Building Data Pipelines with Spark and StreamSets

StreamSets

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Agenda

StreamSets

Data Drift

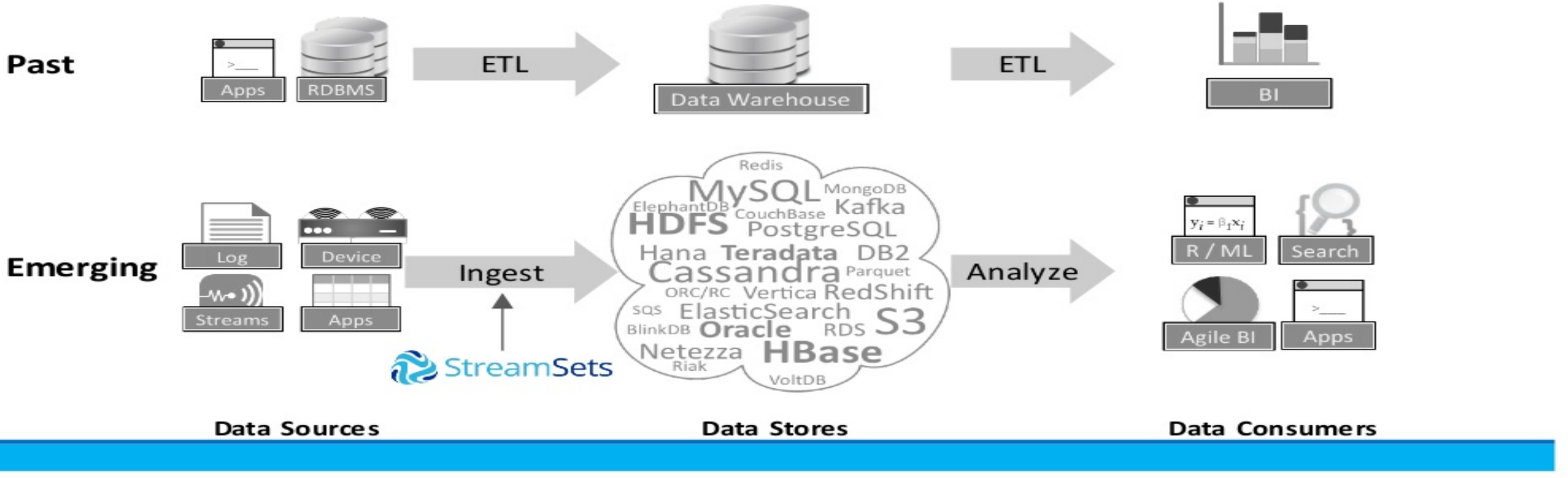
StreamSets Data Collector

Running Pipelines on Spark Today

Future Spark Integration

Demo

The Evolution of Data-in-Motion



Data Drift - a Data Engineering Headache

StreamSets

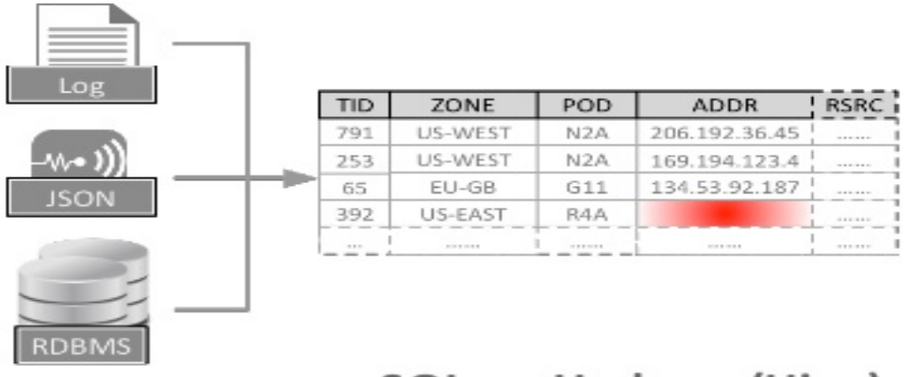
The unpredictable, unannounced and unending mutation of data characteristics caused by the operation, maintenance and modernization of the systems that produce the data

