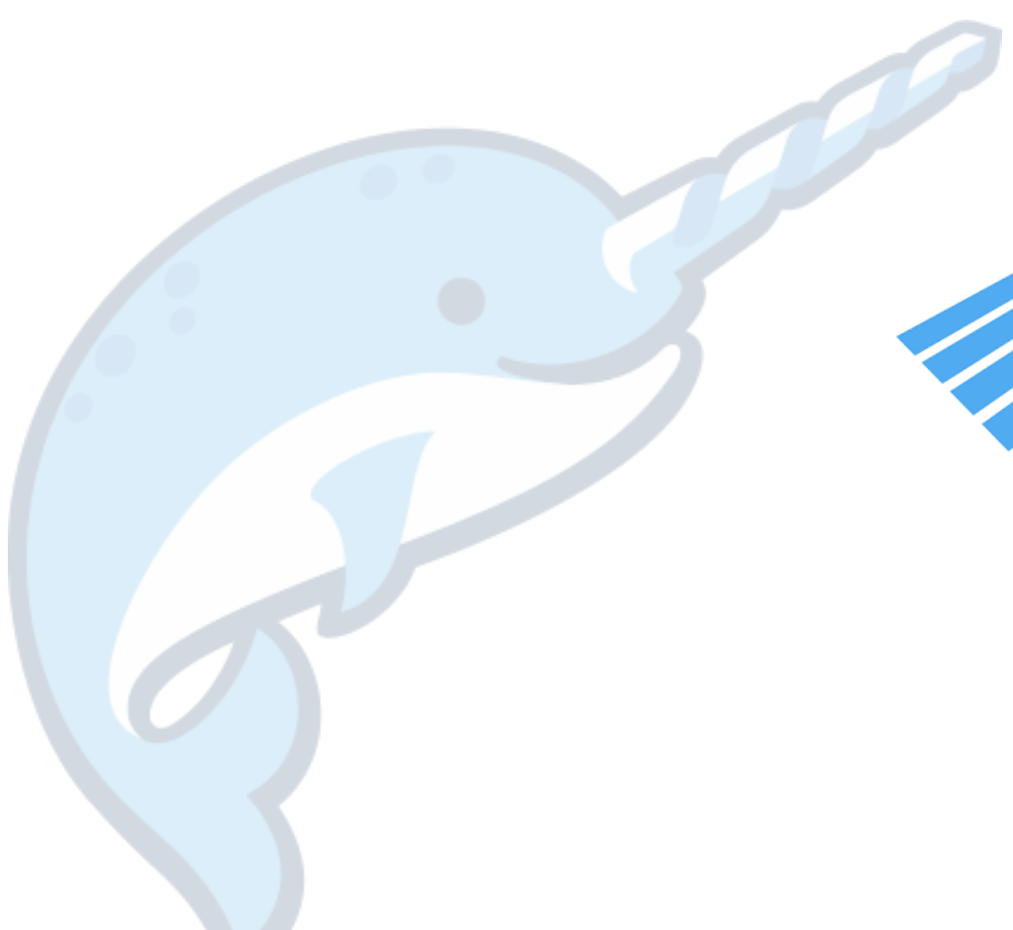


Parquet

If you have your own Columnar format, stop now and use Parquet

😛

Julien Le Dem
Principal Architect, Dremio
VP Apache Parquet

dremio

About Dremio

- Enabling self-service data discovery, exploration and analysis on modern data
- Founded in June 2015
- Building on open source technologies including Drill, Parquet, Spark

Top Silicon Valley VCs

LIGHTSPEED VENTURE PARTNERS

Redpoint

Tomer Shiran
Founder & CEO

- Apache Drill Founder
- MapR (VP Product); Microsoft; IBM Research
- Carnegie Mellon, Technion

Jacques Nadeau
Founder & CTO

- Apache Drill PMC Chair
- Recognized SQL & NoSQL expert
- Quigo (AOL); Offermatica (ADBE); aQuantive (MSFT)

