



# **SPARK IN PRODUCTION: POWERFUL BUT PERILOUS**

Aleš Kotnik, 25th of April 2024

# WHAT IS APACHE SPARK?

Apache Spark™ is a multi-language engine for executing data engineering, data science, and machine learning on single-node machines or clusters.

# HISTORY

APACHE



pork

# HISTORY

Developed by Matei Zaharia in 2009.

APACHE



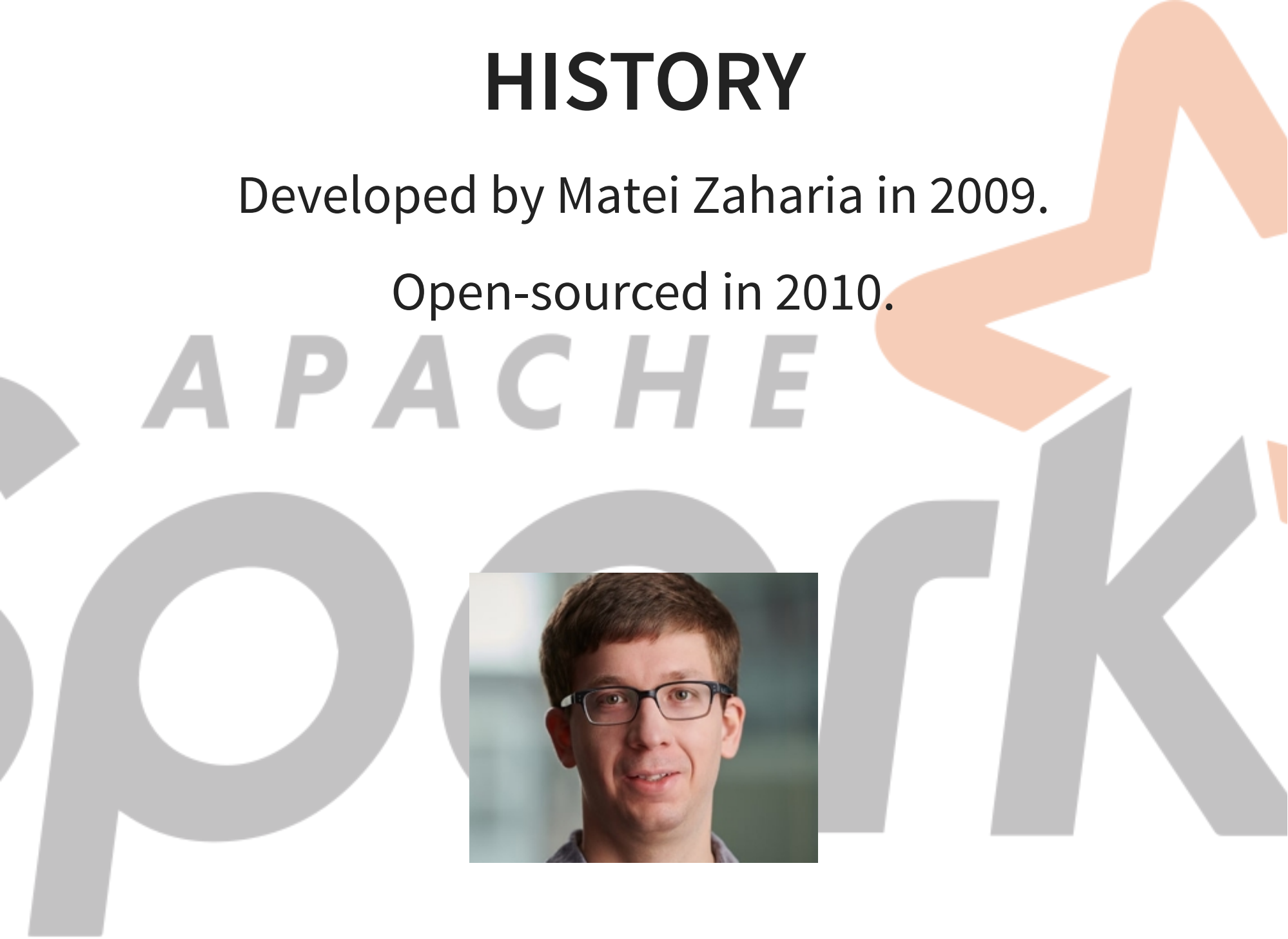
SPARK

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Spark has more than 2,000 contributors



