Streaming Data Concepts

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Recap

- 5 V's of Big Data
    - Volume
    - Variety
    - Velocity
    - Veracity (Variability)
    - Value
- Understanding of the Big Data pipeline and basics of handling Big Data
    - Databases/Data Lakes/Data Warehouses/etc.
    - Hadoop
    - Spark
- Modeling data
    - Machine learning algorithms
    - Tuning and testing models

Now: Common issues seen on data with velocity

Batch data

Batch data

- data that updates only at certain times
- can often be much larger in volume

Example: Update to a database at the end of each hour/day

- update inventory status
- update employee time/roster
- update electricity usage and populate/send bills

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- temperature sensors
- customers using a web app
- in-game player activity/clicks
- financial trading

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- data that is generated over time (usually continuously)
- often small amounts of data with high velocity

Commonly a stream of logs that record events

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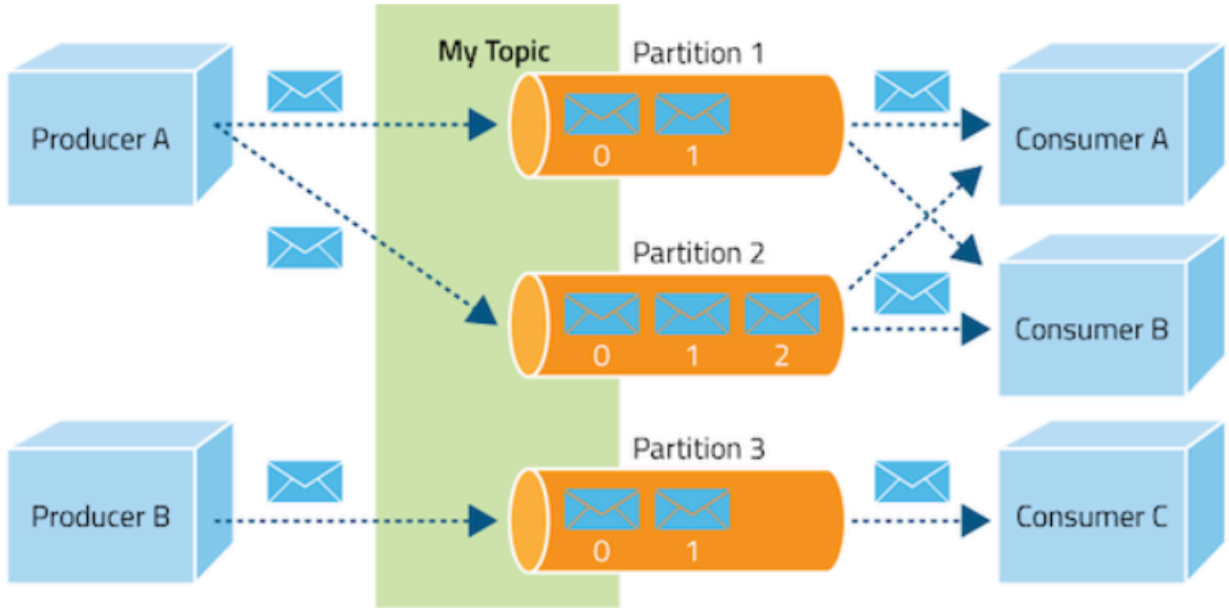
- customers using a web app
- in-game player activity/clicks
- financial trading

