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# Sparkling Water 2.0

The Amsterdam Pipeline Factory of Data Science, Amsterdam
December 6, 2016


# Who am I

- Finishing high-performance cluster monitoring tool for JVM based languages ( JNI, JVMTI, instrumentation )
- Finishing Master’s at Charles Uni in Prague
- Software engineer at H2O.ai - Core Sparkling Water
- Tea lover ( doesn’t mean I don’t like beer!)

# Distributed Sparkling Team

- Michal - Mt. View, CA
- Kuba - Prague, CZ
- Mateusz – Tokyo, JP
- Vlad - Mt. View, CA

# H2O+Spark = Sparkling Water

$H_2O$.ai

Machine Intelligence

# Sparkling Water

- Transparent integration of H2O with Spark ecosystem - MLlib and H2O side-by-side
- Transparent use of H2O data structures and algorithms with Spark API
- Platform for building Smarter Applications
- Excels in existing Spark workflows requiring advanced Machine Learning algorithms

**Functionality missing in H2O can be replaced by Spark and vice versa**

# Benefits


- **Additional algorithms**
  - **NLP**
- **Powerful data munging**
- **ML Pipelines**


- **Advanced algorithms**
  - **speed v. accuracy**
  - **advanced parameters**
- **Fully distributed and parallelised**
- **Graphical environment**
- **R/Python interface**

# How to use Sparkling Water?

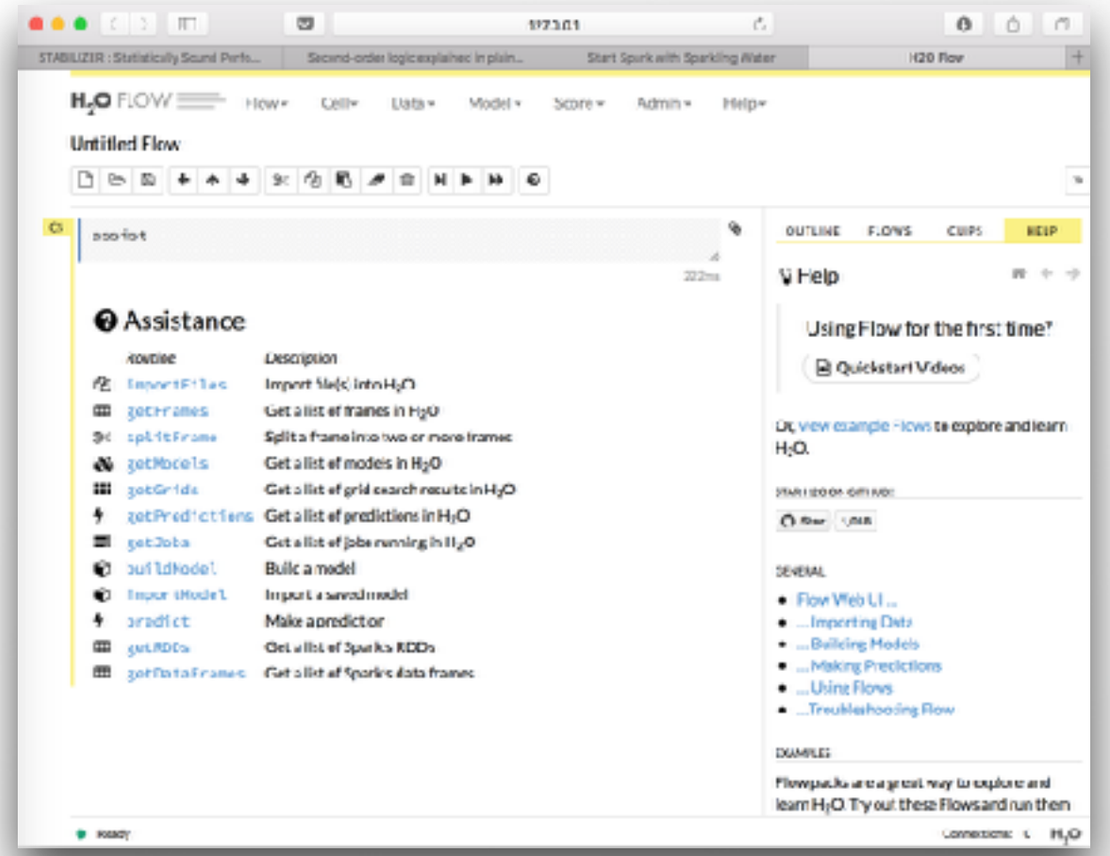
$H_2O$.ai

Machine Intelligence

# Start spark with Sparkling Water

start.sh — Raw

```
$SPARK_HOME/bin/spark-submit \
--class water.SparklingWaterDriver \
--packages ai.h2o:sparkling-water-examples_2.10:1.6.3 \
--executor-memory=6g \
--driver-class-path scalastyle.jar /dev/null
```