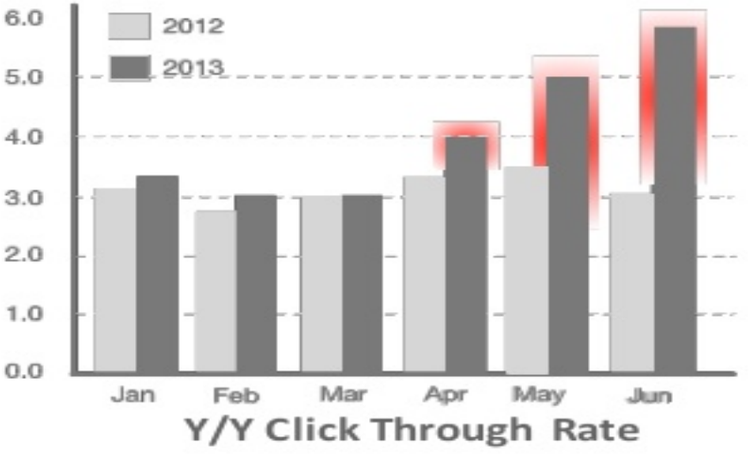
Structure Drift

Semantic Drift

Infrastructure Drift

Example: Data Loss and Corrosion





80% of analyst time is spent preparing and validating data,
while the remaining 20% is actual data analysis