Julien Le Dem
Architect

- Apache Parquet Founder
- Apache Pig PMC Member
- Twitter (Lead, Analytics Data Pipeline); Yahoo! (Architect)

dremio

Background of Parquet

- **Twitter's data**
  - Lots of data: Instrumentation, User graph, Derived data, ...
  - Complex: deeply nested structures

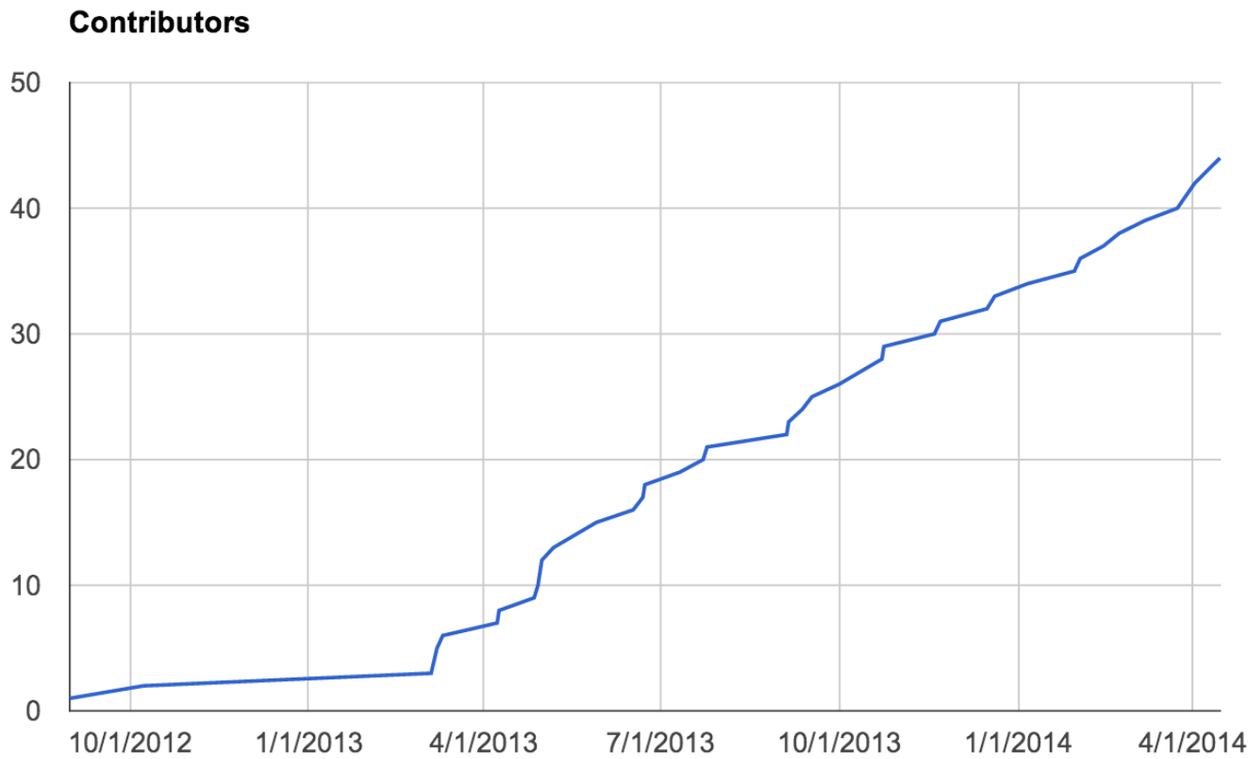
- **Analytics infrastructure**:
  - Several 1000s nodes Hadoop clusters
  - Log collection to HDFS in Thrift

- **Parquet**
  - Columnar: space and query efficient
  - Inspired from the Google Dremel Paper
  - supports complex data
  - interoperable

Caillebotte: The Parquet Planers

Parquet timeline

- **Fall 2012:** Twitter & Cloudera's Impala team merge efforts to develop columnar formats.
- **March 2013:** OSS announcement; Criteo signs on for Hive integration.
- **July 2013:** 1.0 release. 18 contributors from more than 5 organizations.
- **August 2013:** Drill chose Parquet as its primary storage format.
- **May 2014:** Apache Incubator. 40+ contributors, 18 with 1000+ LOC. 26 incremental releases.
- **Apr 2015:** Parquet graduates from the Apache Incubator.