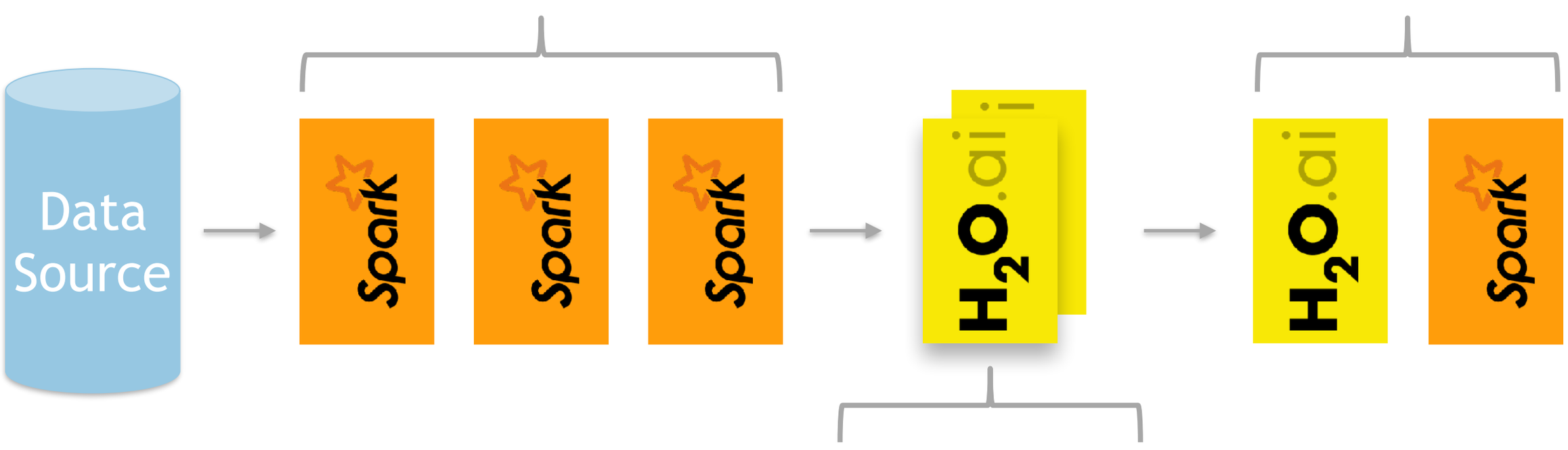


# Model Building

Data munging

Modelling

Prediction processing

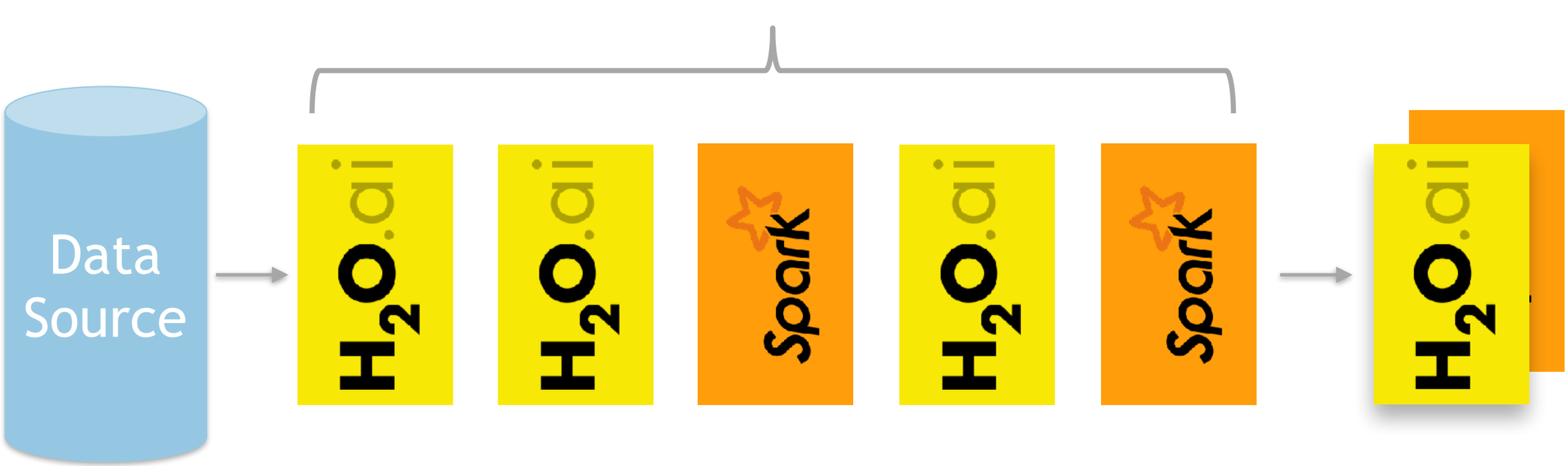



Deep Learning, GBM
DRF, GLM, GLRM
K-Means, PCA
CoxPH, Ensembles

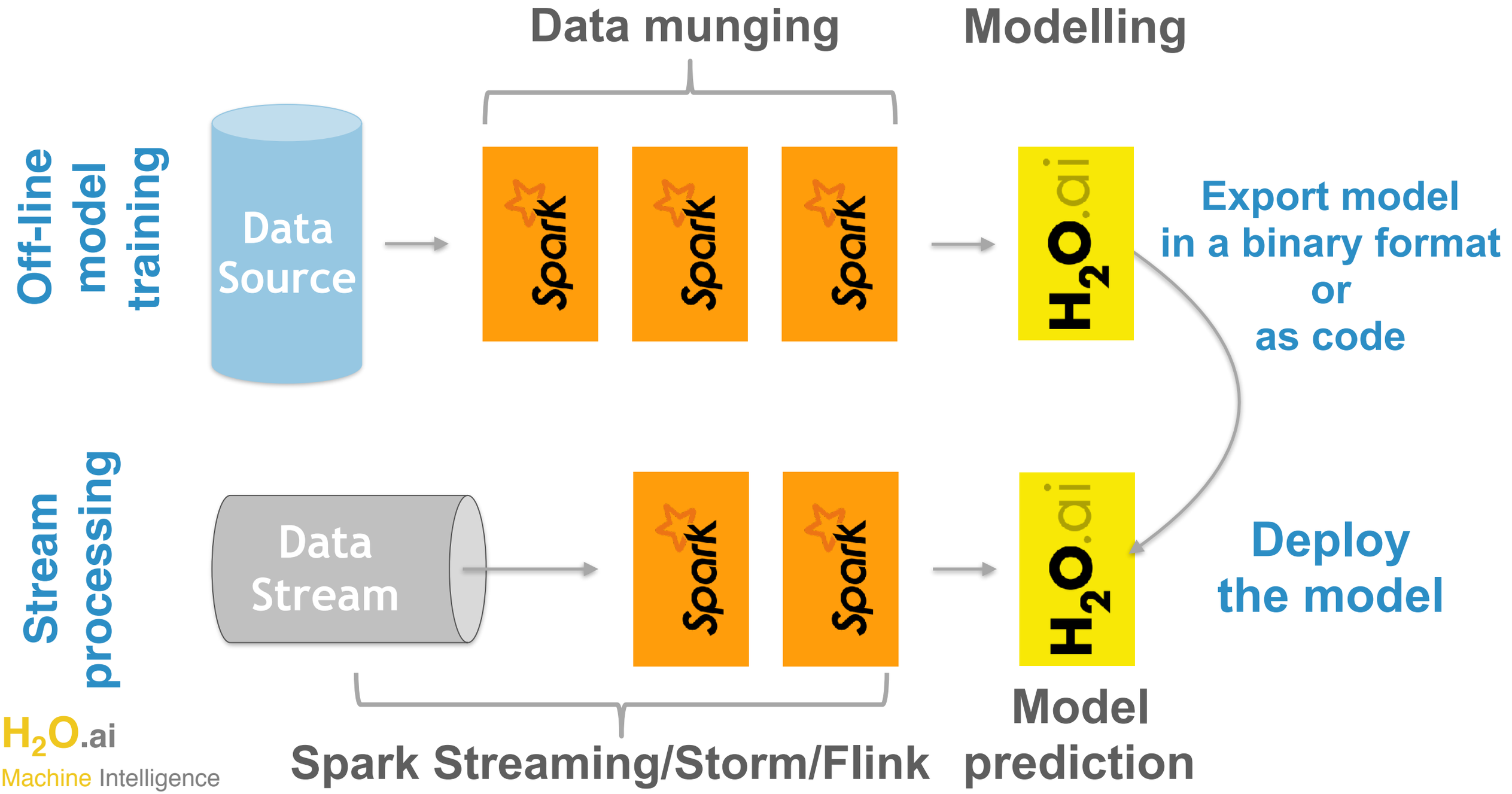
