

PowerStream: Propelling Energy Innovation with Predictive Analytics

Nikita Shamgunov, CTO



Topics

- Renewable Energy
- PowerStream
- Demo
- Q&A

Renewable Energy in the News

Germany Just Got Almost All of Its Power From Renewable Energy

May 15, 2016

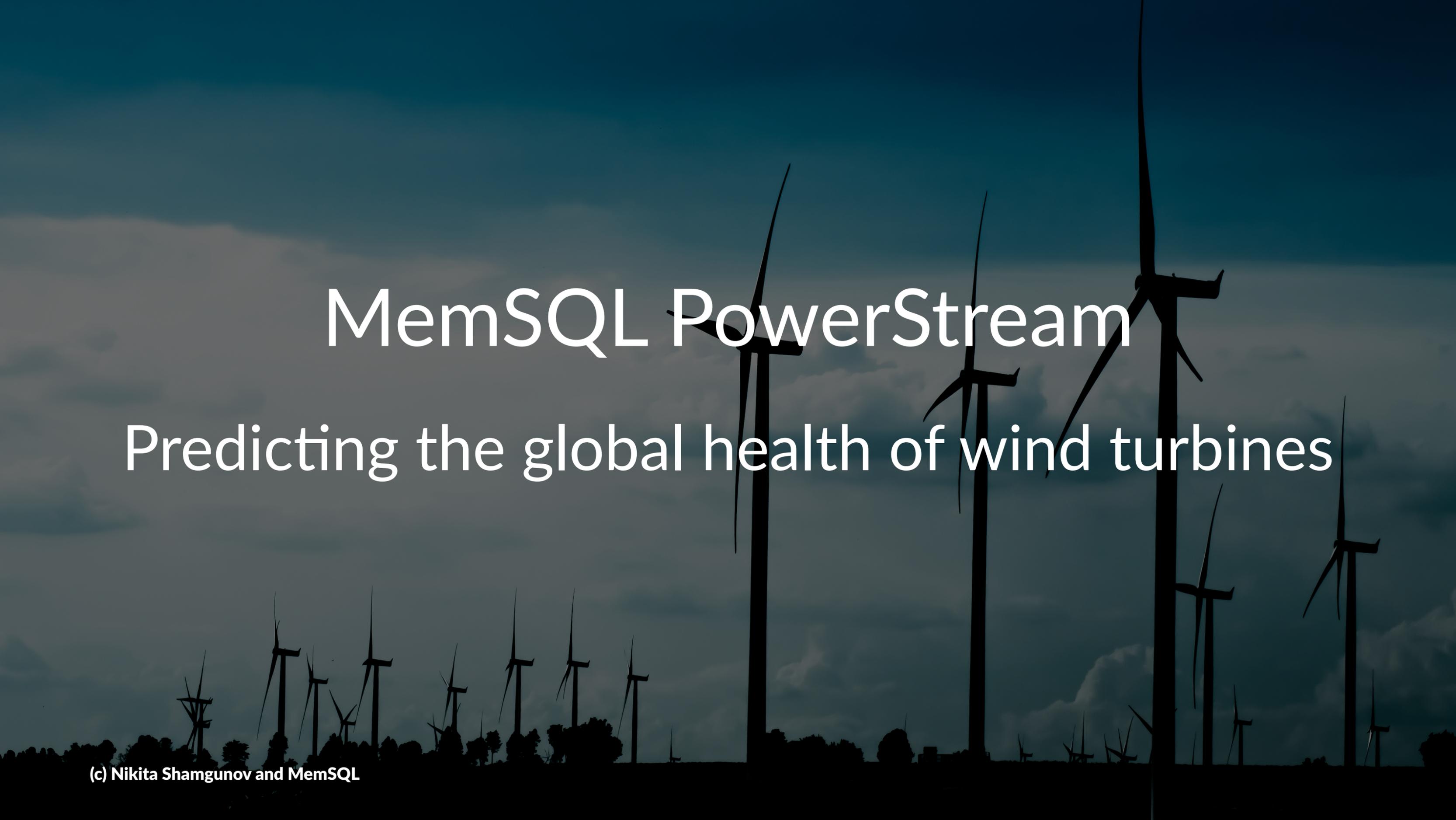
Bloomberg: <http://www.bloomberg.com/news/articles/2016-05-16/germany-just-got-almost-all-of-its-power-from-renewable-energy>



Investment in renewables reached **\$286 billion** worldwide in 2015

BBC: <http://www.bbc.com/news/science-environment-36420750>

Introducing PowerStream

The background of the slide features a series of wind turbine silhouettes against a dark, teal-colored sky with some light clouds. The turbines are arranged in a line across the horizon, with some appearing larger and more prominent than others, creating a sense of depth and scale.