# **POPULAR DEPLOYMENTS OPTIONS**

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- Databricks

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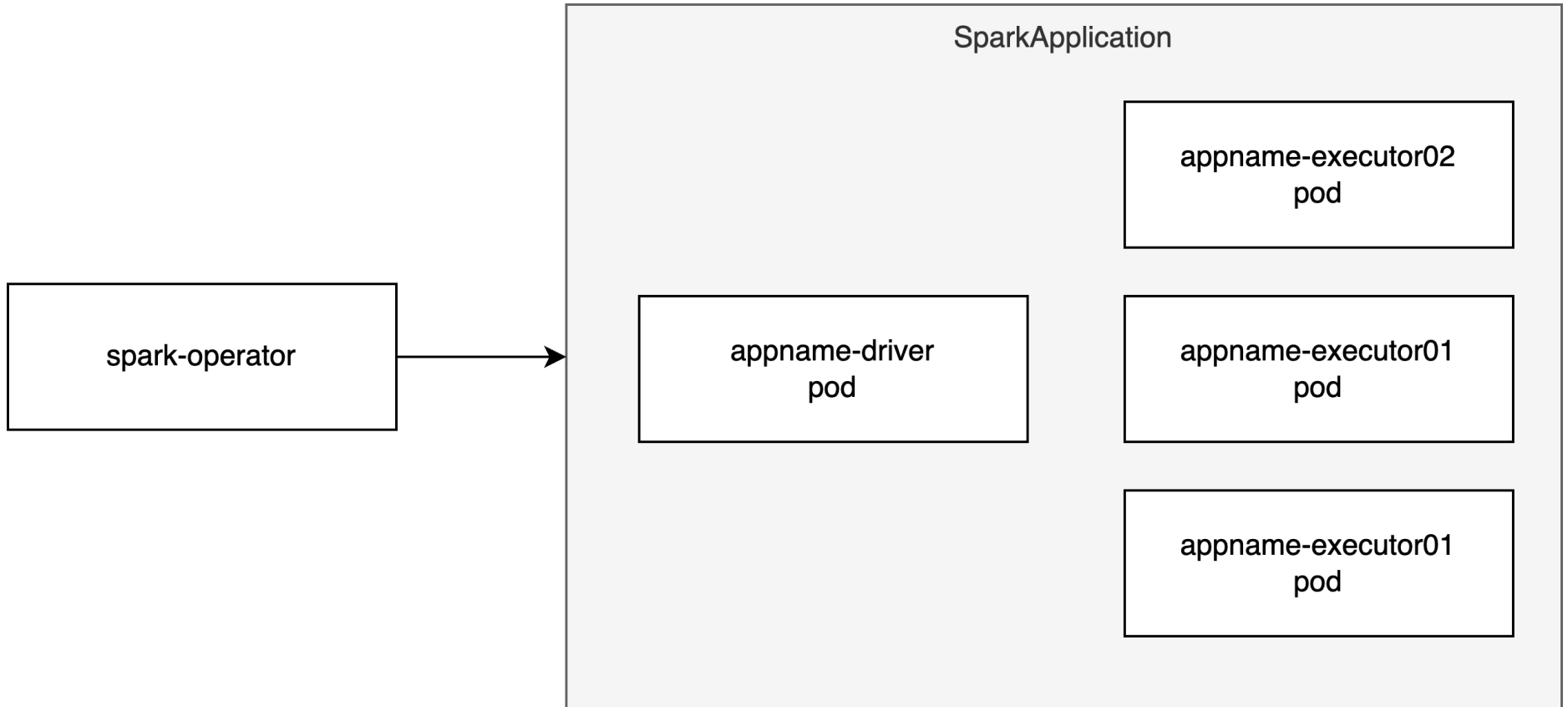
- Databricks
- AWS EMR
- Spark operator for Kubernetes

