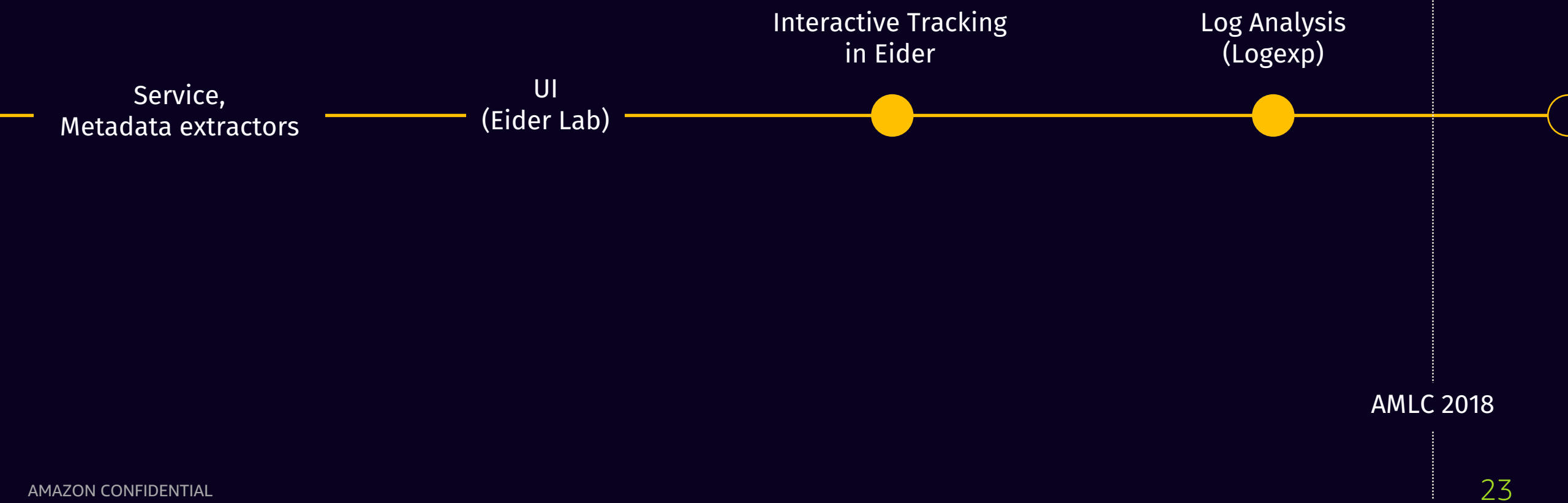
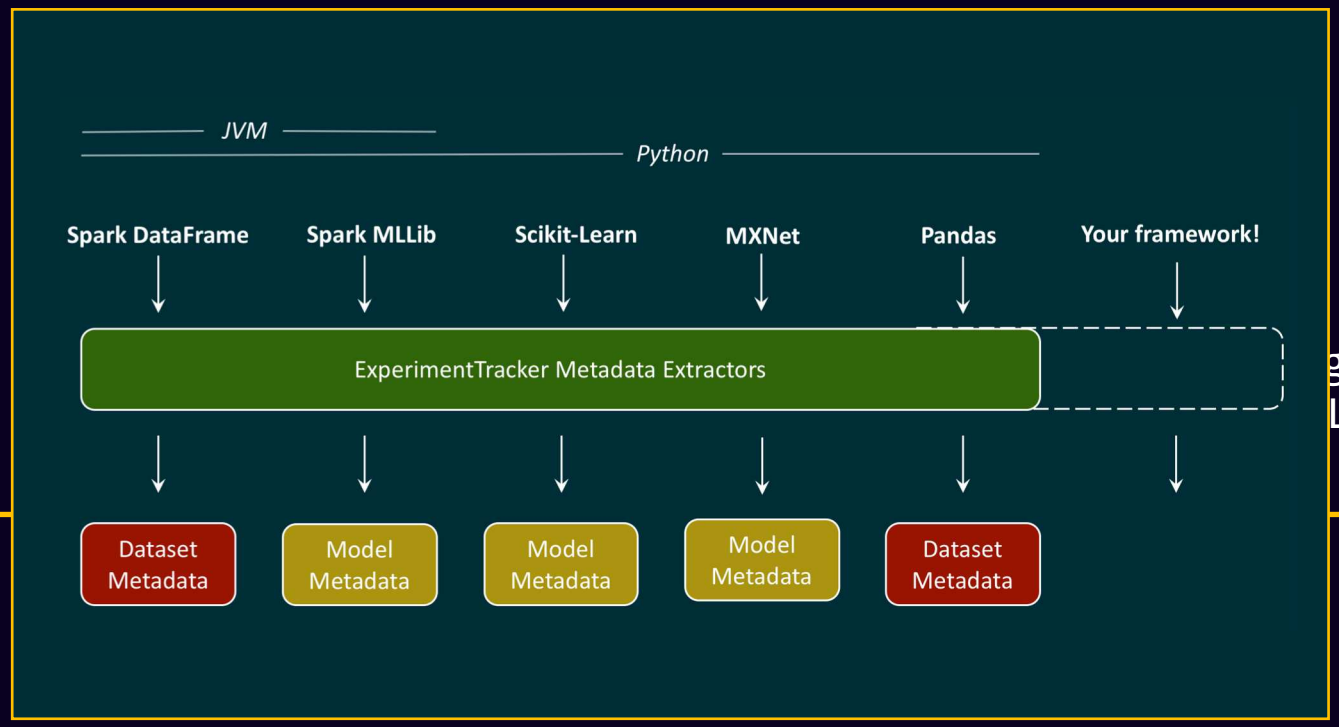