# Data Munging

**Data load/munging/ exploration**

**Modelling**



# Stream processing




H2O.ai
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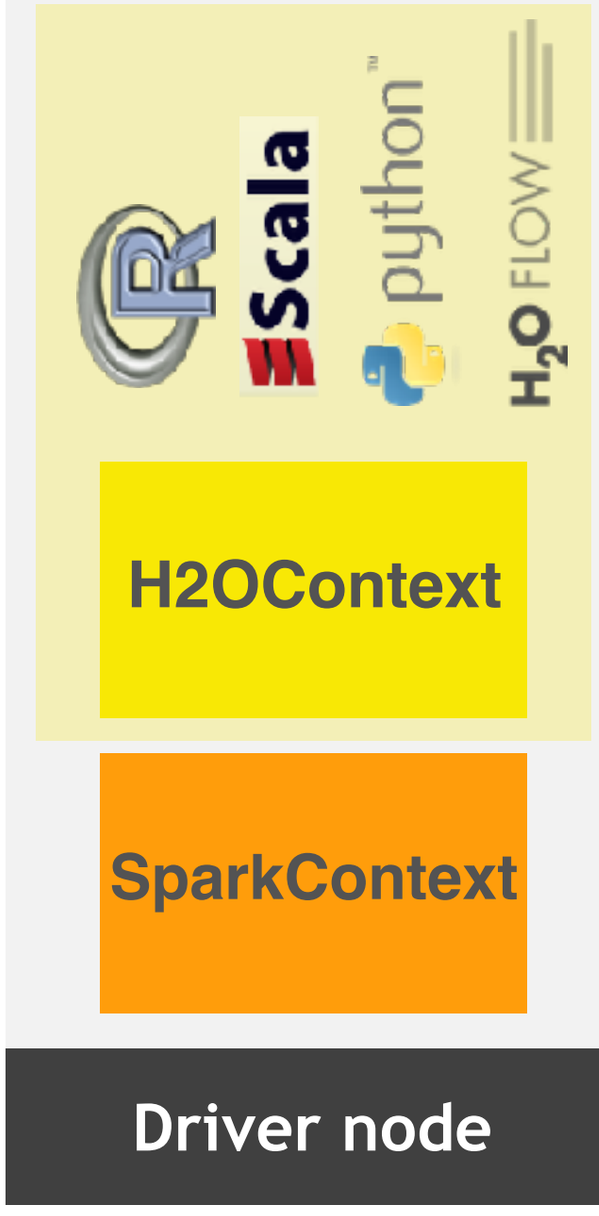
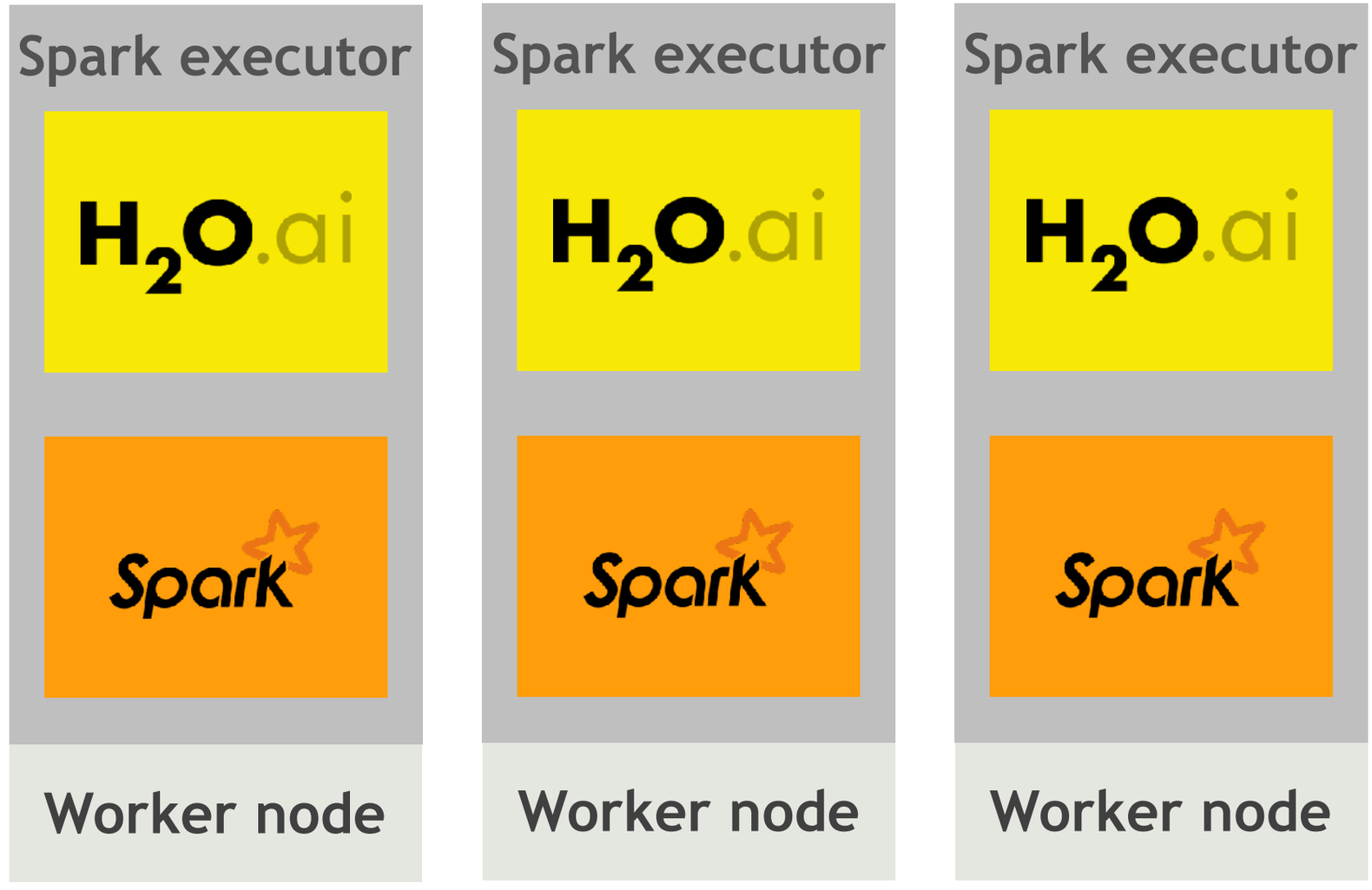
# What is inside?