# SPARK OPERATOR

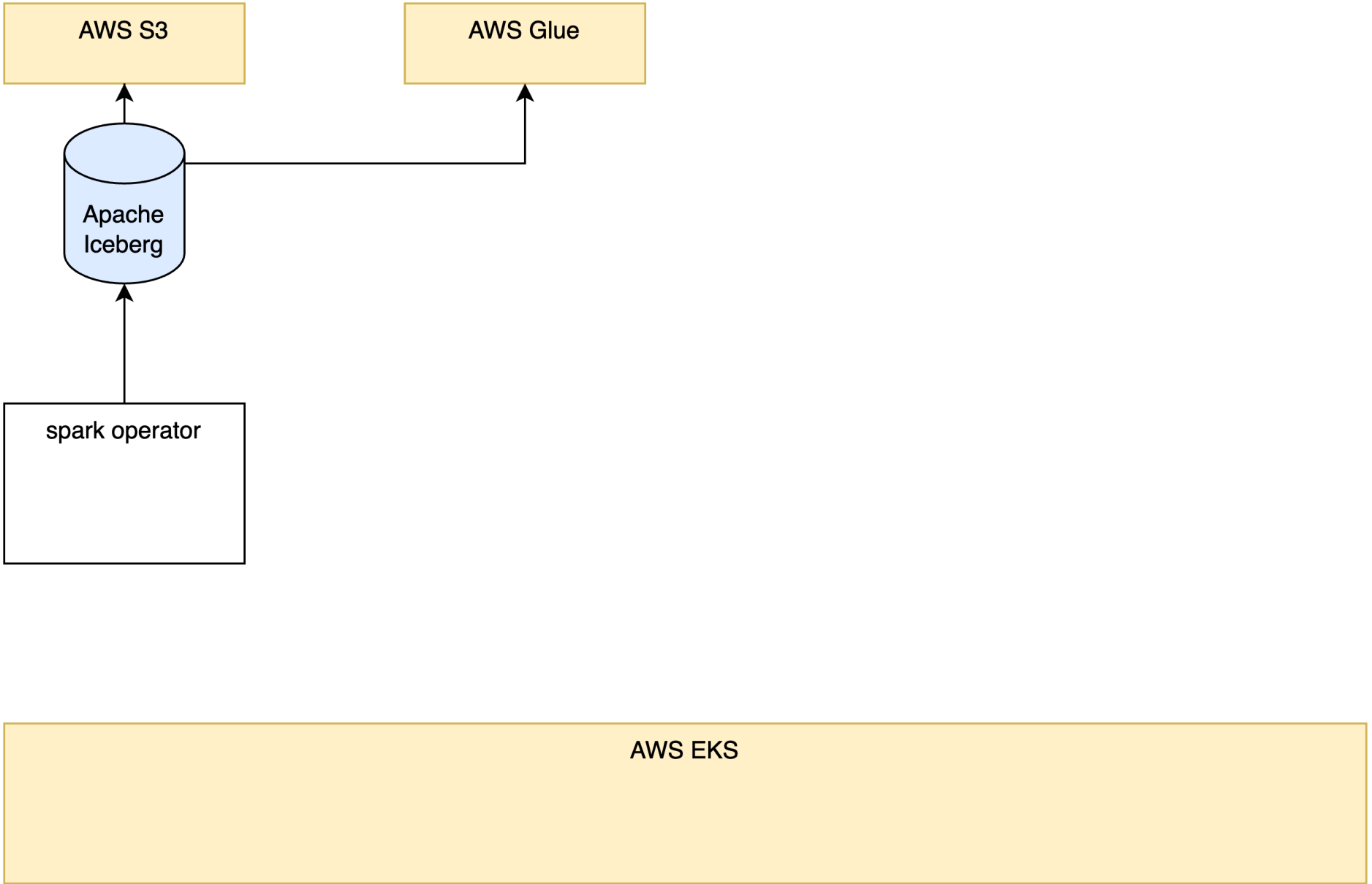
spark operator

AWS EKS

# SPARK APPLICATION



# APACHE ICEBERG



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is a high-performance format for huge analytic tables