Summary & Timeline



Summary & Timeline

Service,
Metadata extractors



g Analysis
Logexp)

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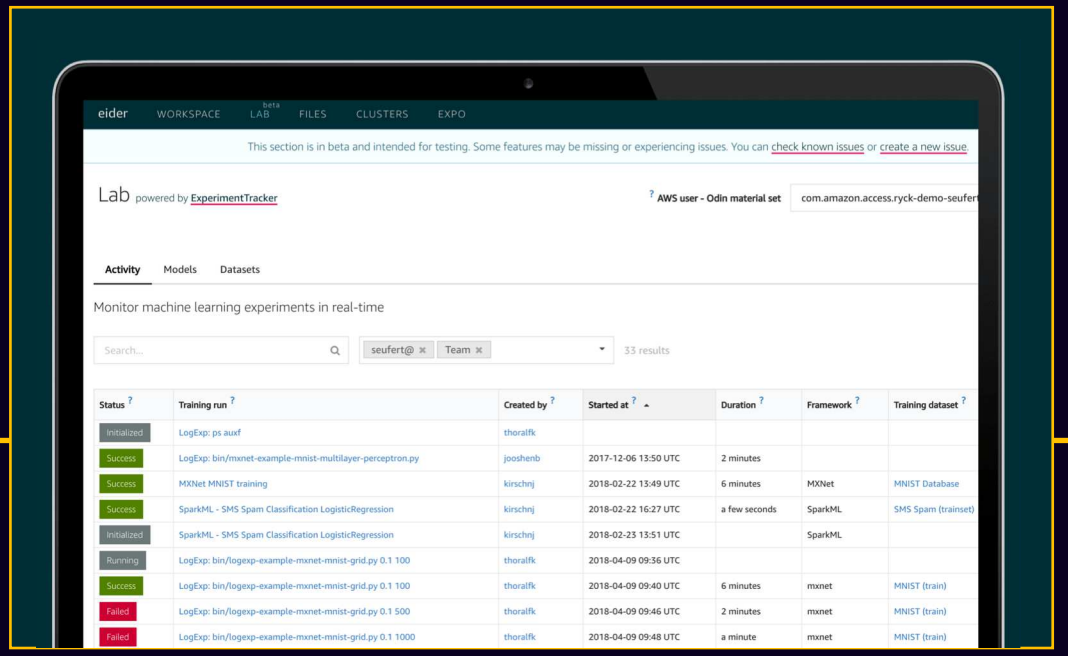
Summary & Timeline

Service,
Metadata extractors

UI
(Eider Lab)