Solving Data Drift

StreamSets

Data Sources

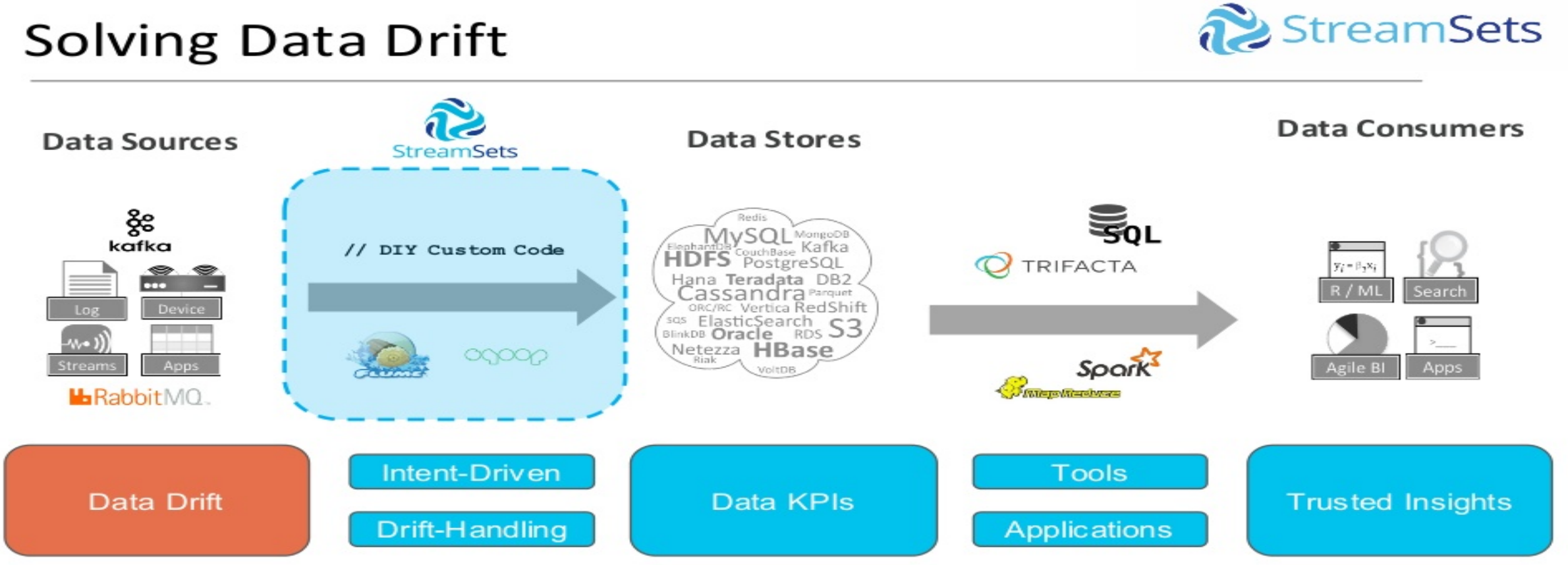
// DIY Custom Code

Data Stores

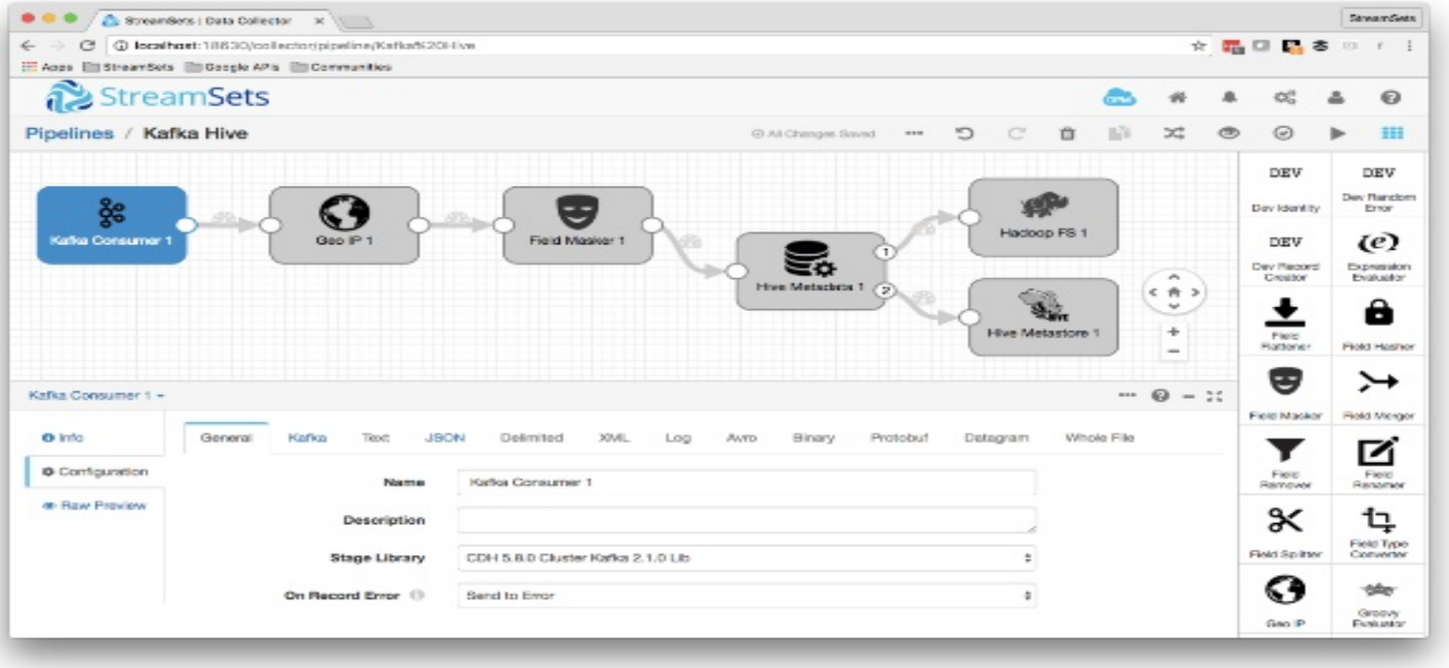
Data Consumers

Data Drift	Custom code Fixed-schema	Poor Data Quality	Tools Applications	Delayed and False Insights