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Schema evolution

Time travel

# JUPYTER NOTEBOOK

```
In [2]: # Import Libraries
from pyspark.sql.types import StructType, StructField, FloatType, BooleanType
from pyspark.sql.types import DoubleType, IntegerType, StringType
import pyspark
from pyspark import SQLContext

# Setup the Configuration
conf = pyspark.SparkConf()

spark_context = SparkSession.builder.config(conf=conf).getOrCreate()
sqlcontext = SQLContext(sc)

# Setup the Schema
schema = StructType([
    StructField("User ID", IntegerType(), True),
    StructField("Username", StringType(), True),
    StructField("Browser", StringType(), True),
    StructField("OS", StringType(), True),
])

# Add Data
data = [(1580, "Barry", "FireFox", "Windows" ),
        (5820, "Sam", "MS Edge", "Linux"),
        (2340, "Harry", "Vivaldi", "Windows"),
        (7860, "Albert", "Chrome", "Windows"),
        (1123, "May", "Safari", "macOS")
]

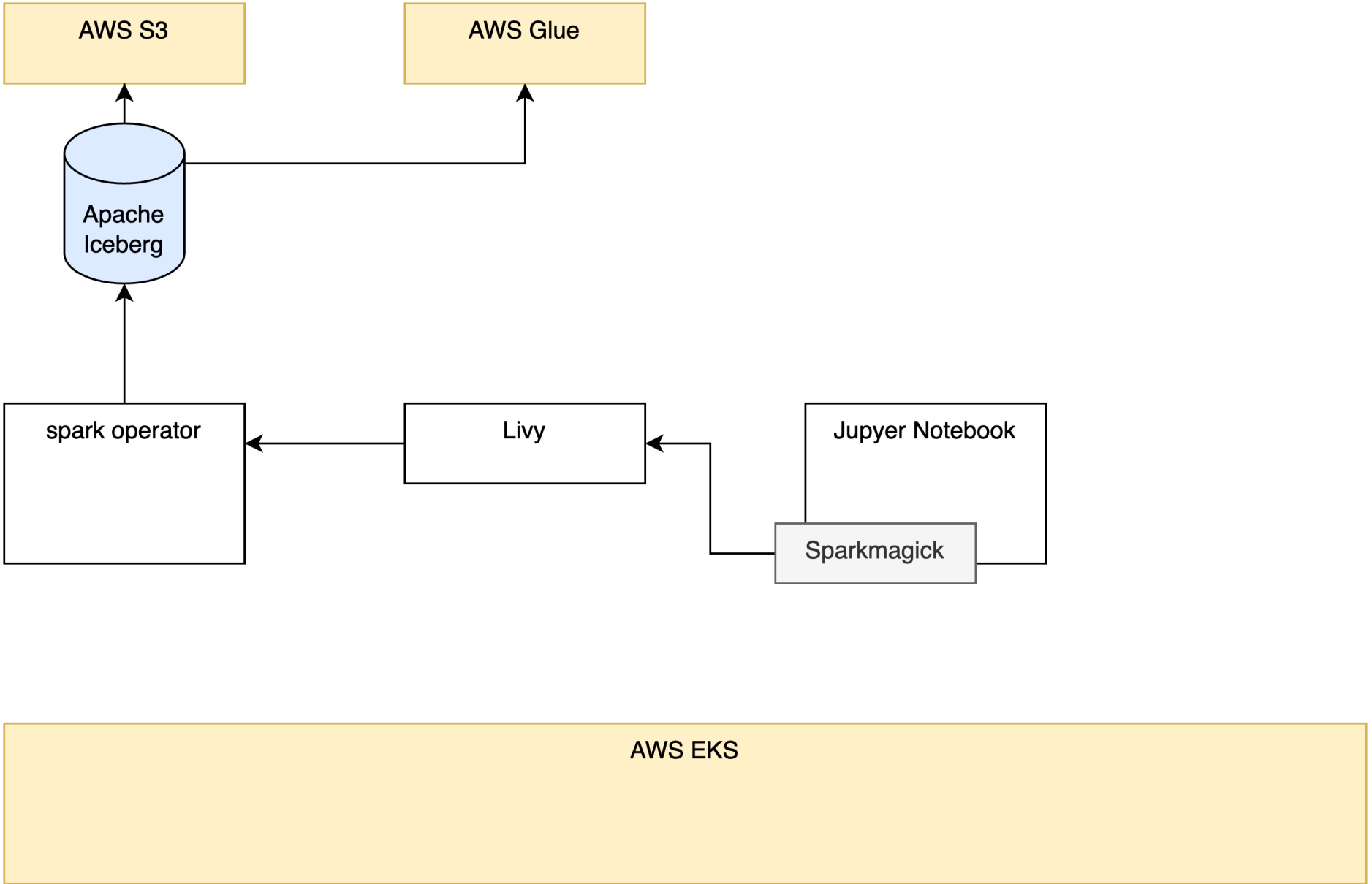
# Setup the Data Frame
user_data_df = sqlcontext.createDataFrame(data, schema=schema)
```

```
In [4]: user_data_df.show()
```

```
+-----+-----+-----+-----+
|User ID|Username|Browser|  OS|
+-----+-----+-----+-----+
|  1580|   Barry|FireFox|Windows|
|  5820|    Sam|MS Edge|  Linux|
|  2340|  Harry|Vivaldi|Windows|
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```