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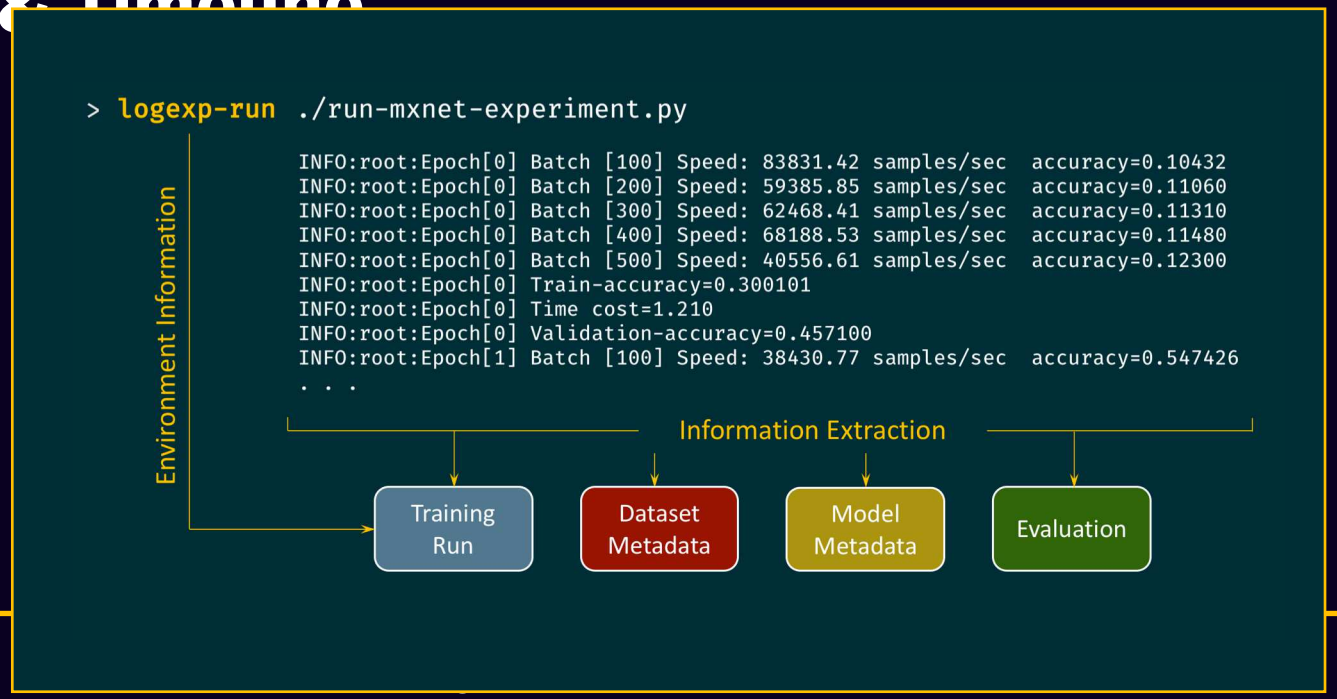
Summary & Timeline

Interactive Tracking in Eider

Log Analysis (Logexp)