MemSQL PowerStream

Predicting the global health of wind turbines

MemSQL PowerStream

197,000 wind turbines around the world

Wind Turbine

Wind Farm





1 to 2 million data points per second
with MemSQL *Streamliner*



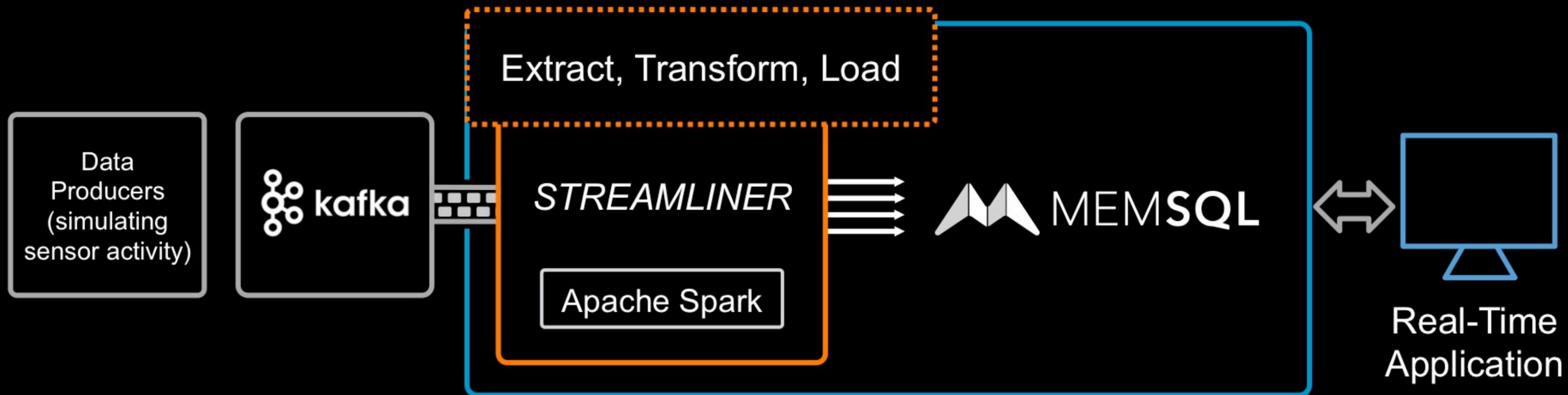
MemSQL PowerStream

Internet-of-Things simulation depicting health of wind turbines globally.

7 machines - AWS C4-2X large instances, at **\$0.311** per hour per machine, annual cost ~ **\$19,000**.



Streamliner Architecture for PowerStream



Visualizing data from **2 million sensors** and **197,000 wind turbines** from around the world. All data generated in real time by MemSQL.