```
In [ ]:
```

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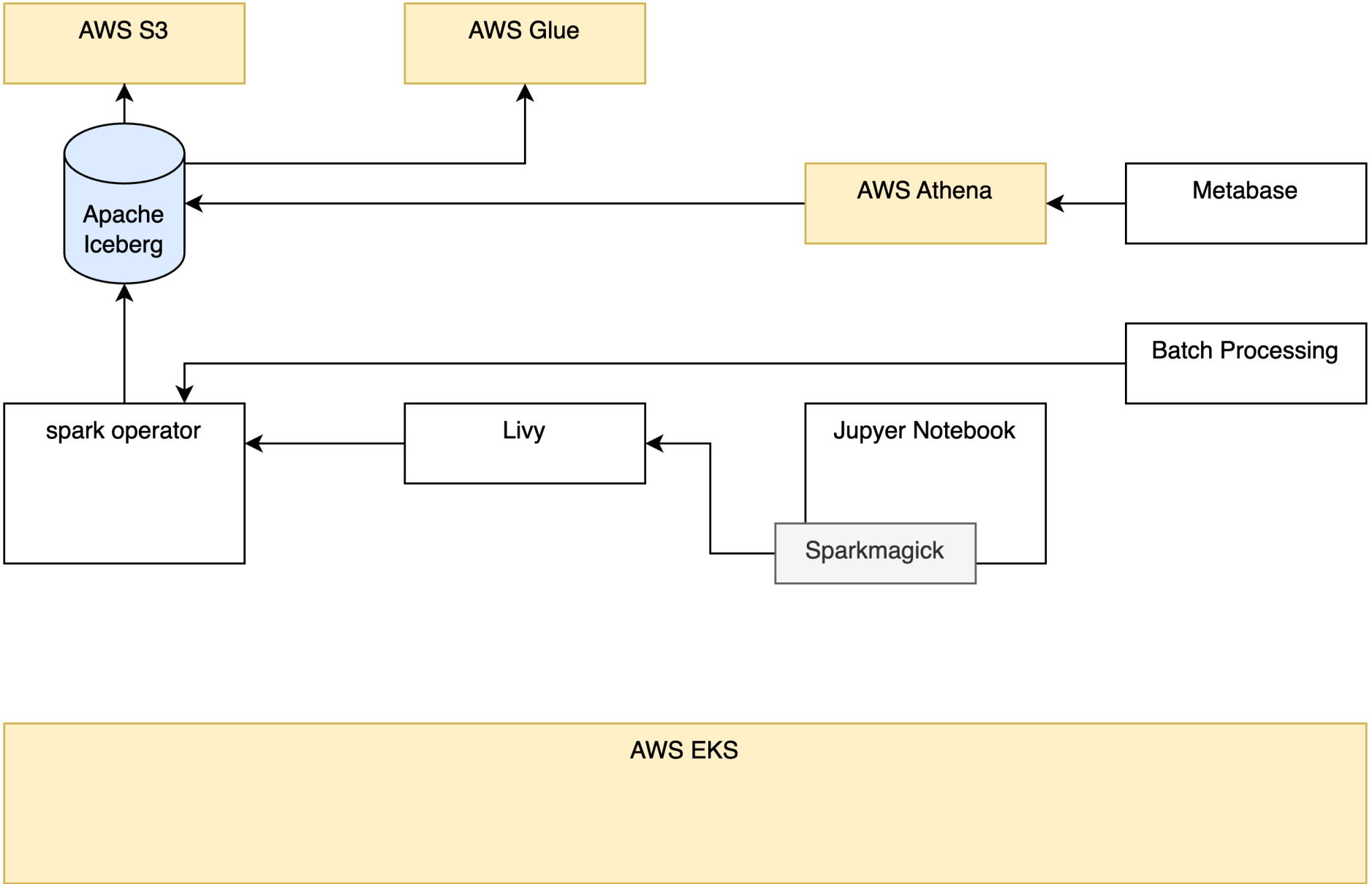
Web-based interface (no local installation needed)

Supports multiple languages, including Python, R and  
Scala

Interactive data visualization capabilities

Provides a Spark connectivity via SparkMagic and Livy

# OTHER CLIENTS



**WHAT CAN GO WRONG?**



**SPARK-OP CAN BRING K8S  
CLUSTER DOWN**

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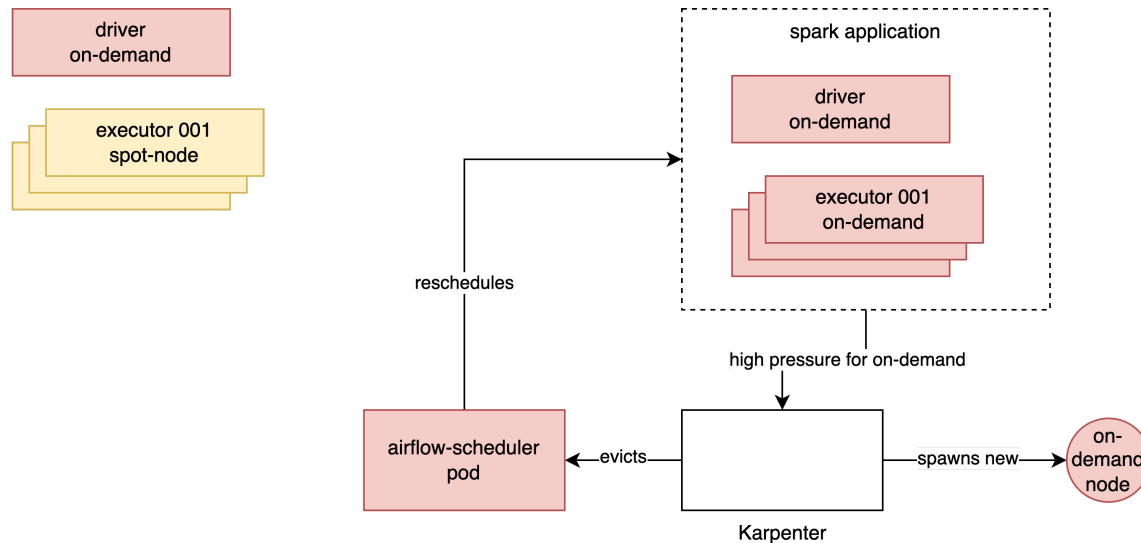
# SPARK-OP CAN BRING K8S CLUSTER DOWN

Failure generating cert for Admission Webhook

Executors lack toleration for spot instance

Starts vicious cycle

# SPARK-OP CAN BRING K8S CLUSTER DOWN



**DEVELOPER UNFRIENDLY**

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Spark + Iceberg -> requires cluster