What does Parquet do?

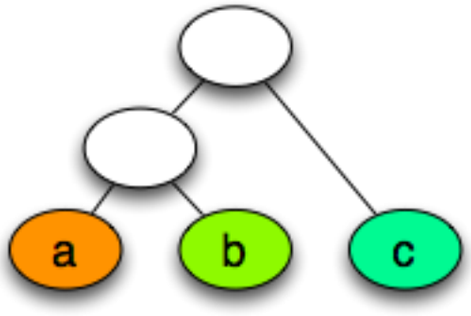
@EmrgencyKittens

Interoperability

Space efficiency

Query efficiency

Columnar storage



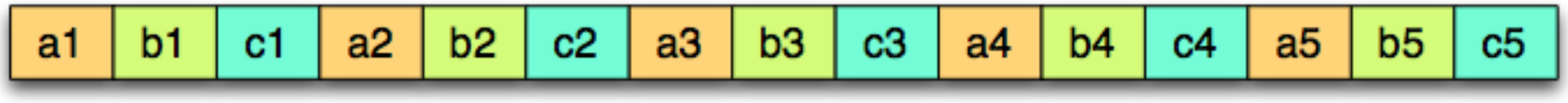
Nested schema

Logical table representation

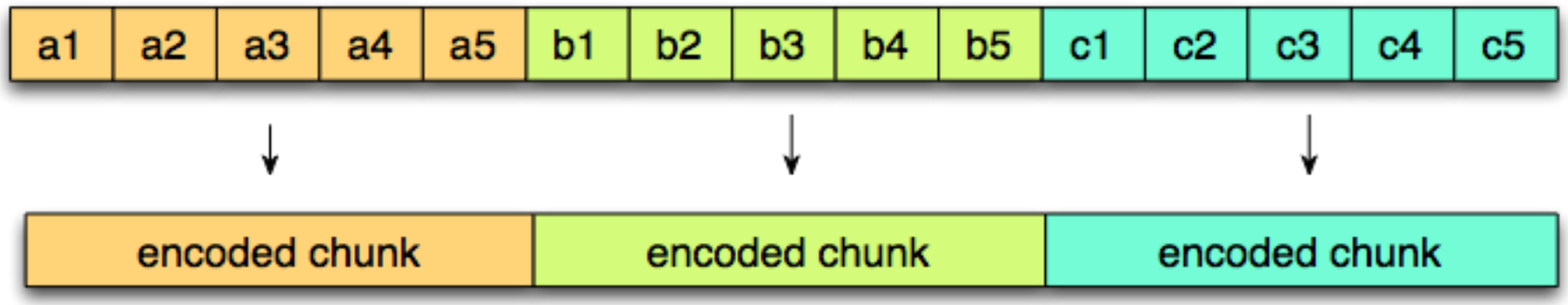
a	b	c
a1	b1	c1
a2	b2	c2
a3	b3	c3
a4	b4	c4
a5	b5	c5

On Disk:

Row layout



Column layout

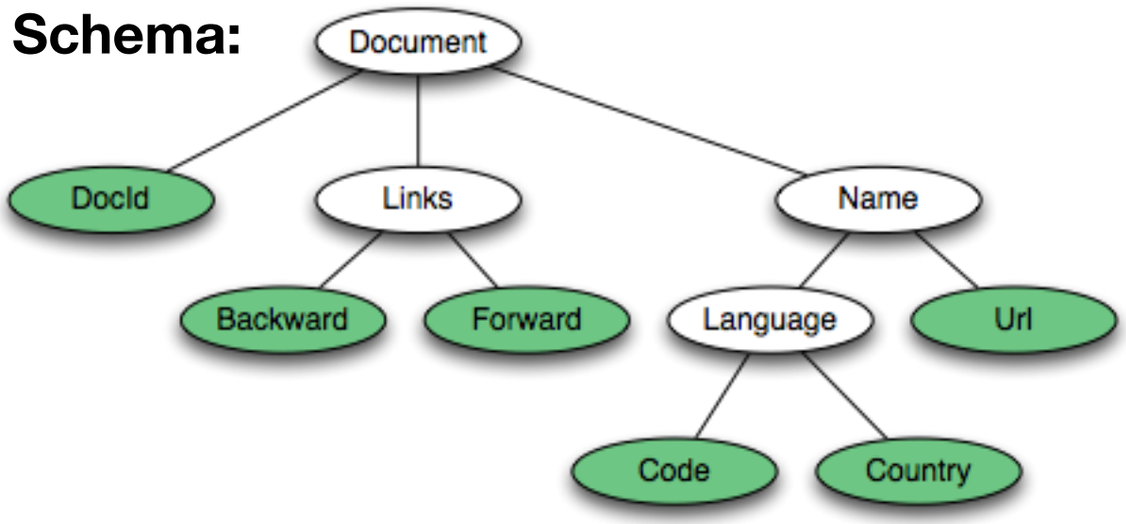


Encodings: Dictionary, RLE, Delta, Prefix

Nested representation

Borrowed from the Google Dremel paper

Schema:



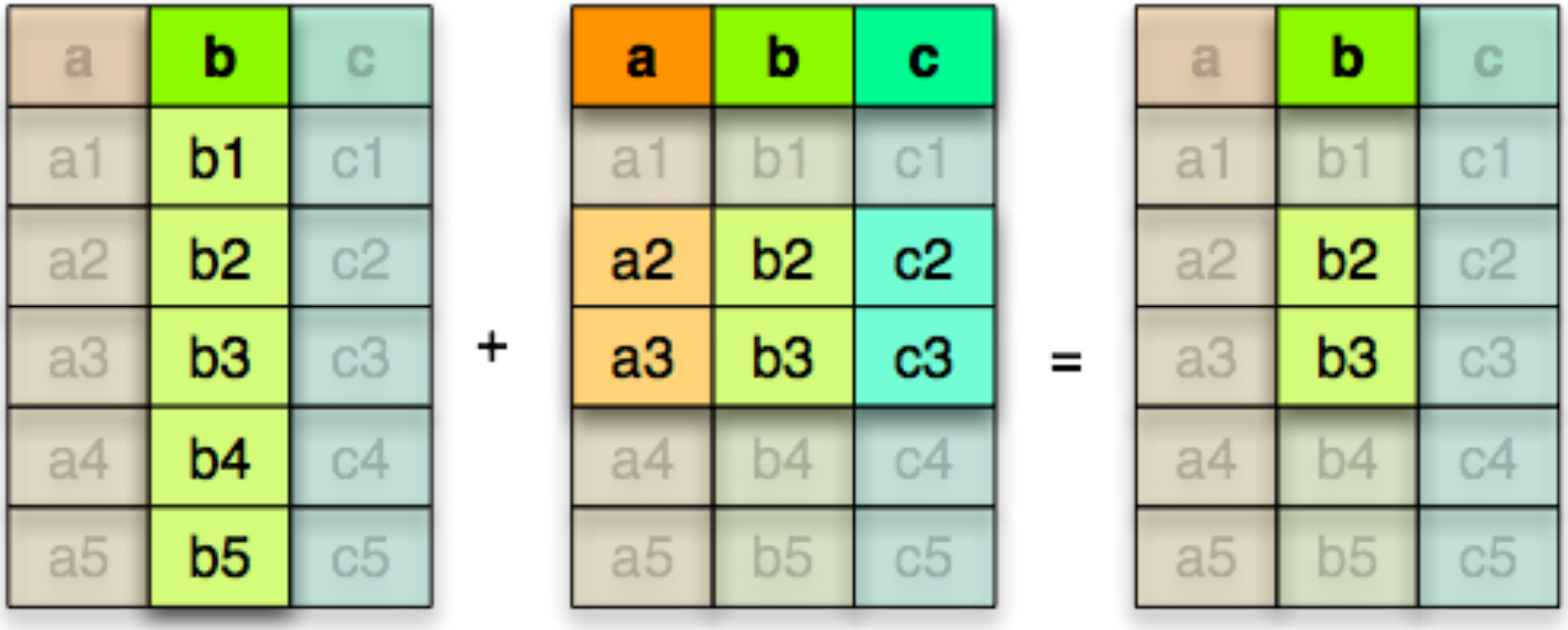
Columns:

docid
links.backward
links.forward
name.language.code
name.language.country
name.url

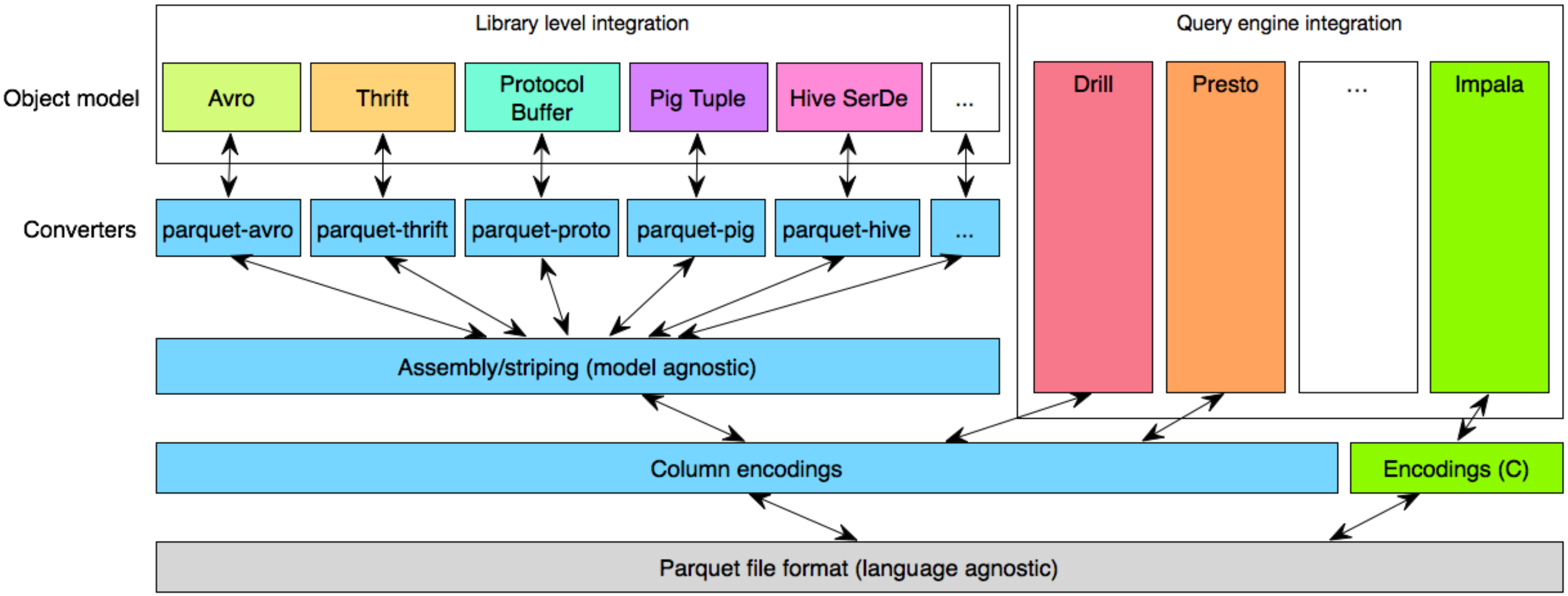
https://blog.twitter.com/2013/dremel-made-simple-with-parquet

Statistics

Vertical partitioning (projection push down) + Horizontal partitioning (predicate push down) = Read only the data you need!