Writes / Second **1.1M**

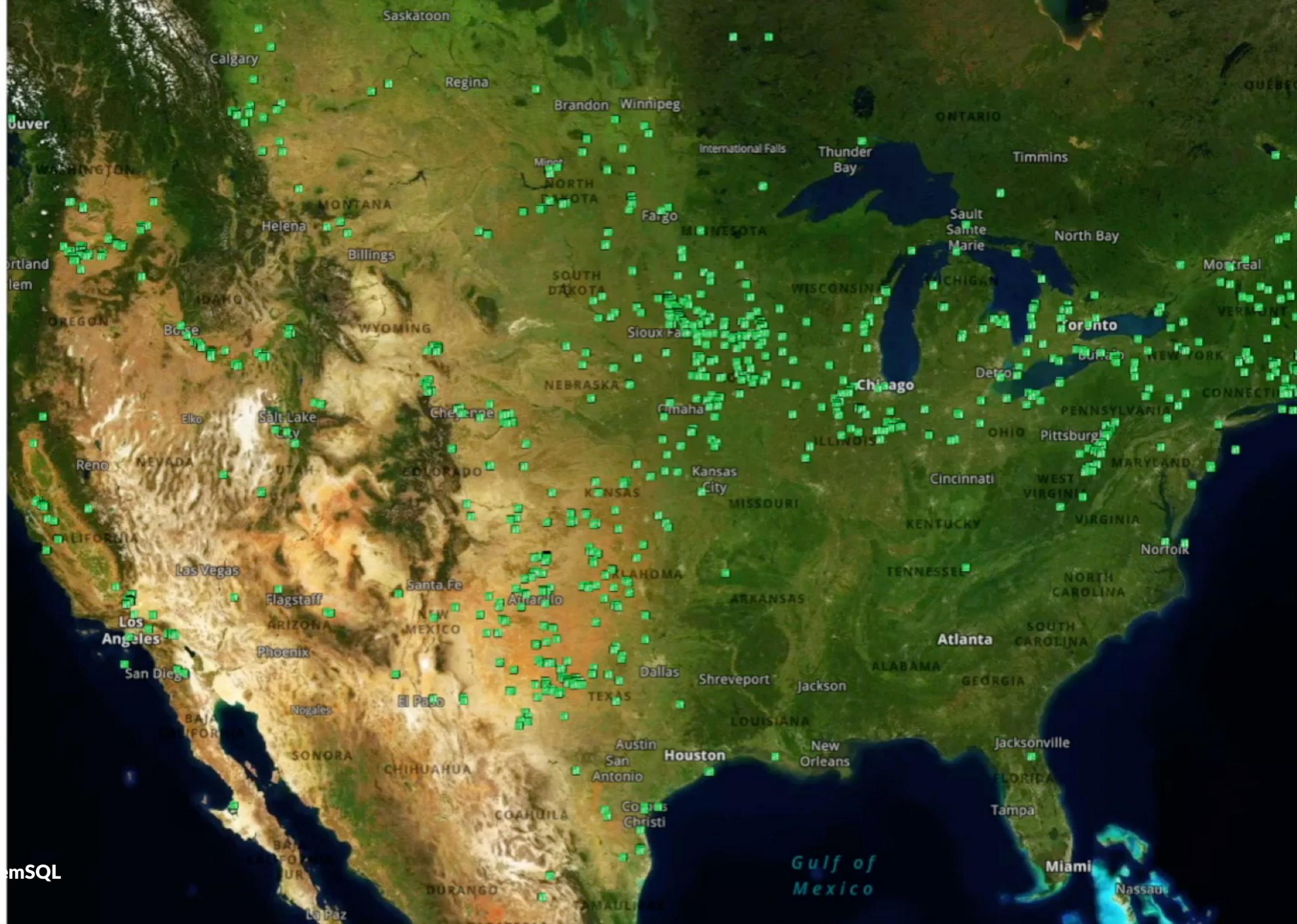
Reads / Second **198K**

Windfarm Sensor Breakdown



Alerts

- Windfarm in Germany/Nordrhein-Westfalen/Steinfurt
- Windfarm in Germany/Sachsen-Anhalt
- Windfarm in Germany/Niedersachsen/Salzgitter
- Windfarm in Germany/Schleswig-Holstein/Wiemersdorf
- Windfarm in Germany/Niedersachsen
- Windfarm in Germany/Sachsen-Anhalt/Aschersleben
- Windfarm in Germany/Sachsen
- Windfarm in Germany/Schleswig-Holstein
- Windfarm in Germany/Nordrhein-Westfalen/Rüthen
- Windfarm in Germany/Baden-Württemberg



Visualizing data from **2 million sensors** and **197,000 wind turbines** from around the world. All data generated in real time by [MemSQL](#).