AMLC 2018

Summary & Timeline



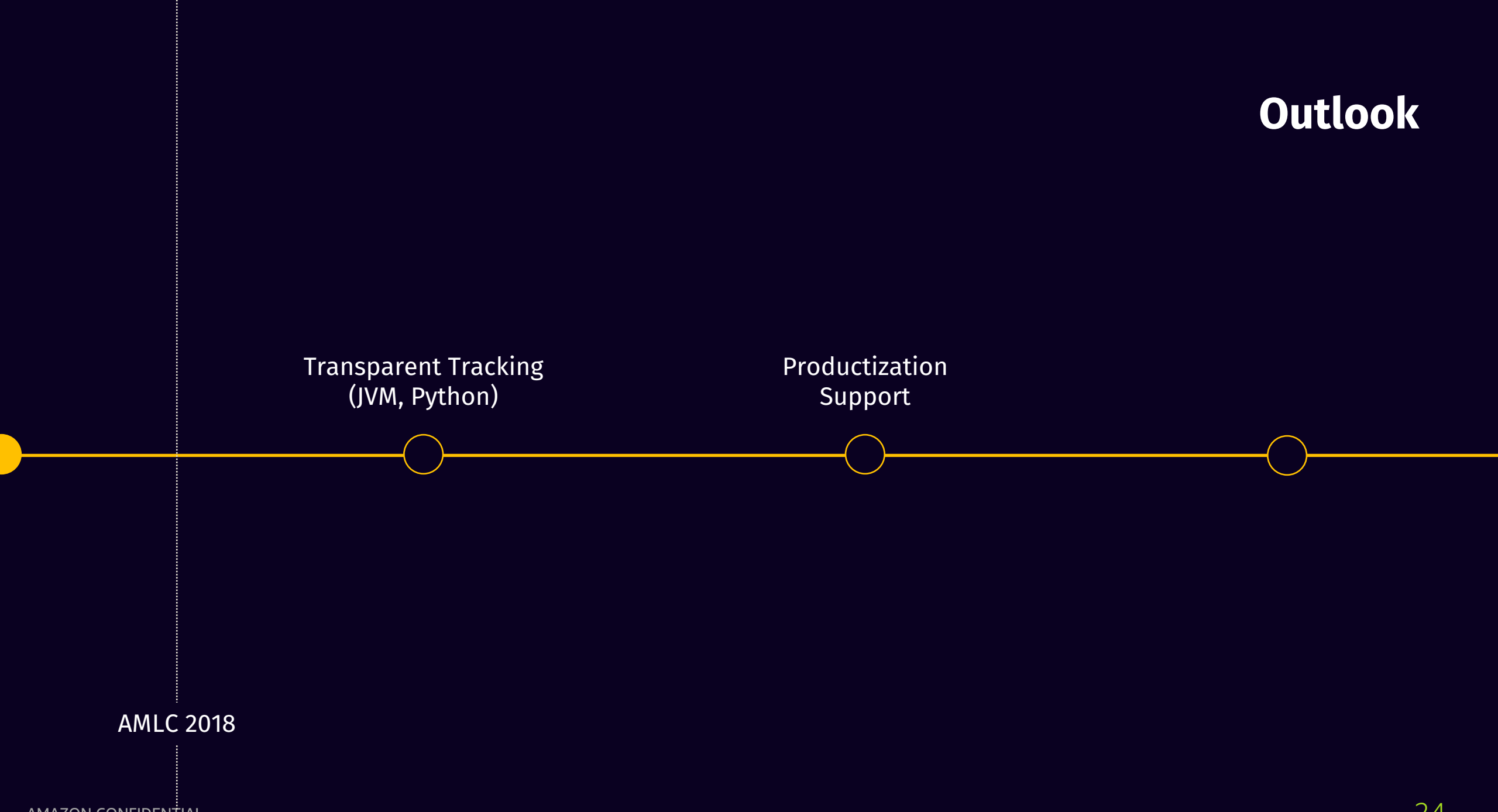
Log Analysis (Logexp)

Service, Metadata extractors

(Eider Lab)