Data streams often in an unstructured or semi-structured format

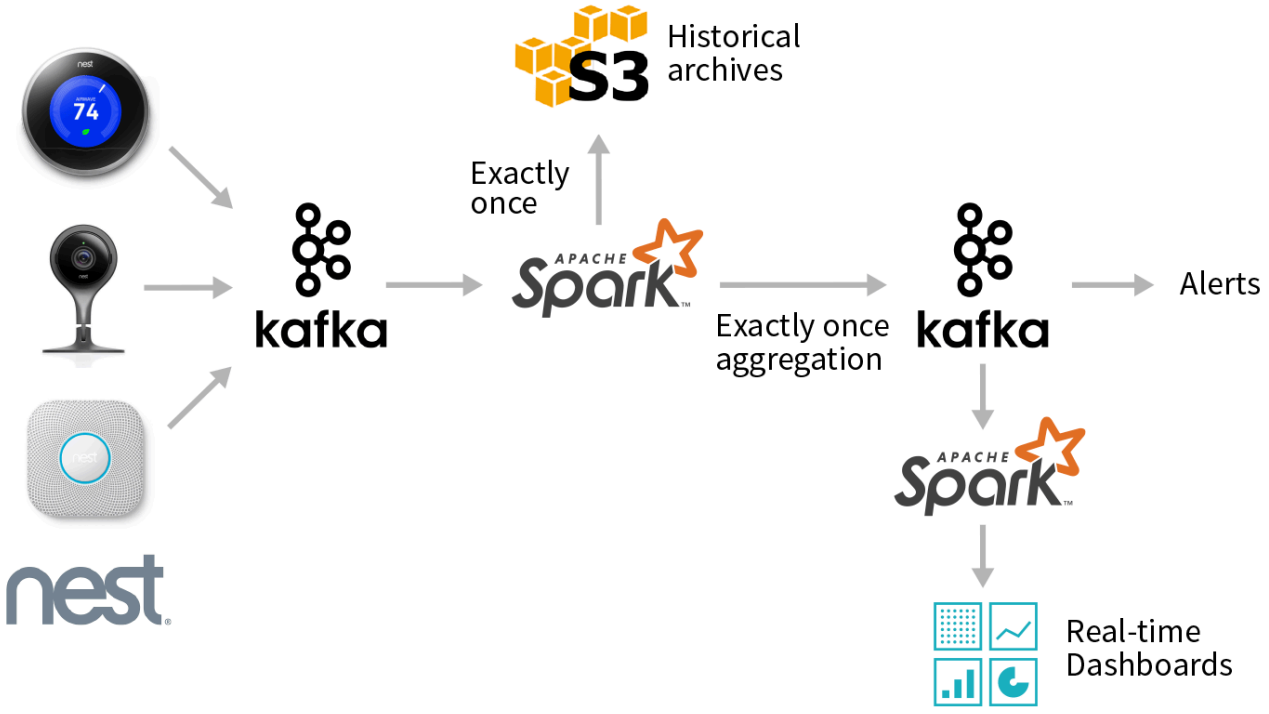
- JSON data or XML key-value pairs

Data Producers and Consumers



https://docs.cloudera.com/documentation/kafka/1-2-x/topics/kafka.html

Example Streaming Setup



https://databricks.com/blog/2017/04/26/processing-data-in-apache-kafka-with-structured-streaming-in-apache-spark-2-2.html

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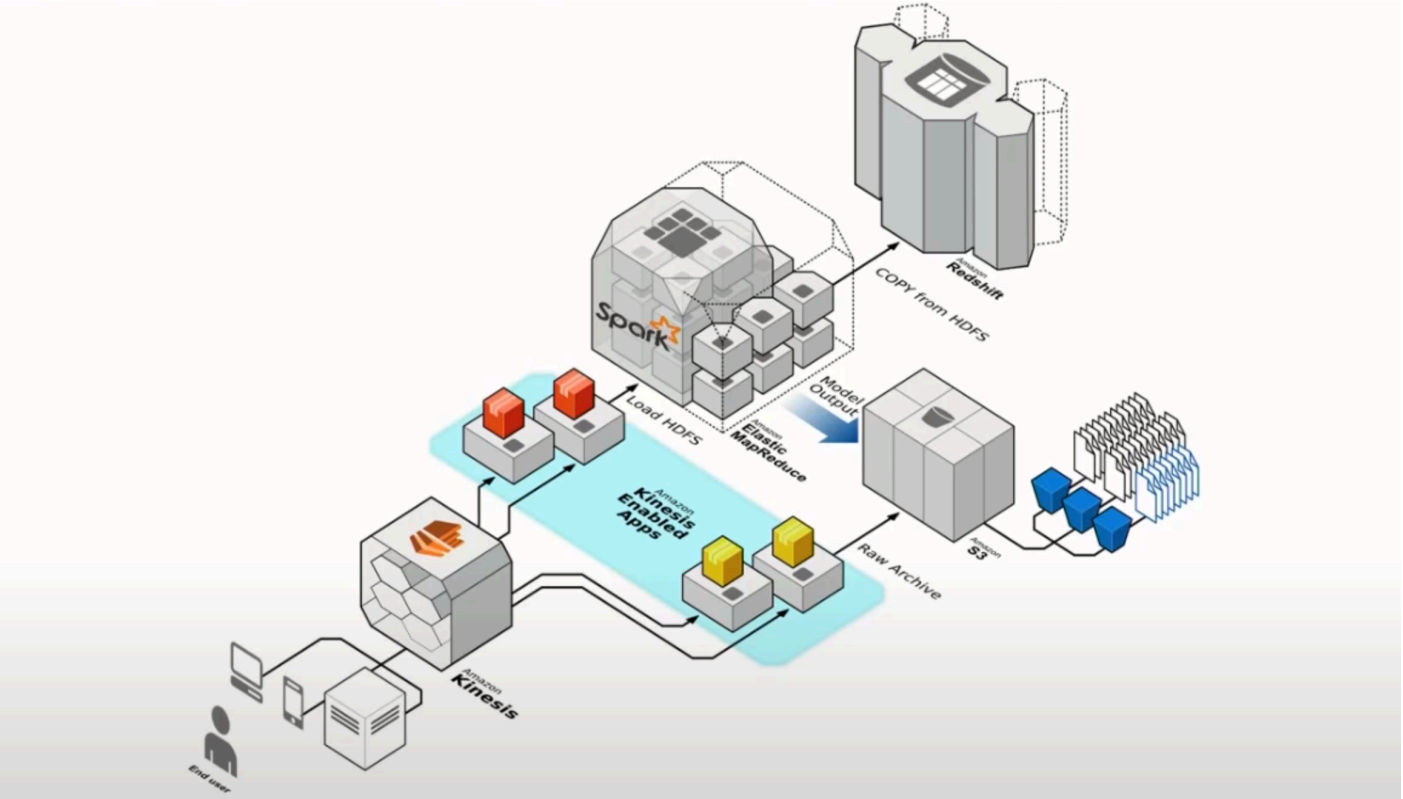