Solving Data Drift



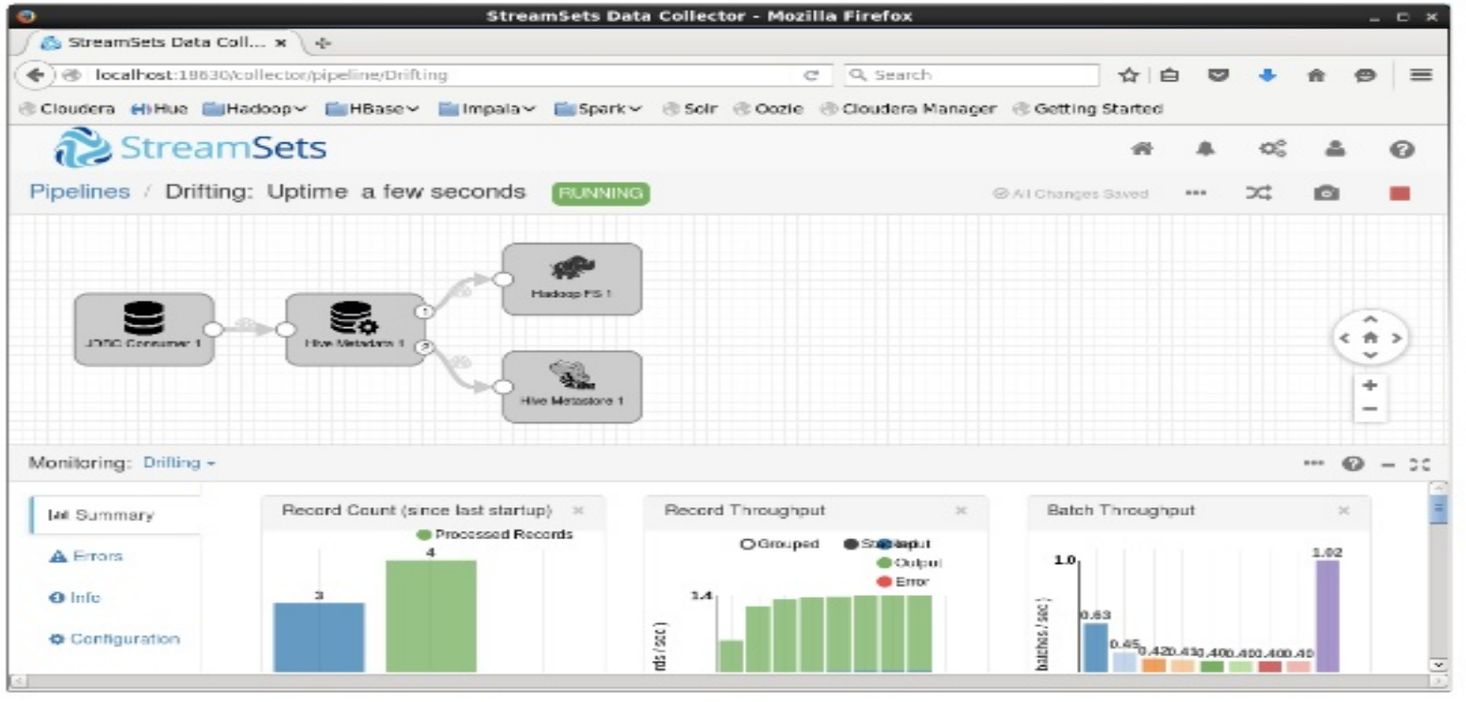
StreamSets Data Collector



Open source software for the rapid development and reliably operation of complex data flows.