Interoperability



Query engines, frameworks and libraries integrated with Parquet (non exhaustive)

Query engines:

Hive, Impala, HAWQ,
IBM Big SQL, Drill, Tajo,
Pig, Presto, SparkSQL

Frameworks:

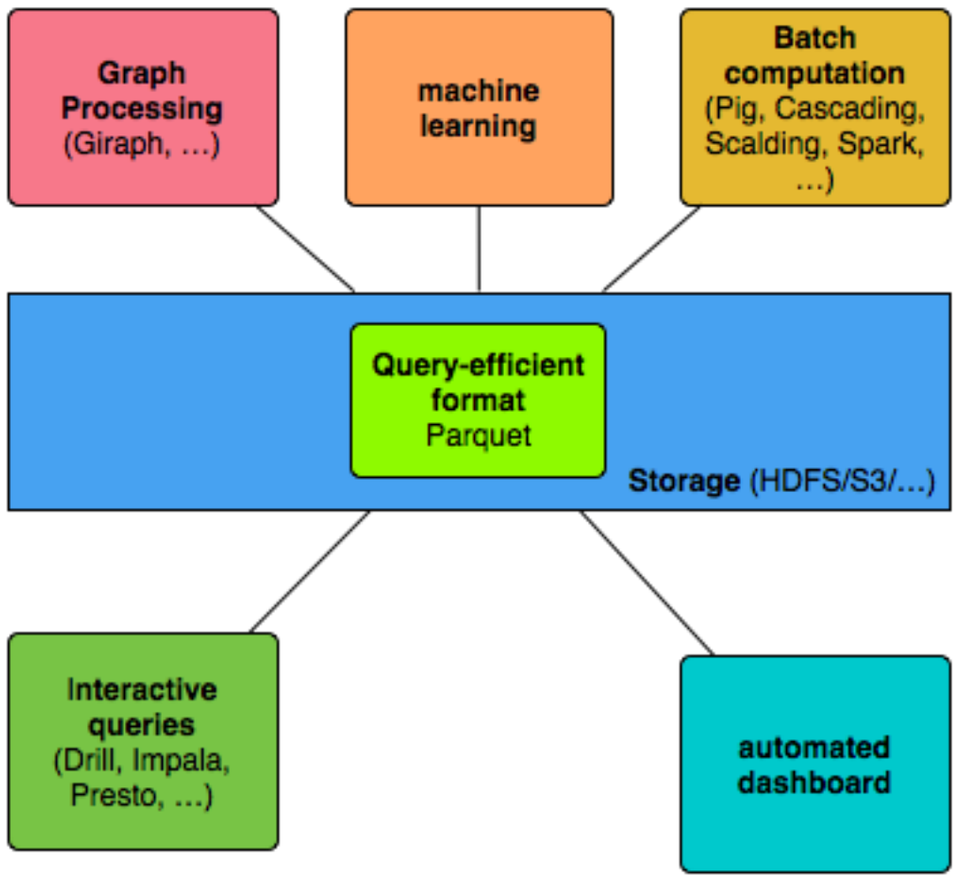
Spark, MapReduce, Cascading,
Crunch, Scalding, Kite

Data Models:

Avro, Thrift, ProtocolBuffers,
POJOs

Loose coupling

- Users don't want to load their data into every tool.
- Many tools are available and show up every day.
- The cost of trying a new tool should be minimal



Get involved

Twitter:
- @ApacheParquet

Mailing list:
- dev@parquet.apache.org

Github repo:
- https://github.com/apache/parquet-mr

Parquet sync ups:
- Regular meetings on google hangout

dremio