Writes / Second **2M**

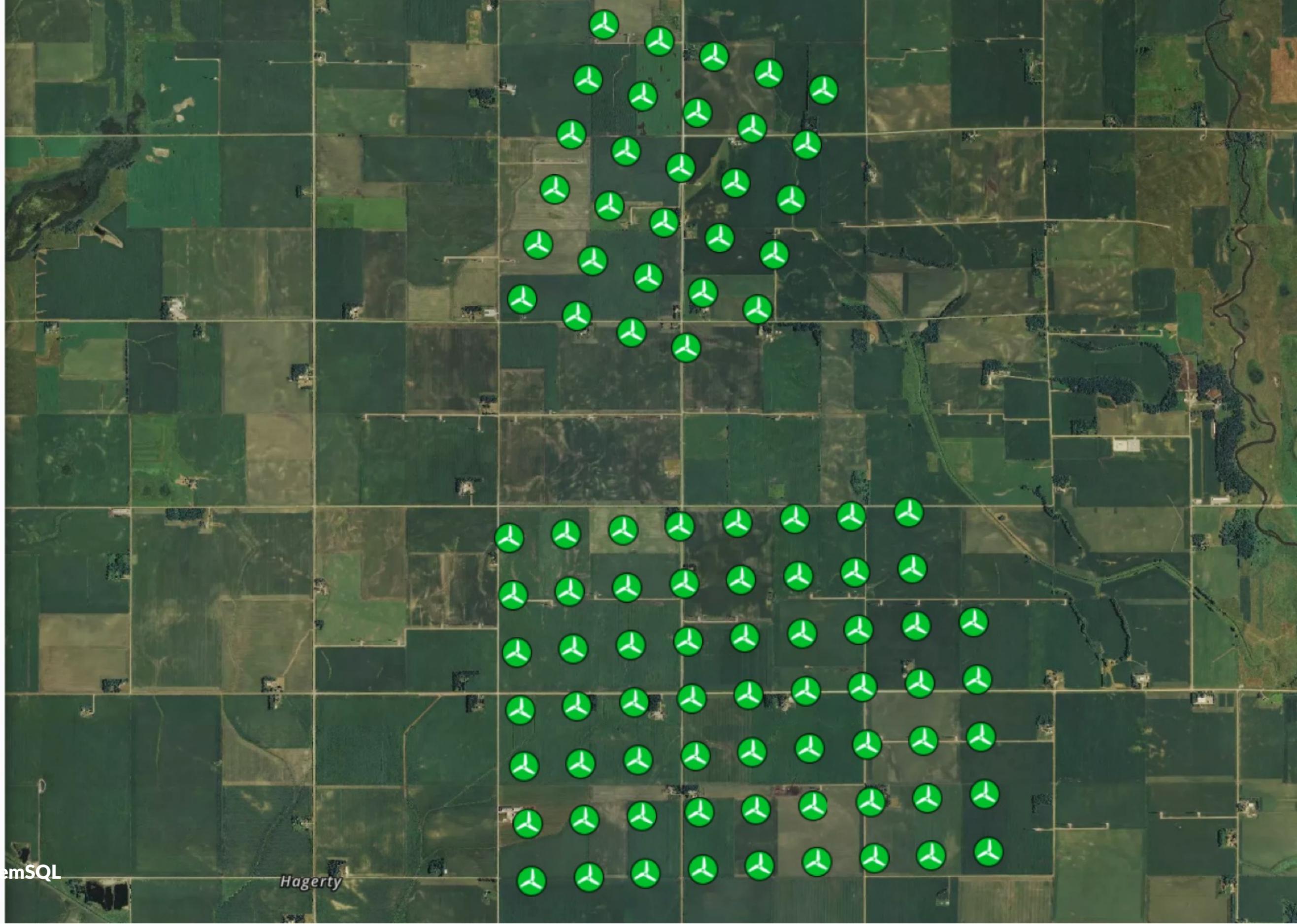
Reads / Second **2K**

Turbine Sensor Breakdown

 90  0

Alerts

- Windfarm in Germany/Nordrhein-Westfalen/Steinfurt
- Windfarm in Germany/Sachsen-Anhalt
- Windfarm in Germany/Niedersachsen/Salzgitter
- Windfarm in Germany/Schleswig-Holstein/Wiemersdorf
- Windfarm in Germany/Niedersachsen
- Windfarm in Germany/Sachsen-Anhalt/Aschersleben
- Windfarm in Germany/Sachsen
- Windfarm in Germany/Schleswig-Holstein
- Windfarm in Germany/Nordrhein-Westfalen/Rüthen
- Windfarm in Germany/Baden-Württemberg