- Intent-driven
- UI Abstraction
- Extensible

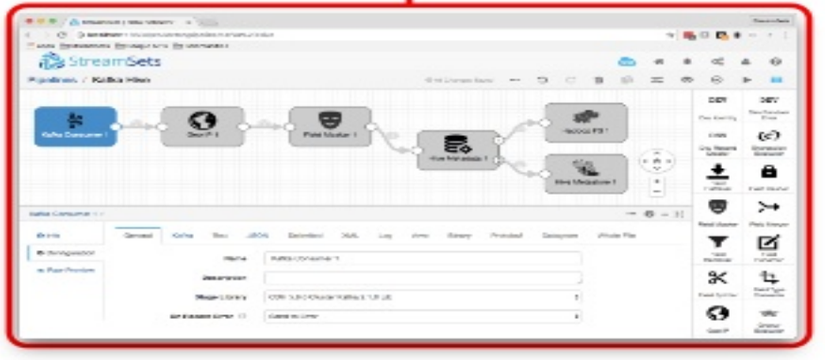
Handling Drift with Hive



- Monitor data structure
- Detect schema change
- Alter Hive Metadata

Running Pipelines on Spark Today


```
spark-submit
--num-executors ...
--archives ...
--files ...
--jar ...
--class ...
```



- Container on Spark
- Leverage Kafka RDD
- Scale out for performance

SDC on Spark - Connectivity

StreamSets

Sources

- Kafka

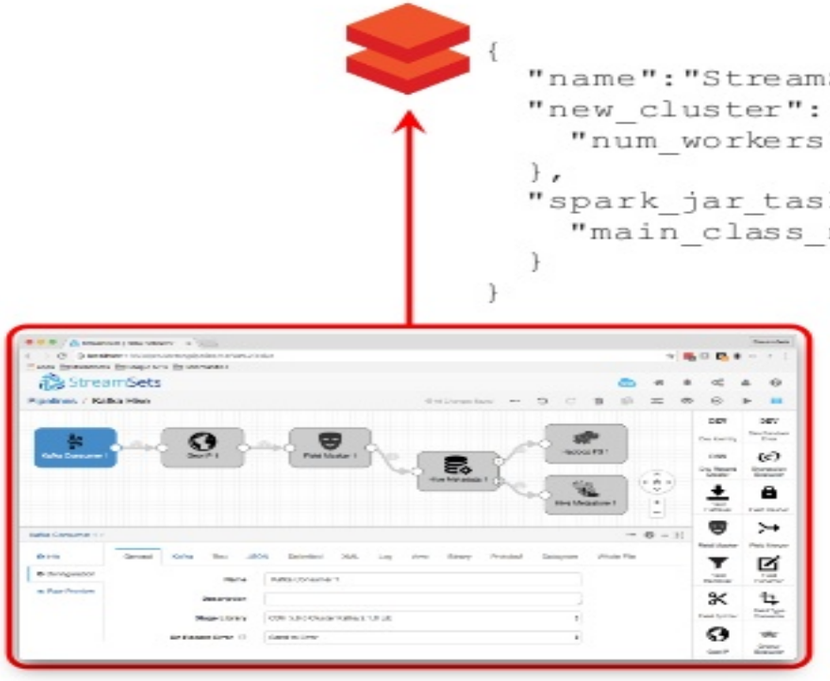
Destinations

- HDFS
- HBase
- S3
- Kudu
- MapR DB
- Cassandra
- ElasticSearch
- Kafka
- MapR Streams
- Kinesis
- etc, etc, etc!

Future Directions

StreamSets

Run Pipelines on Databricks



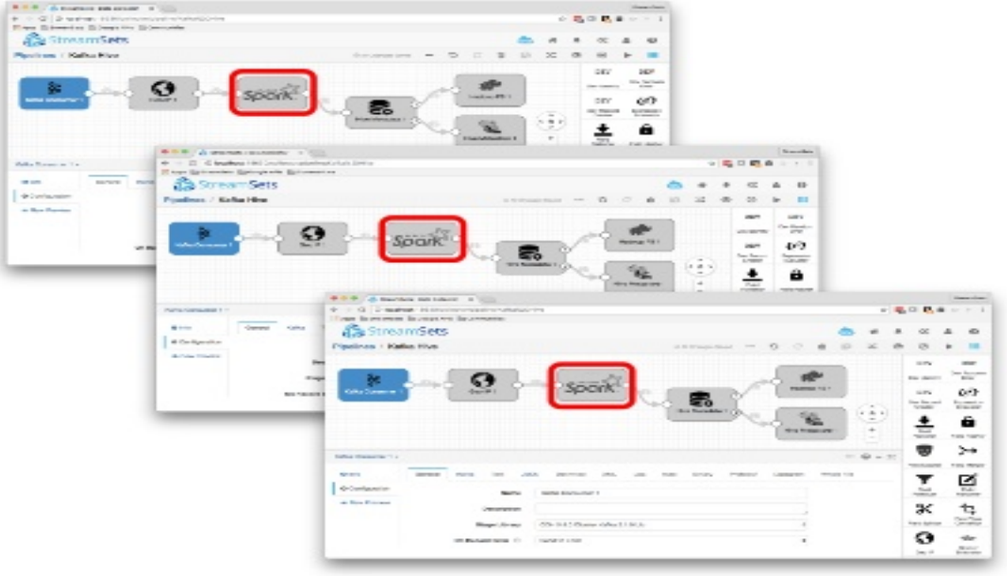
```
{
  "name":"StreamSets Data Collector",
  "new_cluster":{
    "num_workers":1
  },
  "spark_jar_task":{
    "main_class_name":"com.streamsets..."
  }
}
```