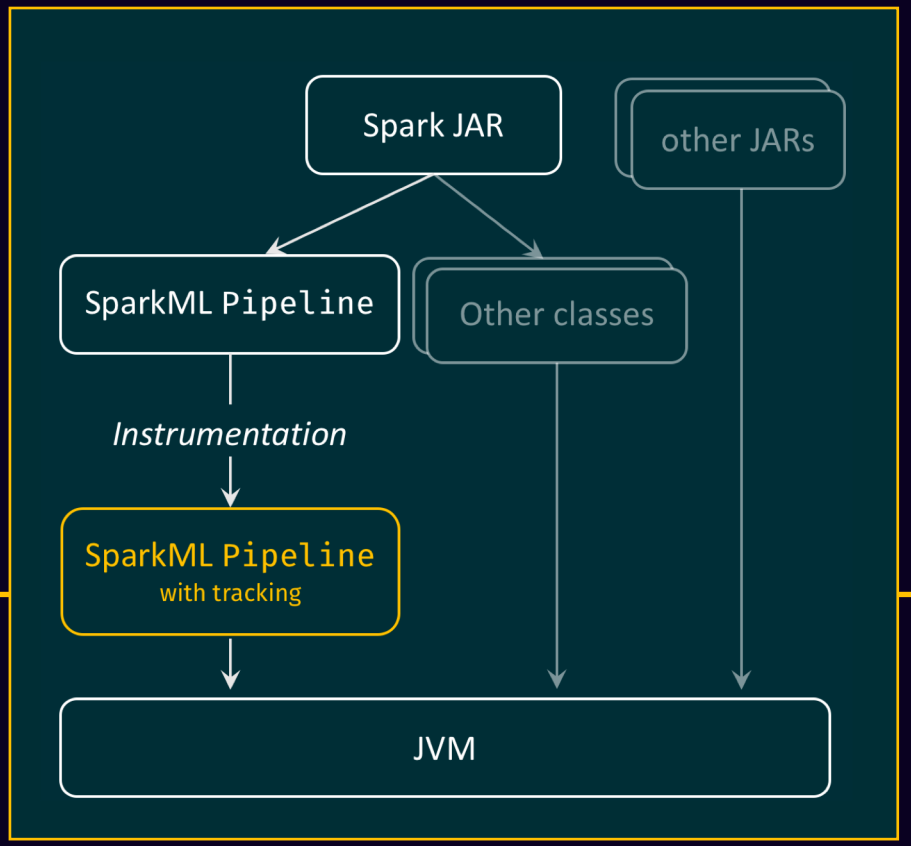
AMLC 2018

Outlook



Outlook

Transparent Tracking
(JVM, Python)



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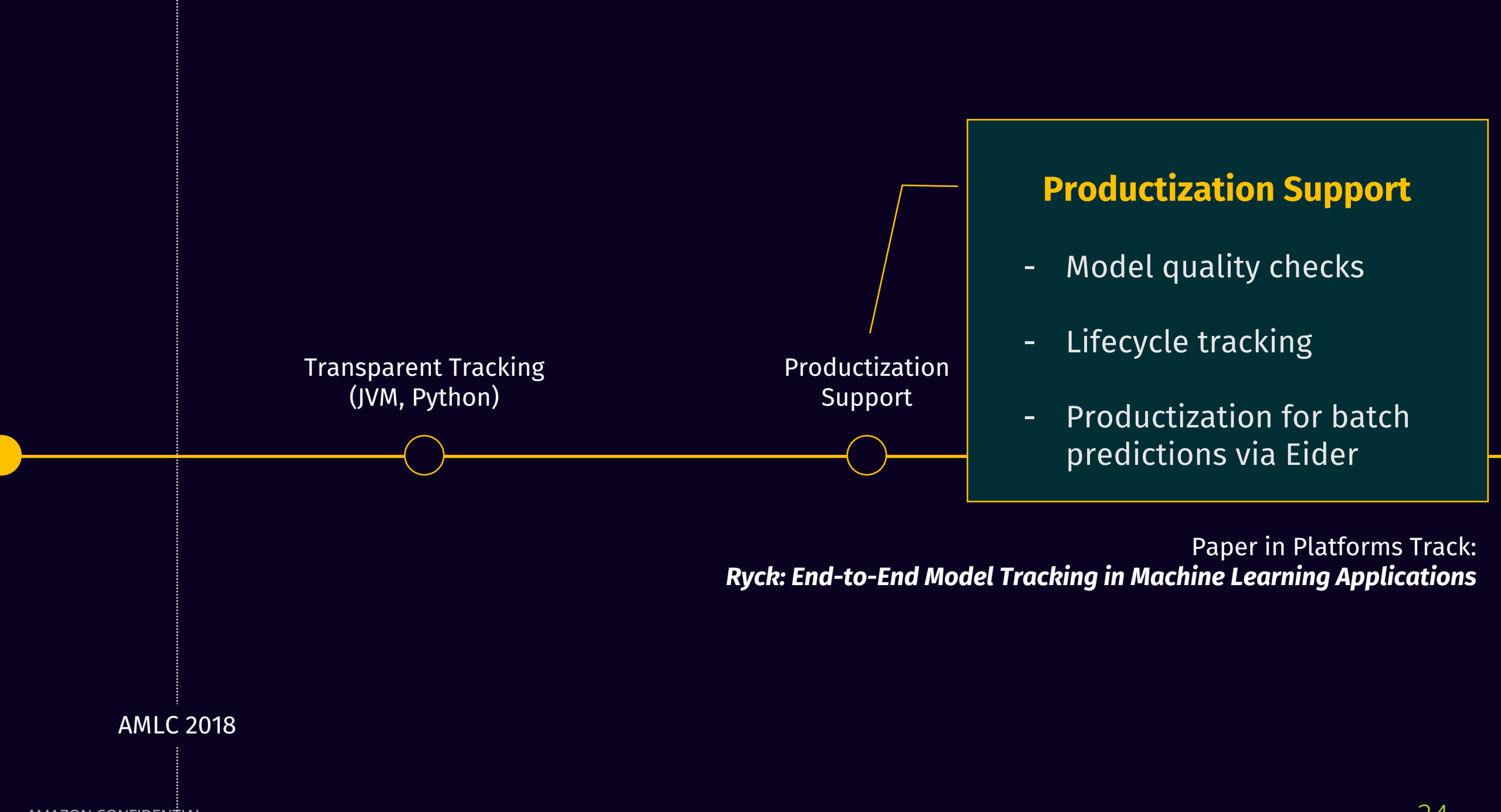