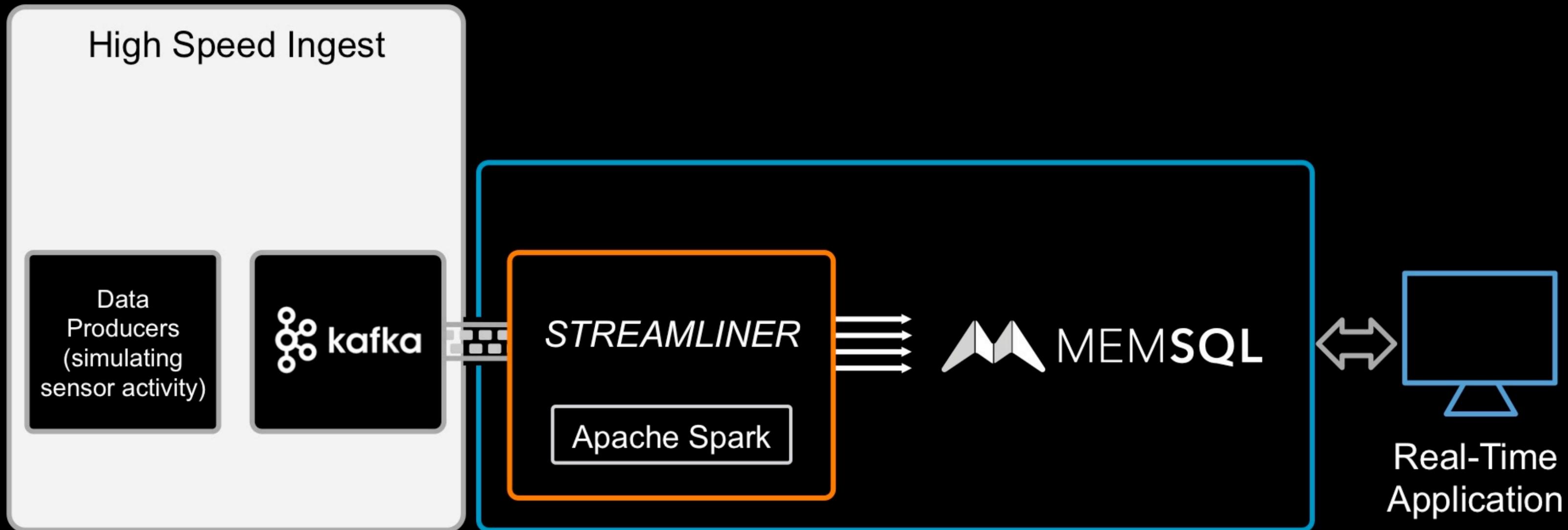


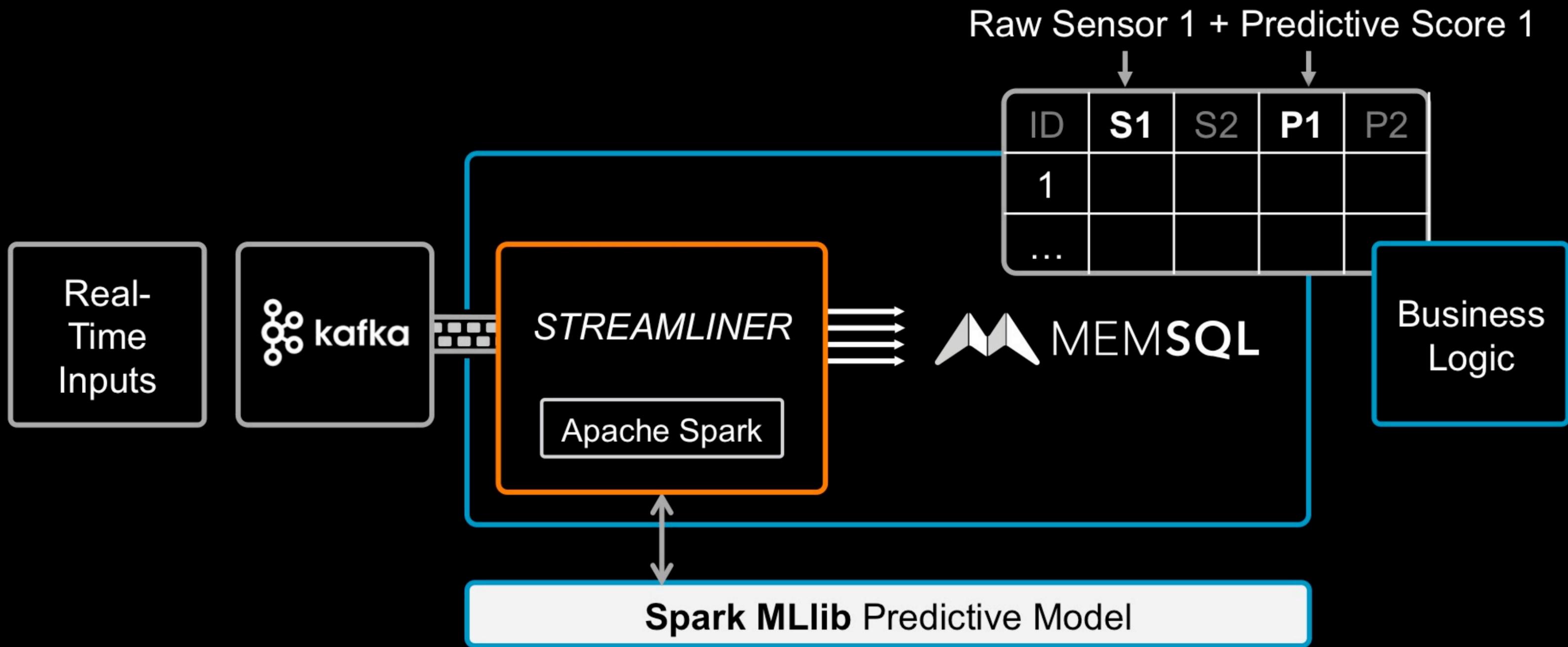
Demo Sequence

- Part I
 - High Speed Ingest
 - Predictive Analytics
 - Business Intelligence
- Part II
 - Spark SQL Pushdowns