- Container on Databricks
- Leverage REST API
- Add S3 origin

Break Out Spark Processor

StreamSets

Spark Local Mode



- Standalone containers, Spark processor
- Leverage Spark code
- Custom RDD
- Start local Spark job for each batch
- Example use cases: *running* image classification, sentiment analysis

Spark Processor - Connectivity

StreamSets

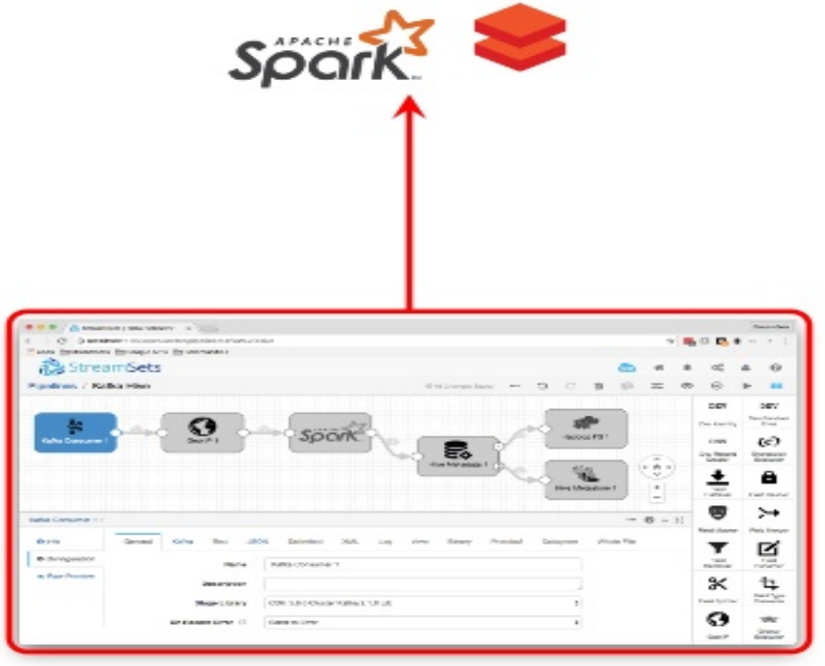
Sources

- Kafka
- S3
- MapR Streams
- JDBC
- MongoDB
- Local Filesystem
- Redis
- JMS
- HTTP
- UDP
- etc, etc, etc!