Scala/Py main program

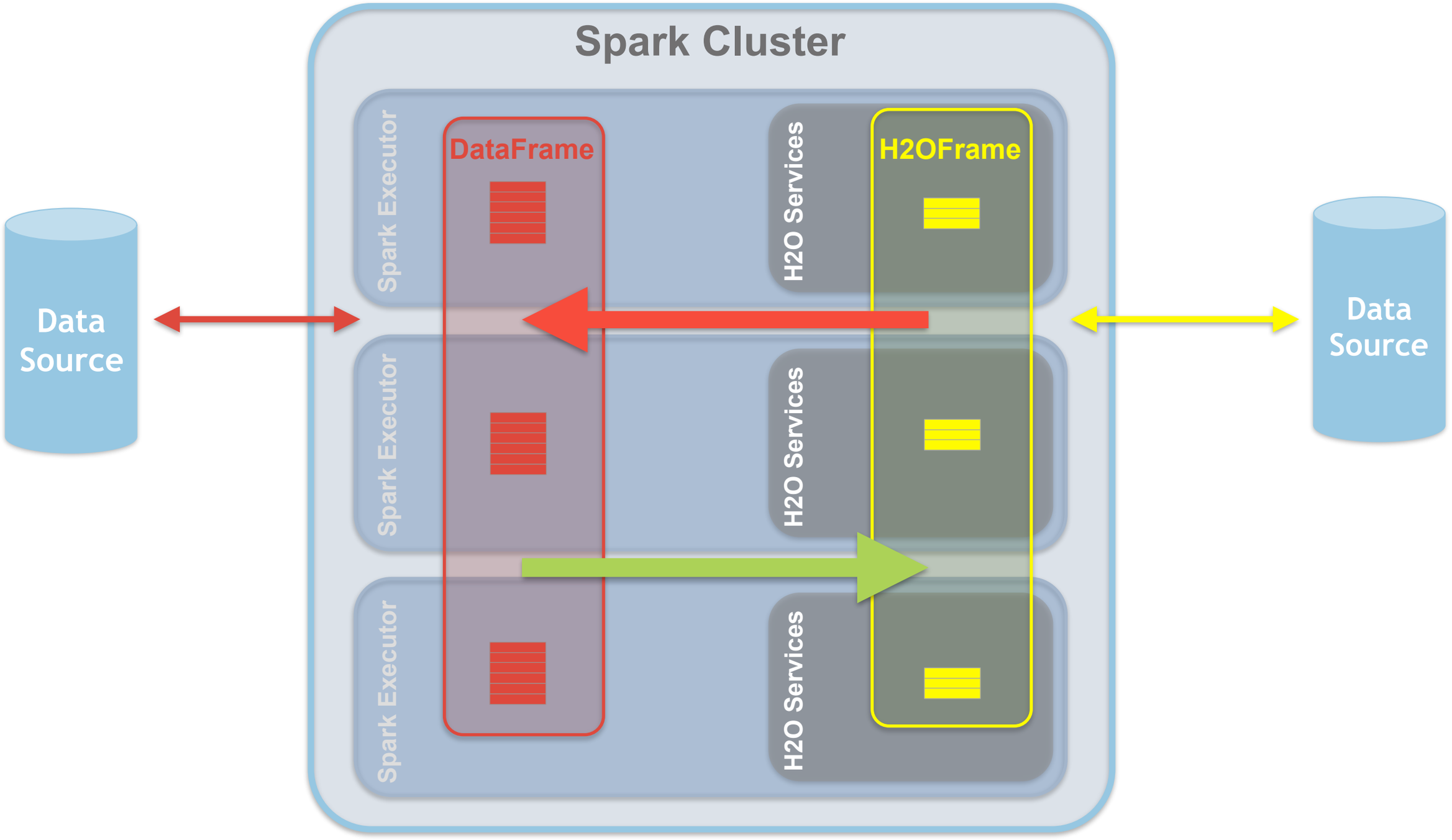



Spark + H2O

SPARKLING WATER



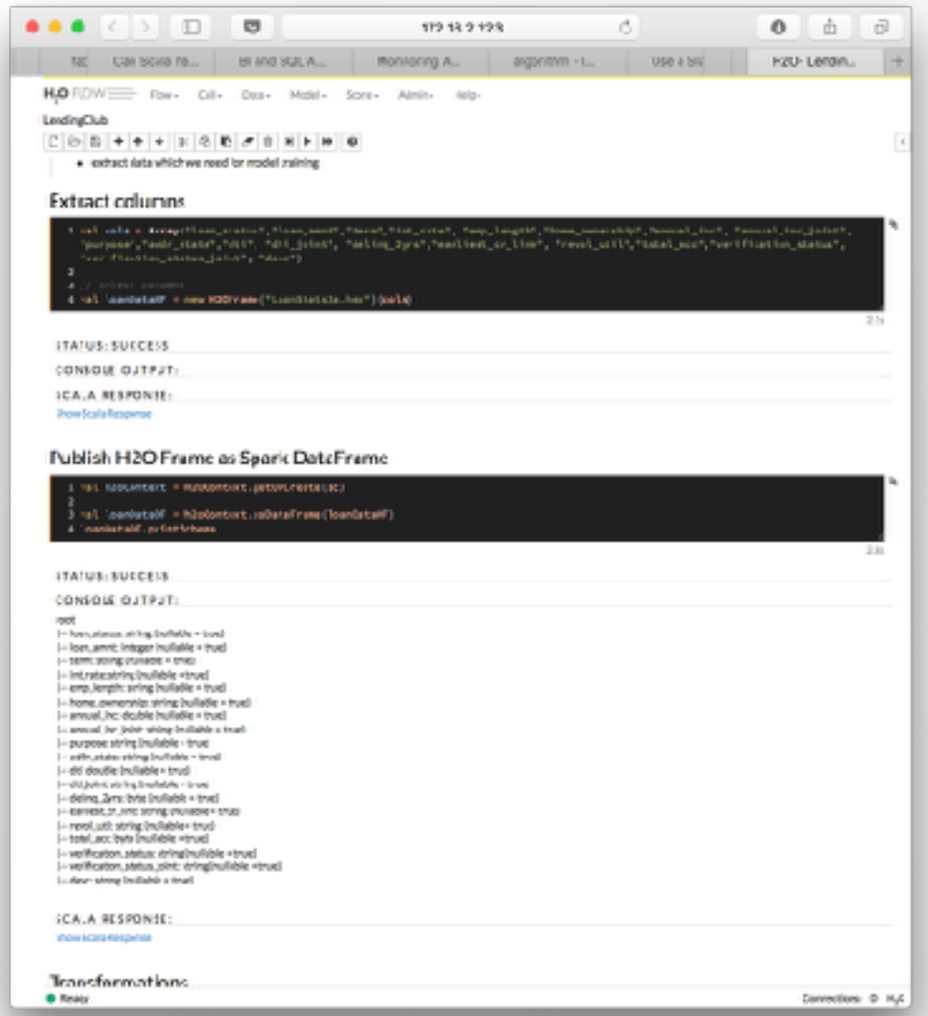

Cluster


Spark Cluster
Spark Executor
DataFrame
H2O Services
H2OFrame
Spark Executor
H2O Services
Spark Executor
H2O Services
Data Source
Data Source
h2oContext.asDataFrame
h2oContext.asH2OFrame

# New features, finally!

# Scala code in H2O Flow

- New type of cell
- Access Spark from Flow UI
- Experimenting made easy