MemSQL and Spark Real-time application

Demo part I



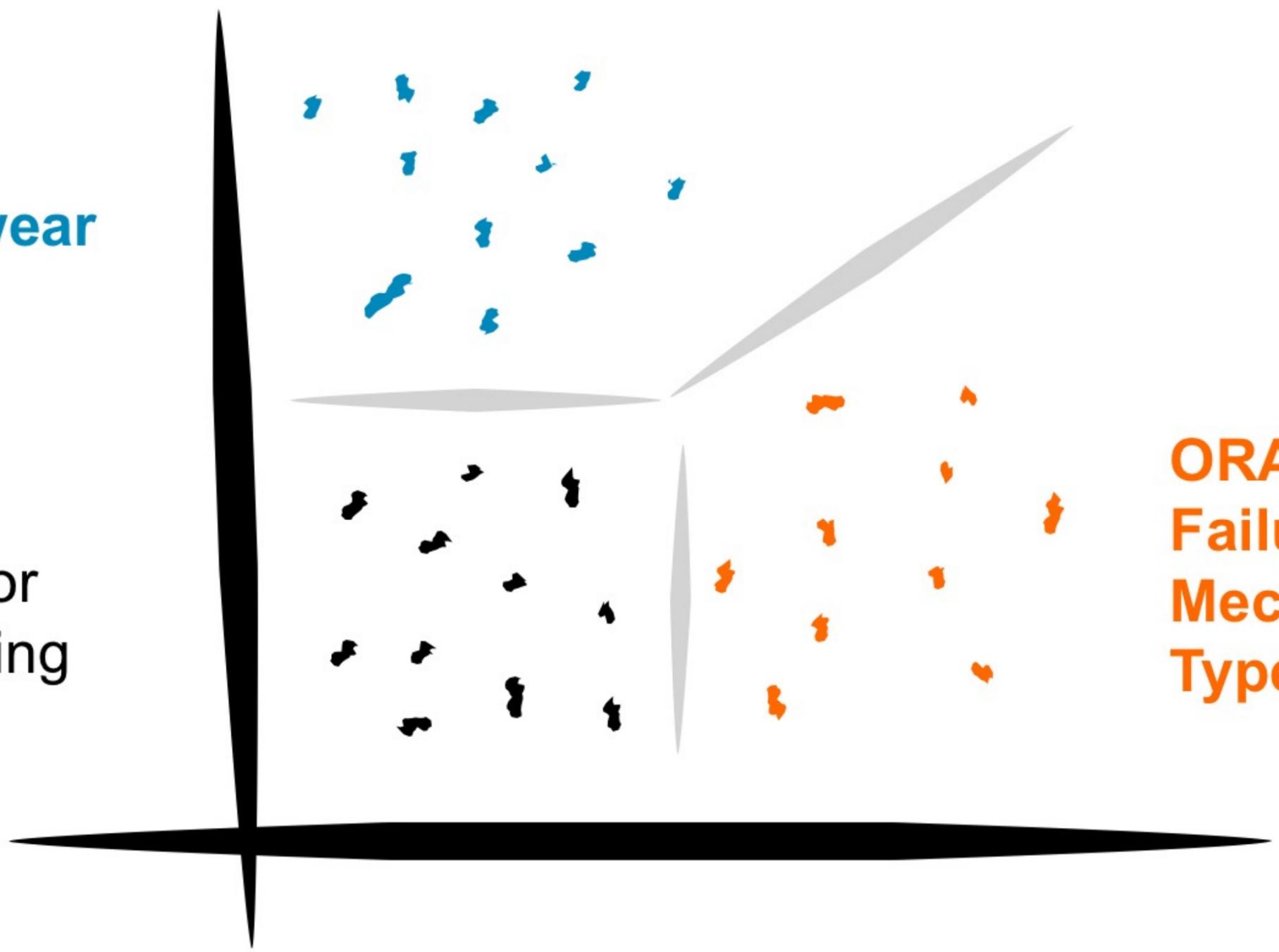


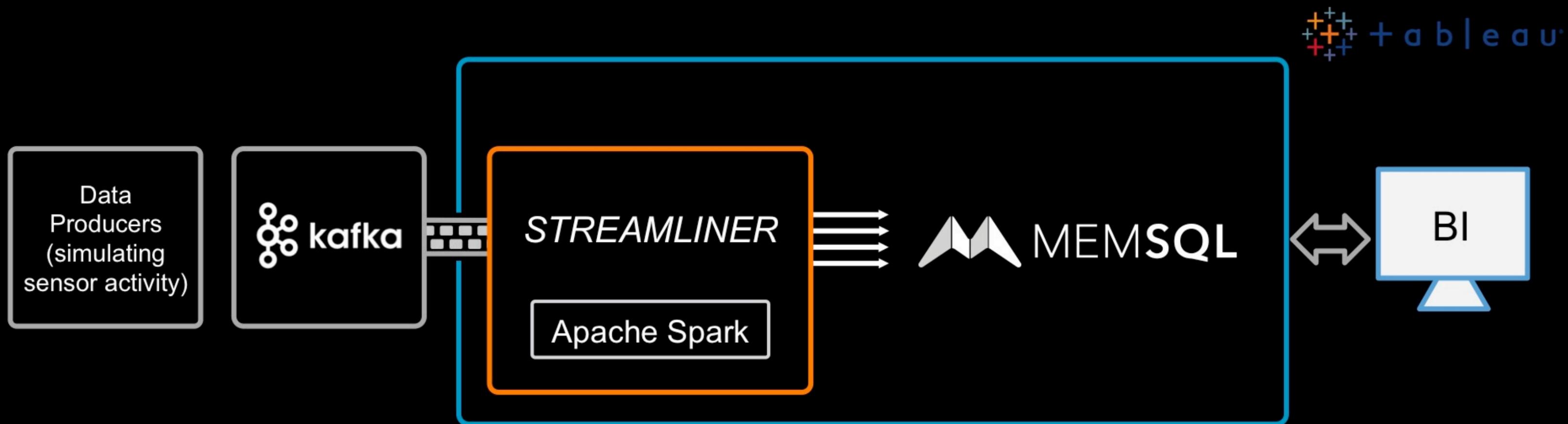
Classification

BLUE
Failure
Mechanical wear
Type 1

BLACK
training data for
turbine operating
normally

ORANGE
Failure