Destinations

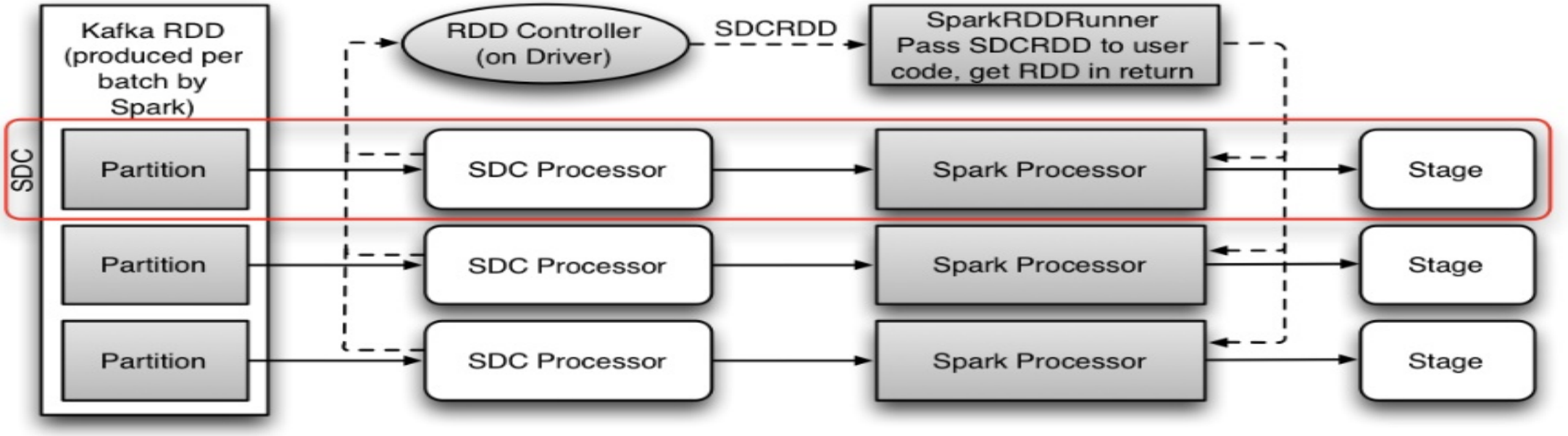
- HDFS
- HBase
- S3
- Kudu
- MapR DB
- Cassandra
- ElasticSearch
- Kafka
- MapR Streams
- JDBC
- etc, etc, etc!

Deepen Spark Integration



- Container on Spark, Spark processor
- Leverage Spark code
- Custom RDD
- Start Spark job 'on cluster' for each pipeline
- Example use cases: *training* image classification, sentiment analysis

Spark Integration Architecture



SDC on Spark - Connectivity Tomorrow

StreamSets

Sources

- Kafka
- *S3*
- *MapR Streams*
- *JDBC*
- *MongoDB*
- *Redis*
- *JMS*
- *HTTP*
- *UDP*
- ...any partitionable data source...

Destinations

- HDFS
- HBase
- S3
- Kudu
- MapR DB
- Cassandra
- ElasticSearch
- Kafka
- MapR Streams
- JDBC
- etc, etc, etc!

Demo

StreamSets

Conclusion

StreamSets

StreamSets Data Collector brings a UI abstraction to Spark

Standalone container + local Spark Processor bring wide connectivity to Spark code

Spark Container + Spark Processor allow iterative Spark code in pipelines

Resources

StreamSets

Download StreamSets Data Collector

https://streamsets.com/opensource

Contribute Code

https://github.com/streamsets/datacollector

Get Involved

https://streamsets.com/community

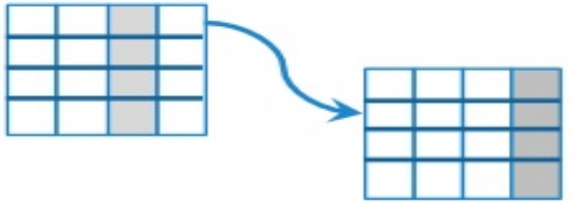
Thank You!