# H2O Frame as Spark's Datasource

- Use native Spark API to load and save data
- Spark can optimise the queries when loading data from H2O Frame
- Use of Spark query optimiser
- Let's see it in practise!

# Machine learning pipelines

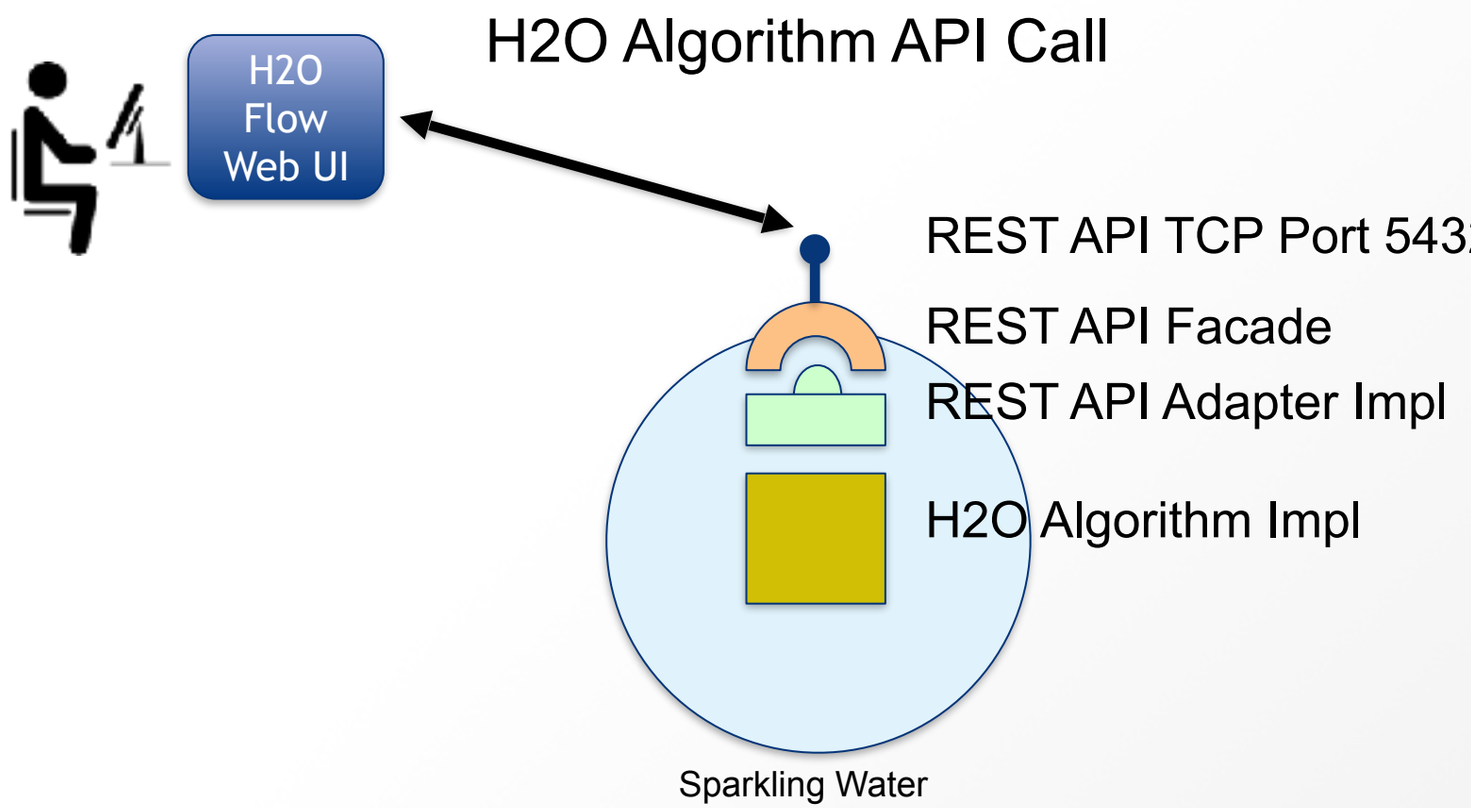
- Wrap our algorithms as Transformers and Estimators
- Support for embedding them into Spark ML Pipelines
- Can serialise fitted/unfitted pipelines
- Unified API => Arguments are set in the same way for Spark and H2O Models