Paper in Platforms Track:
Ryck: End-to-End Model Tracking in Machine Learning Applications

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Seattle

Margaret Tung
UX Designer
Seattle

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teams

160,000+
entities

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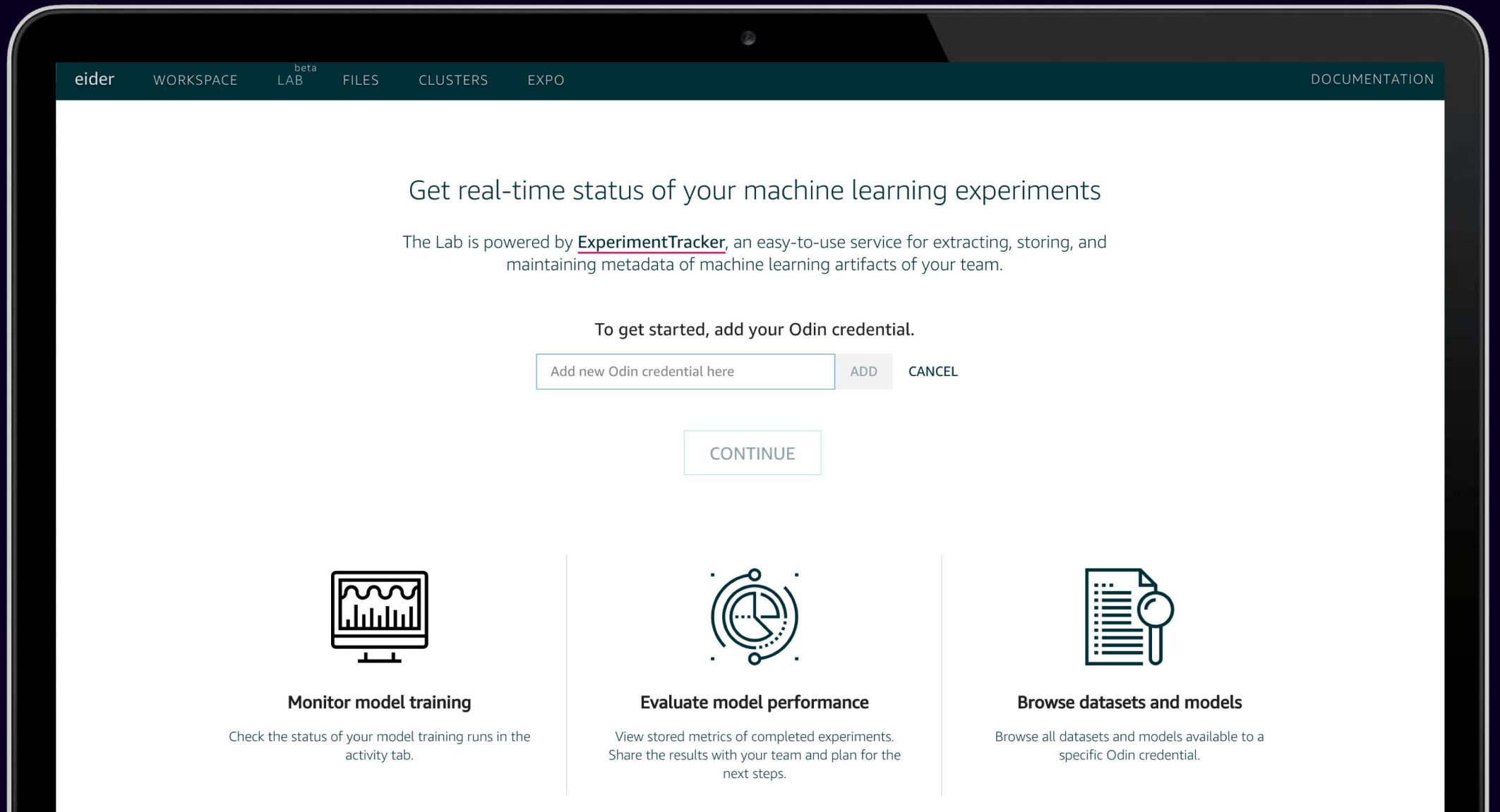