Mechanical wear
Type 2

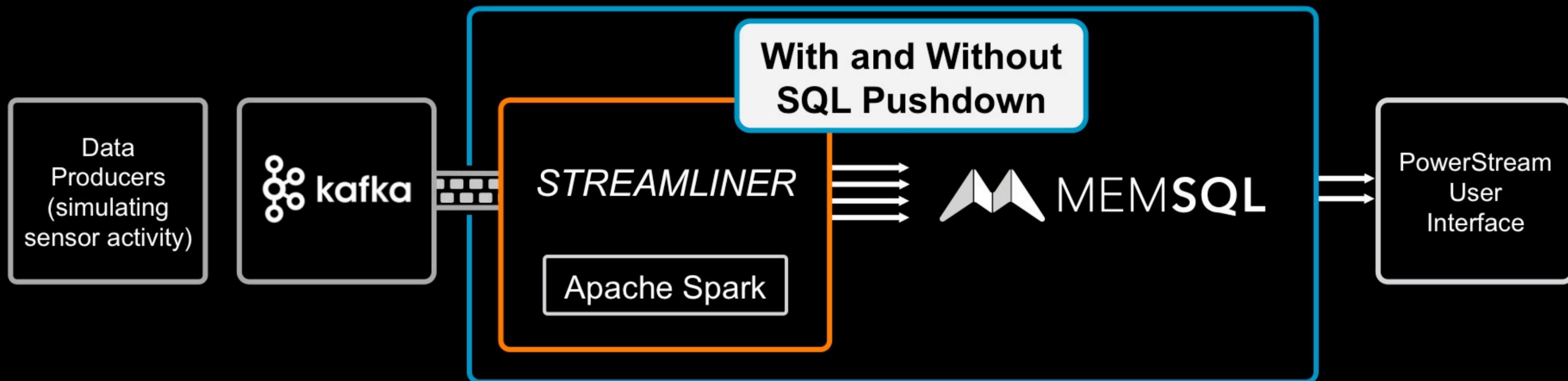




Demo Part I

MemSQL and Spark Better together

Demo part II

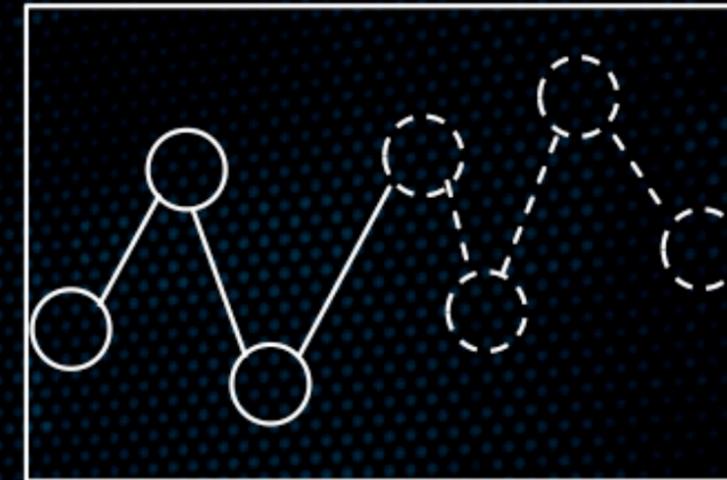
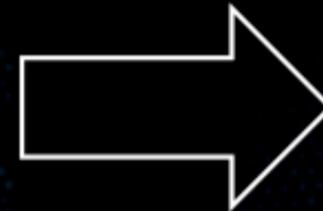
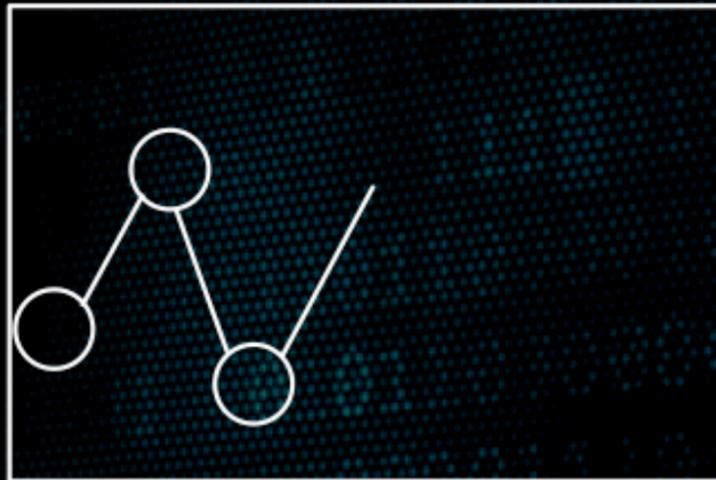