StreamSets

Backup Slides

StreamSets

Structure Drift



107.3.137.195 → fe80::21b:21ff:fe83:90fa


```
{
 "first": "jon"
 "last": "smith"
 "email": "jsmith@acme.com"
 "add1": "123 Washington"
 "add2": ""
 "city": "Tucson"
 "state": "AZ"
 "zip": "85756"
}
```


→


```
{
 "first": "jane"
 "last": "smith"
 "email": "jane@earth.net"
 "add1": "456 Fillmore"
 "add2": "Apt 120"
 "city": "Fairfield"
 "state": "VA"
 "zip": "24435-1001"
 "phone": "401-555-1212"
}
```


Data Structure Evolution

Structure Drift

Data structures and formats evolve and change unexpectedly

Implication:
Data Loss
Data Squandering

Semantic Drift

24122-52172 → 00-24122-52172

Account Number Expansion

M134: user {jsmith} read access granted {ac:24122-52172}

↓

M134: user {jsmith} read access granted {ca.ac:24122-52172}

Namespace Qualification

```
.....
...,3588310669797950,$91.41,jcb,K1088-W#9,...
...,6759006011936944,$155.04,switch,A6504-Y#9,...
...,677111111111 51415,$37.78,laser,Q9936-T#9,...
...,3585905063294299,$164.48,jcb,S4643-H#9,...
...,5363527828638736,$117.52,mastercard,X3286-P#9,...
...,4903080150282806,$168.03,switch,I9133-W#3,...
.....
```

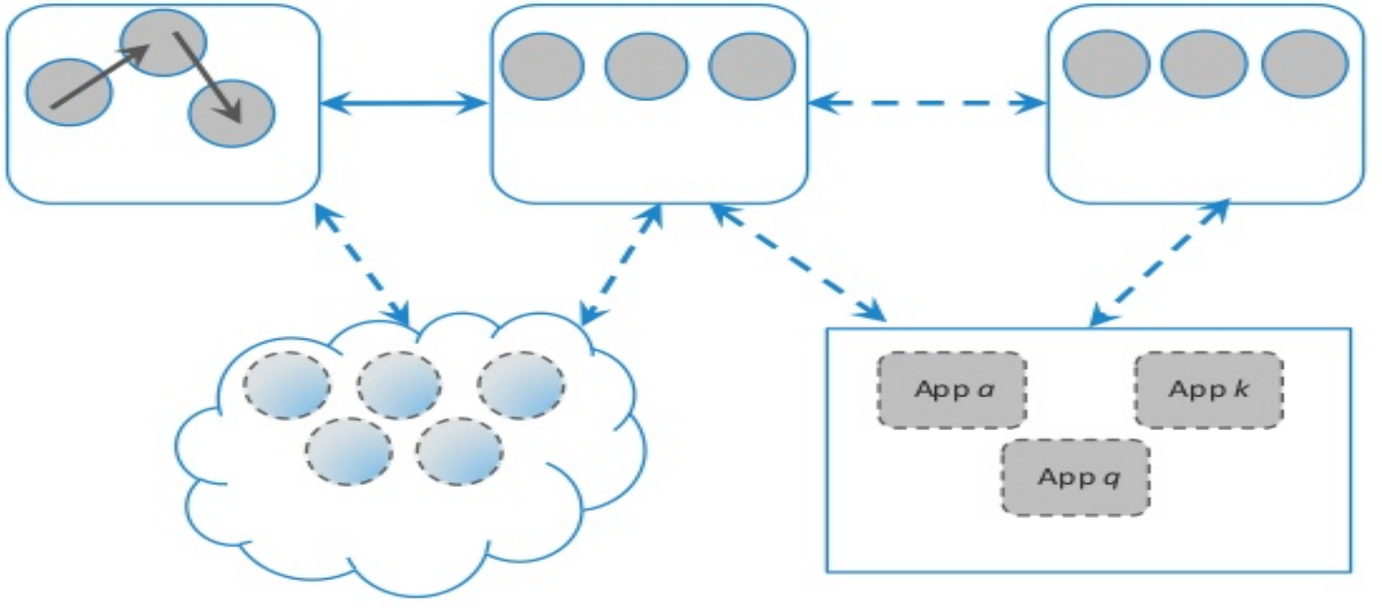
Outlier / Anomaly Detection

Semantic Drift

Data semantics change with evolving applications

Implication:
Data Corrosion
Data Loss

Infrastructure Drift



Infrastructure Drift

Physical and Logical Infrastructure changes rapidly

Implication:
Poor Agility
Operational Downtime