https://www.youtube.com/watch?v=Mxr408U_gqo&t=2s

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Example

- Acoustic monitor on a machine
- Stream process detects an abnormal squeak and issues an alert
- Batch process invokes a model to predict time to failure based on the squeak progression
  - Schedule maintenance for the machine before it is likely to fail

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- Algorithmic stock market trading
- Trending twitter posts

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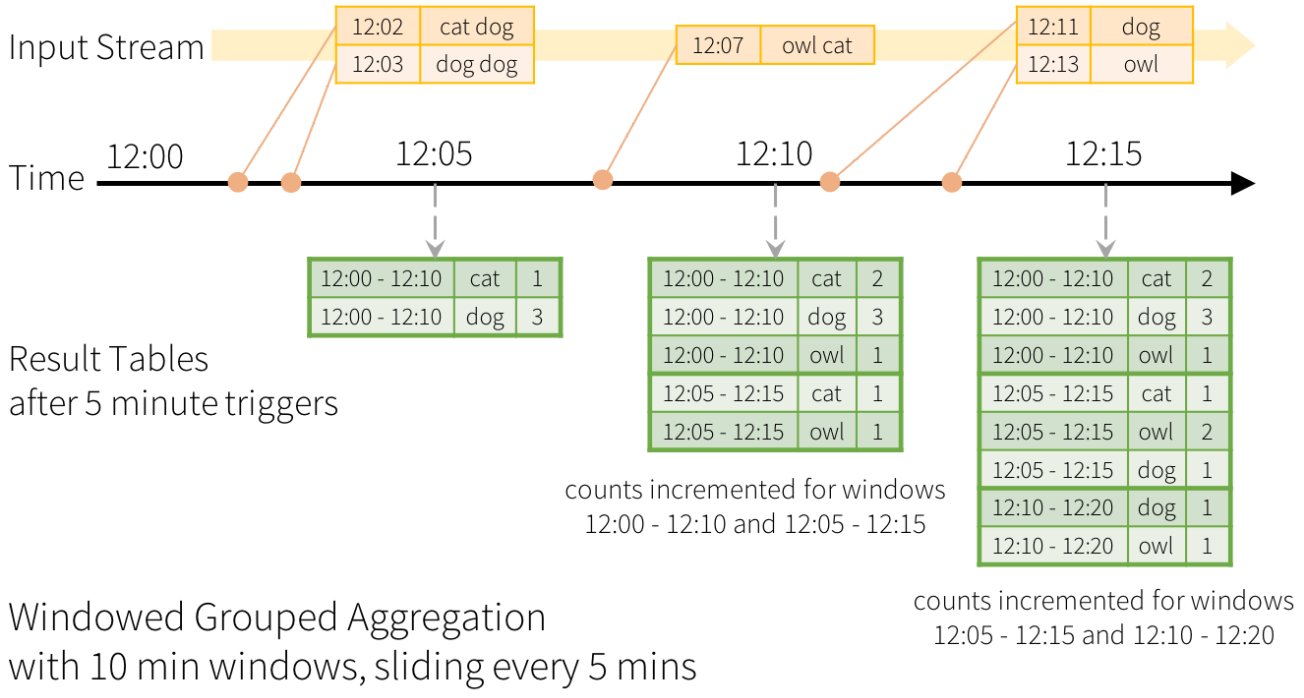
Updating or using predictive models

- Product recommendations

Summarizing Streaming Data Over Windows

Often want to summarize/find trends/etc. over certain windows of time



Recap

- Important information can be gleaned from streaming data
- Dealing with data as it comes in over time creates a number of common use cases
    - Preprocessing/Sending alerts
    - Combining data streams and dealing with time intervals
    - Detecting trends, counting, and averages (over certain windows or buckets of time)
    - Updating or using predictive models