SQL Pushdown

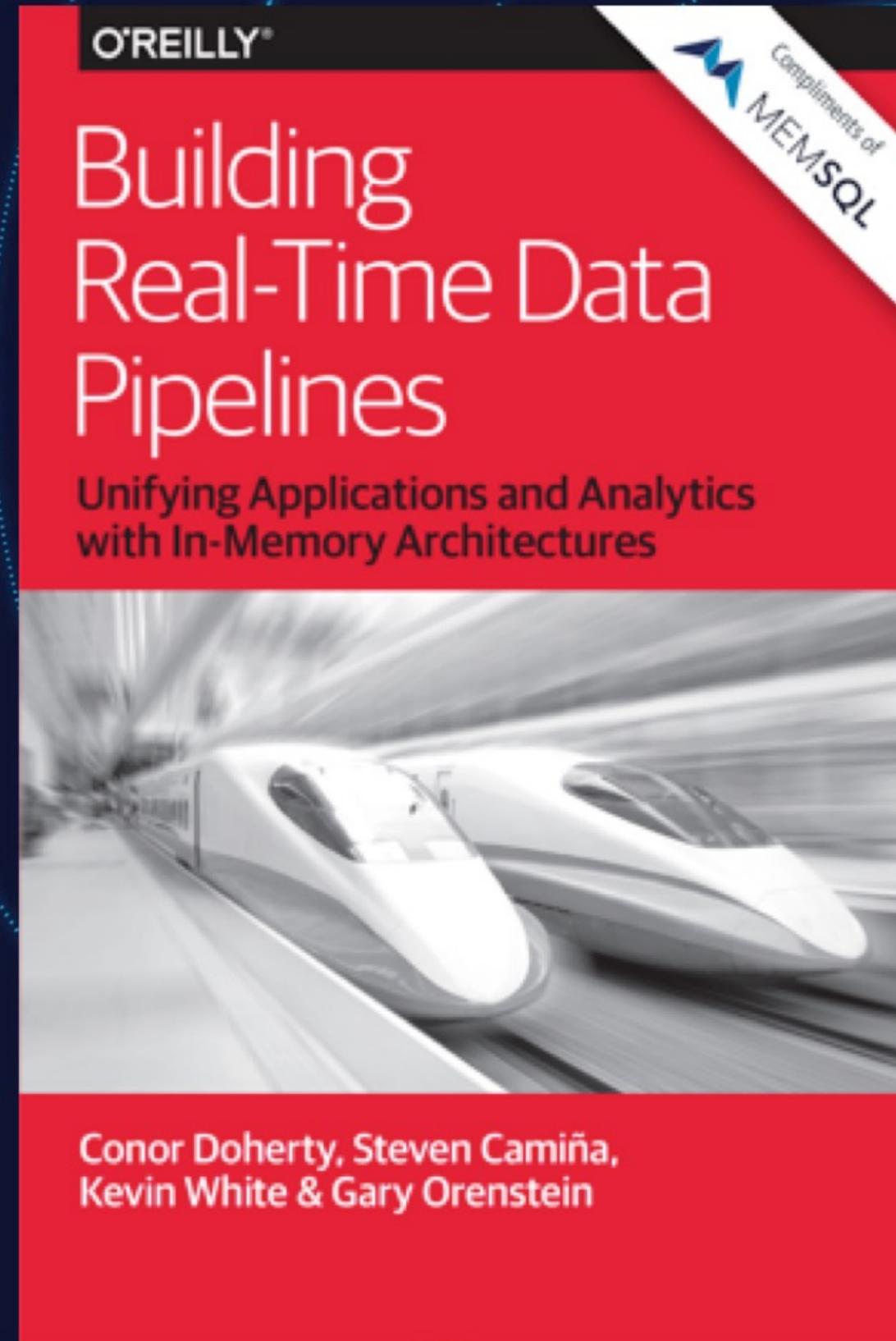
- Delegate SQL query processing to a database
- Enhance speed and concurrency
- Complement other Spark capabilities
- Use Spark as a high level interface
- Command line example with and without pushdown

Demo Part II

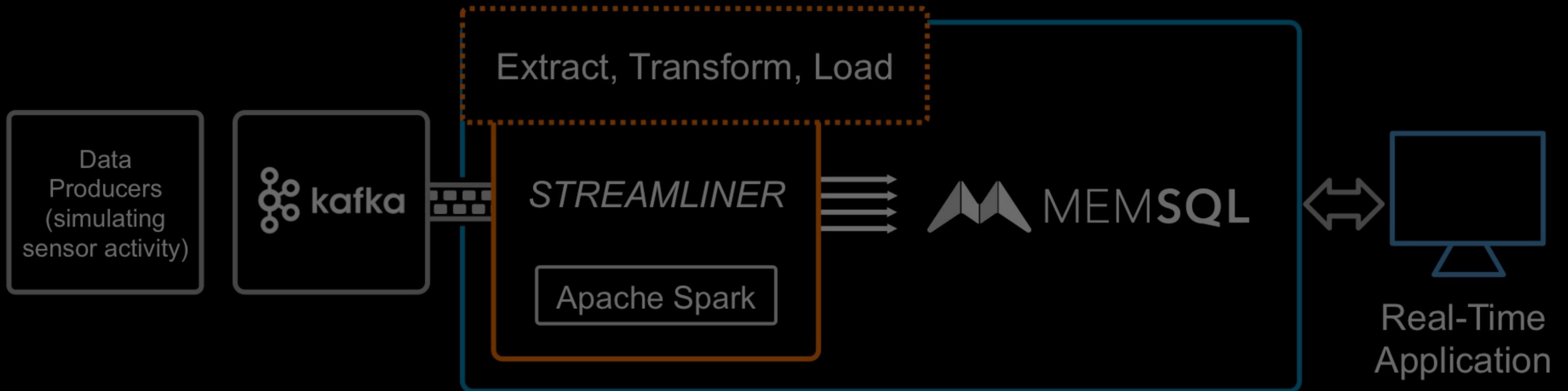
From a Real-Time Dashboard to Predictive Applications



Get the blueprint



Questions and answers



THANK YOU.

@nikitashamgunov