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A lot of time is spent in complex Spark UI

# DEVELOPER UNFRIENDLY

APACHE Spark 2.2.1 tape-sparksql-jr\_80b2f86d42bfb62... application UI

Jobs Stages Storage Environment Executors SQL

## Details for Job 2

Status: SUCCEEDED  
Completed Stages: 3

- ▶ Event Timeline
- ▼ DAG Visualization

Stage 2

WholeStageCodegen

Exchange

Stage 3

WholeStageCodegen

Exchange

Stage 4

Exchange Exchange

WholeStageCodegen WholeStageCodegen

SortMergeJoin

▶ Completed Stages (3)

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Data scientist often feel at home with pandas

**BECOMES A HAMMER**



A detailed illustration of a hammer. The head of the hammer is inscribed with 'APACHE SPARK' and has 'D4D' written on its face. The handle is inscribed with 'D4D' and 'DATA'. The hammer is positioned over a large grid of data points, with several nails scattered around its base. The background is a light gray grid with various alphanumeric characters and numbers.

# BECOMES A HAMMER

How can do X with Spark?

A large hammer is the central focus, with 'APACHE SPARK' written on its head and 'D4D' on the handle. The hammer is positioned over a grid of data, which appears to be a table with various numerical and alphanumeric values. At the base of the hammer, there is a large pile of nails, suggesting that the hammer is being used to drive them into the data grid. The overall scene is rendered in a detailed, shaded style, giving it a three-dimensional appearance.

# BECOMES A HAMMER

How can do X with Spark?