# MLlib Algorithms in Flow UI

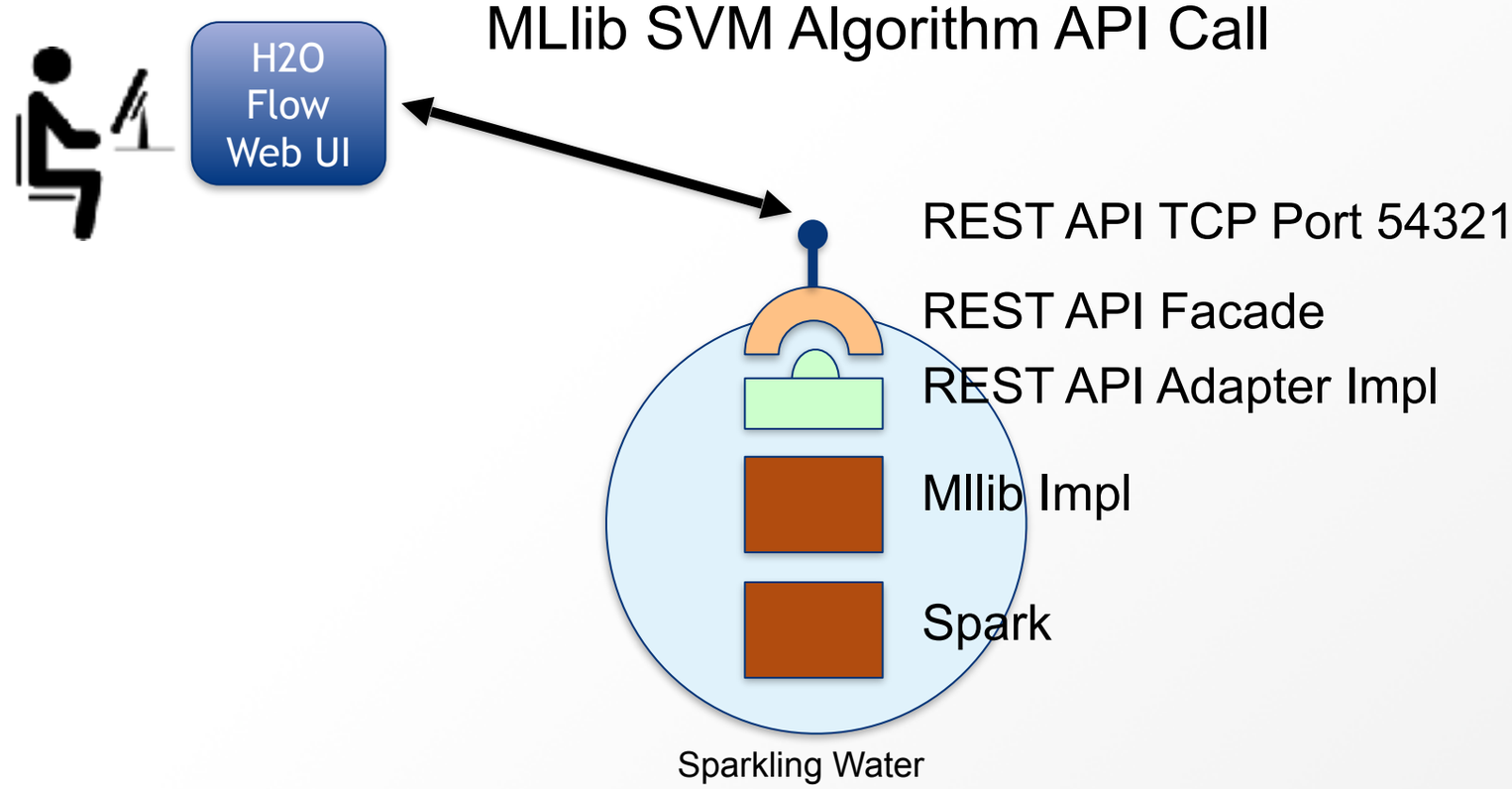
- Can examine them in H2O Flow
- Can generate POJO out of them

- Let’s see Support Vector Machines ( SVM )!