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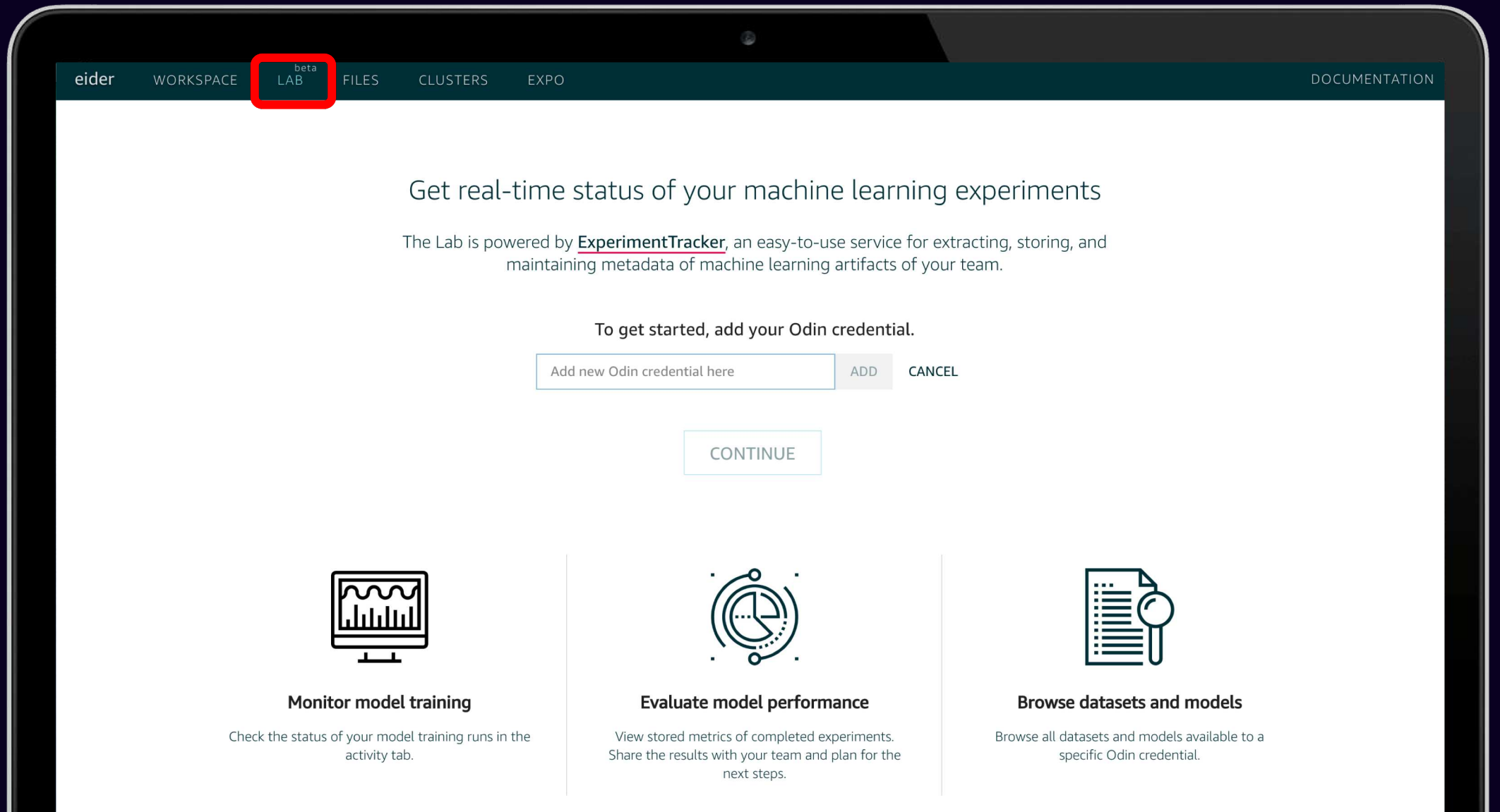

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