Raises complexity



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How can do X with Spark?

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Hard and painful maintenance of scheduled jobs

**TAKEAWAY**



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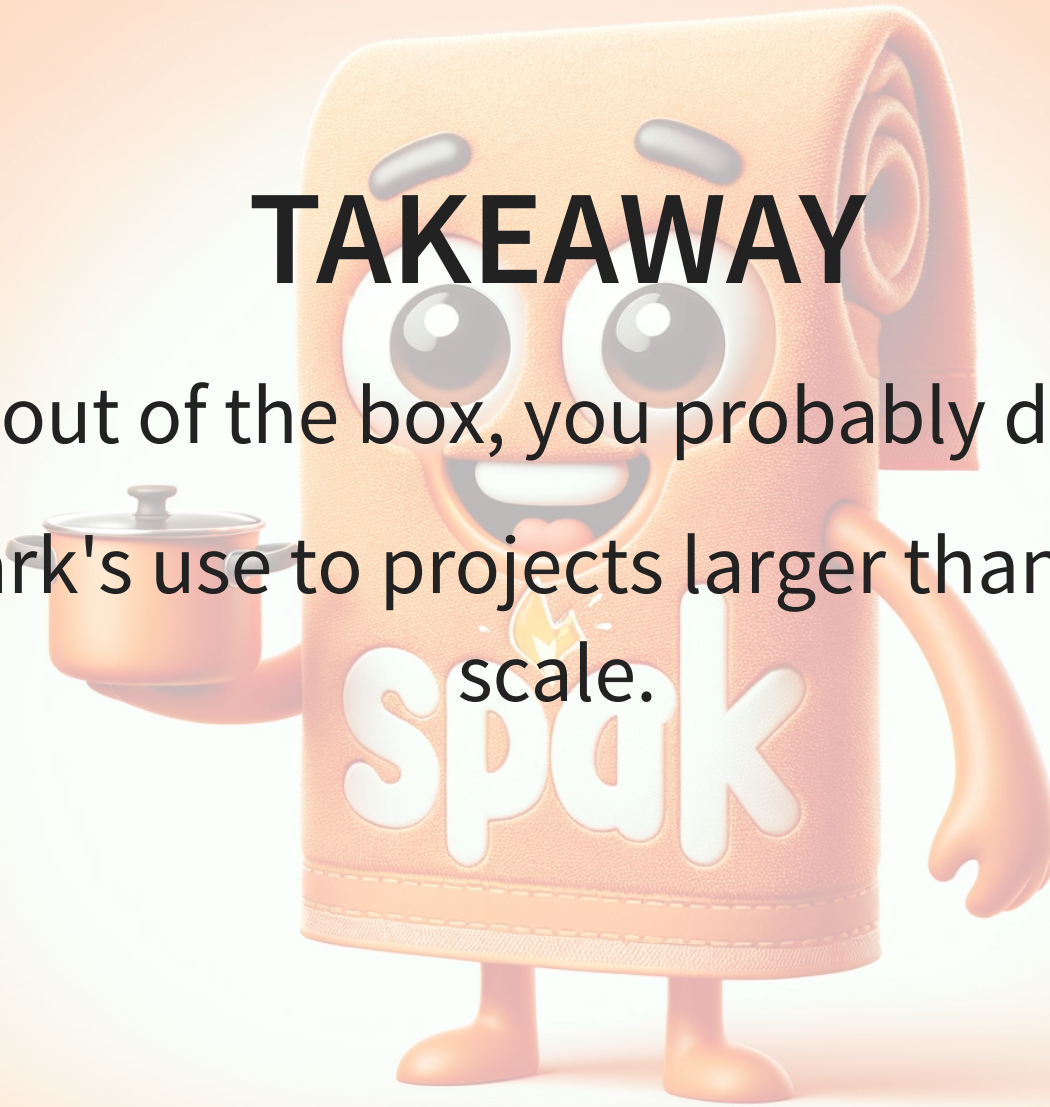
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Limit Spark's use to projects larger than a terabyte scale.



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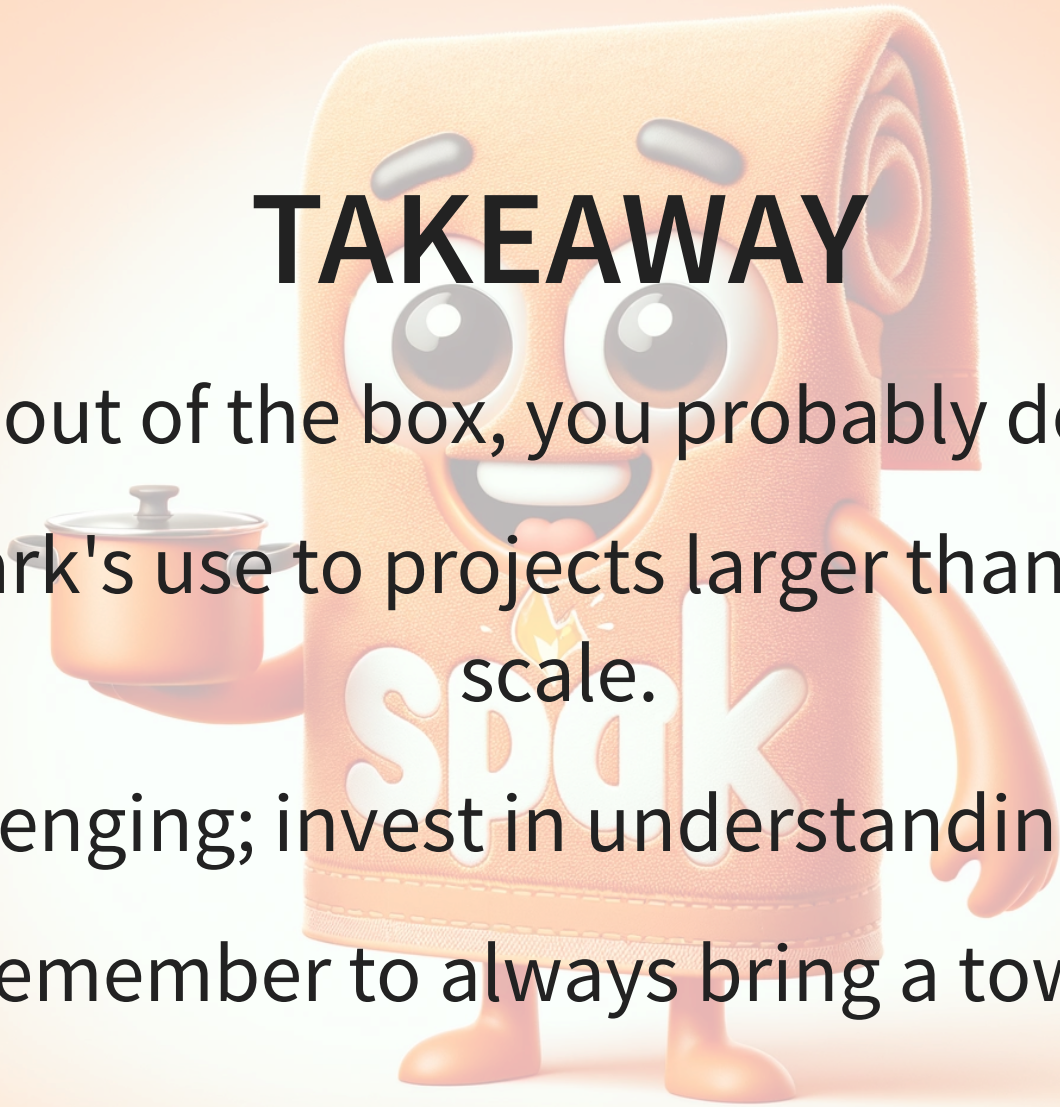
# TAKEAWAY

If it works out of the box, you probably don't need it.

Limit Spark's use to projects larger than a terabyte scale.

It's challenging; invest in understanding it better.

Remember to always bring a towel.



# THANK YOU!

Questions?