# H2O Algo from Flow



# Pure MLlib Algo from Flow



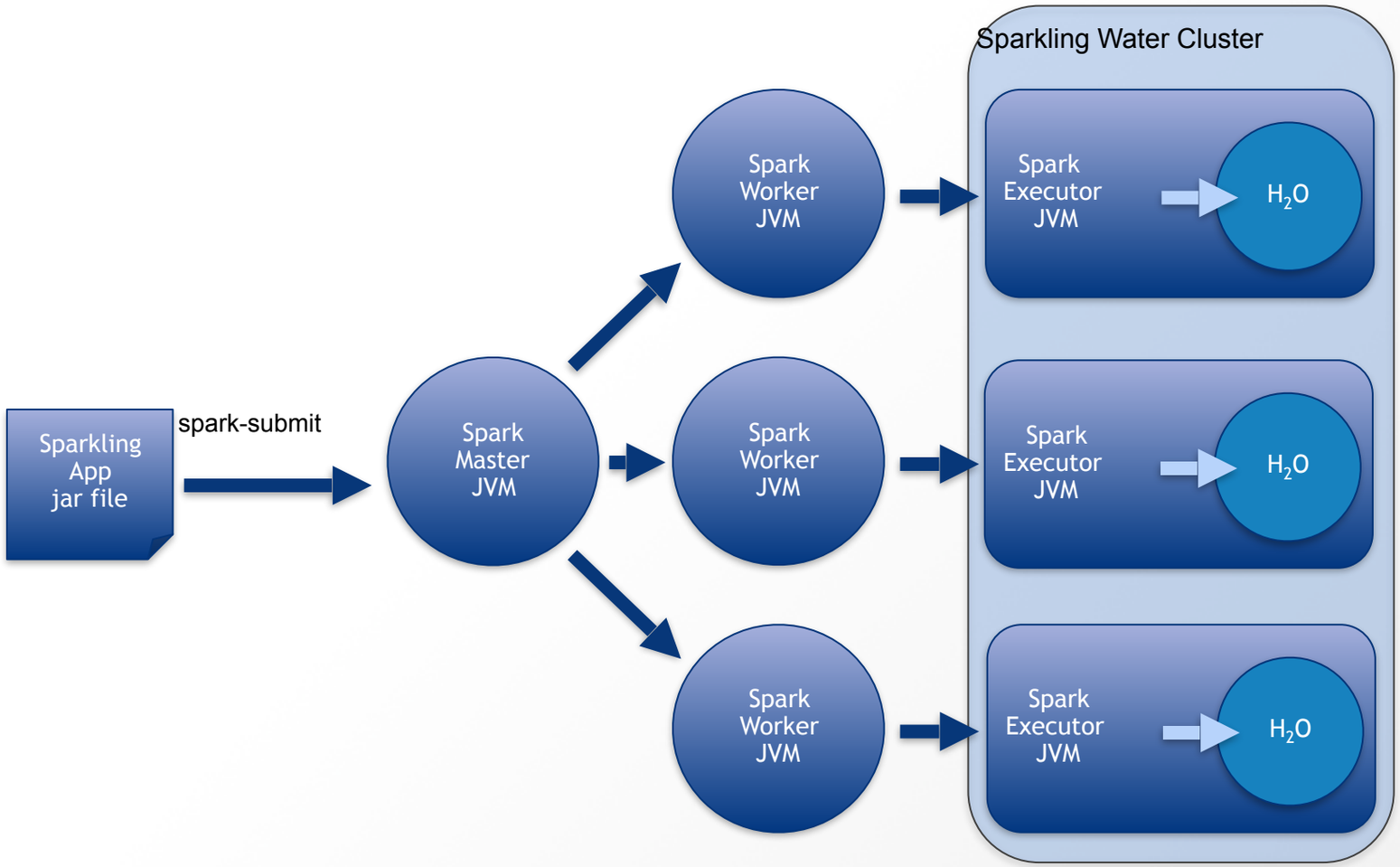
# PySparkling made easy

- PySparkling now in PyPi
- Contains all H2O and Sparkling Water dependencies, no need to worry about them
- Just add in on your Python path and that's it

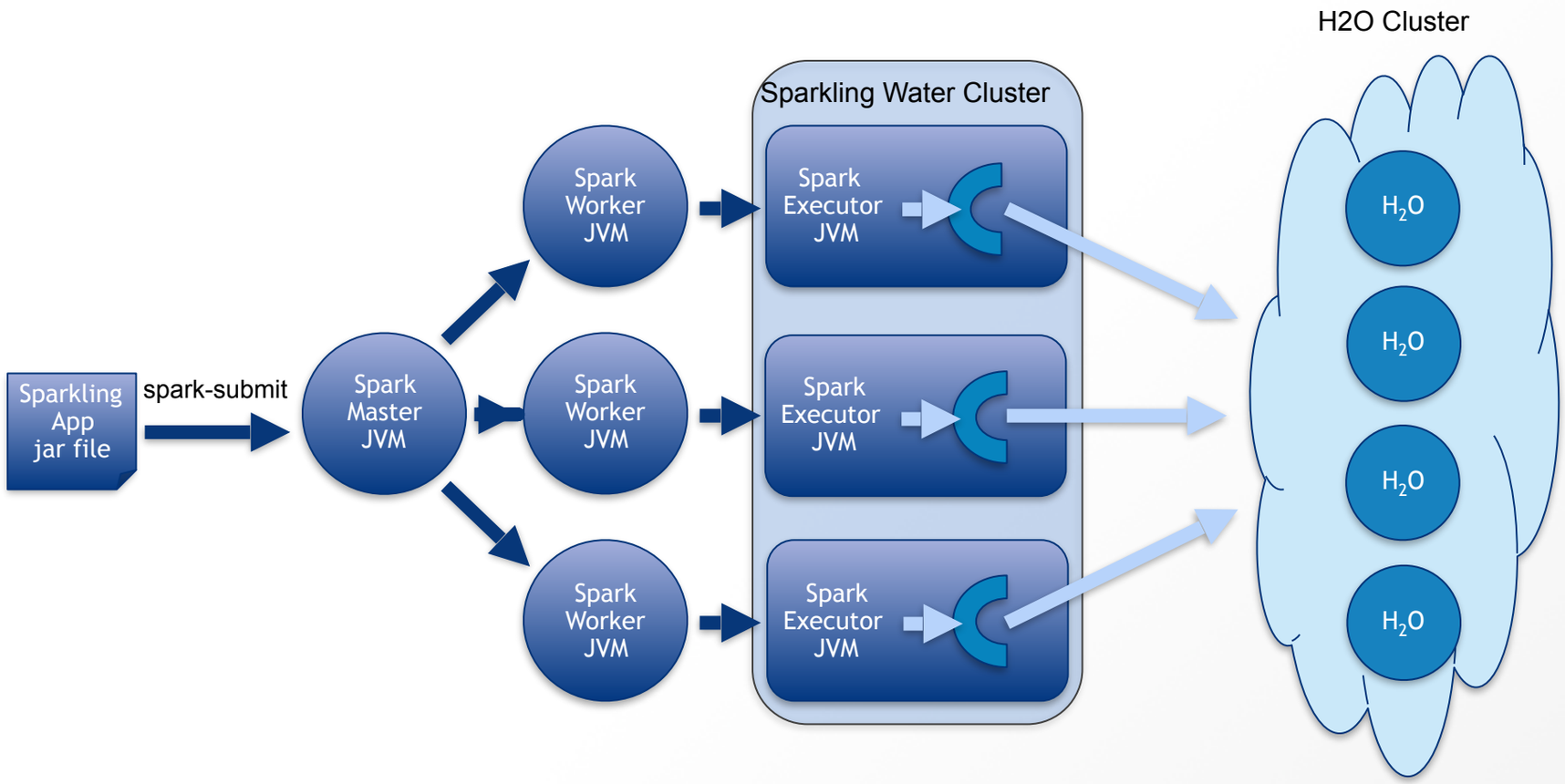
# Sparkling Water high-availability

- New solution
- Not yet in master, in testing phase
- Sparkling Water is using external H2O cluster instead of starting H2O in each executor
- Spark executors can come and go and H2O won't be affected
- Start H2O cluster on YARN automatically

# Sparkling Water Internal Backend



# Sparkling Water External Backend



# And others!

- Support for Datasets
- RSparkling
- Zeppelin notebook support
- Integration with TensorFlow ( via DeepWater)
- Support for high-cardinality fast joins
- Secure Communication - SSL
- Bug fixes..

# Coming features

- Support for more MLlib algorithms in Flow
- Python cell in the H2O Flow
- Integration with Steam
- ...

# More info

## Checkout H2O.ai Training Books

http://h2o.ai/resources

## Checkout H2O.ai Blog

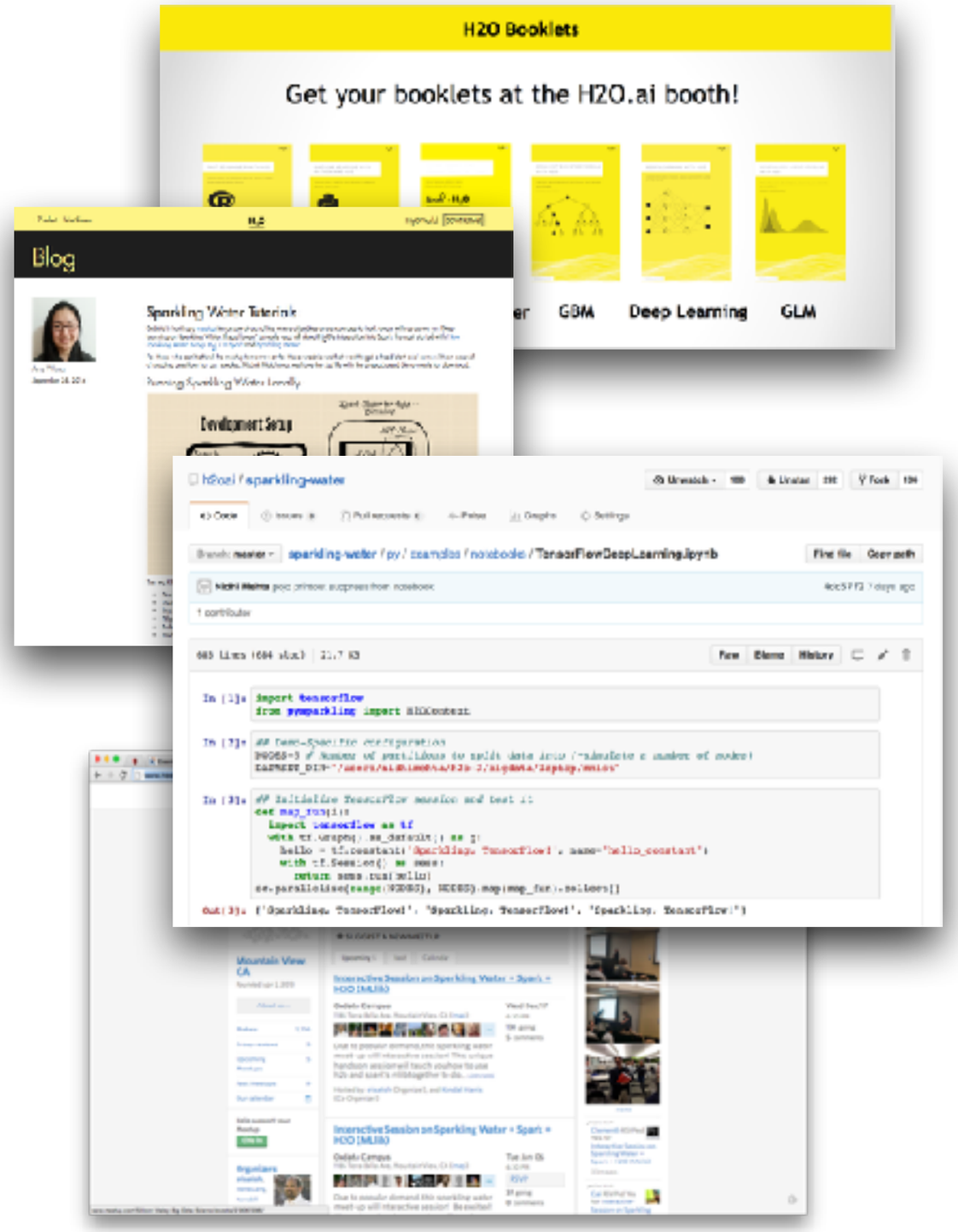
http://h2o.ai/blog/

## Checkout H2O.ai Youtube Channel

https://www.youtube.com/user/0xdata

## Checkout GitHub

https://github.com/h2oai/sparkling-water

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# Thank you!

**Sparkling Water is open-source ML application platform combining power of Spark and H2O**


**Learn more at h2o.ai**
**Follow us at @h2oai**