

TOO BIG TO FAIL

An Introduction to Distributed Search with Cassandra and Solr



OpenSource Connections
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ABOUT ME

Systems Analyst
Programming
Information Retrieval



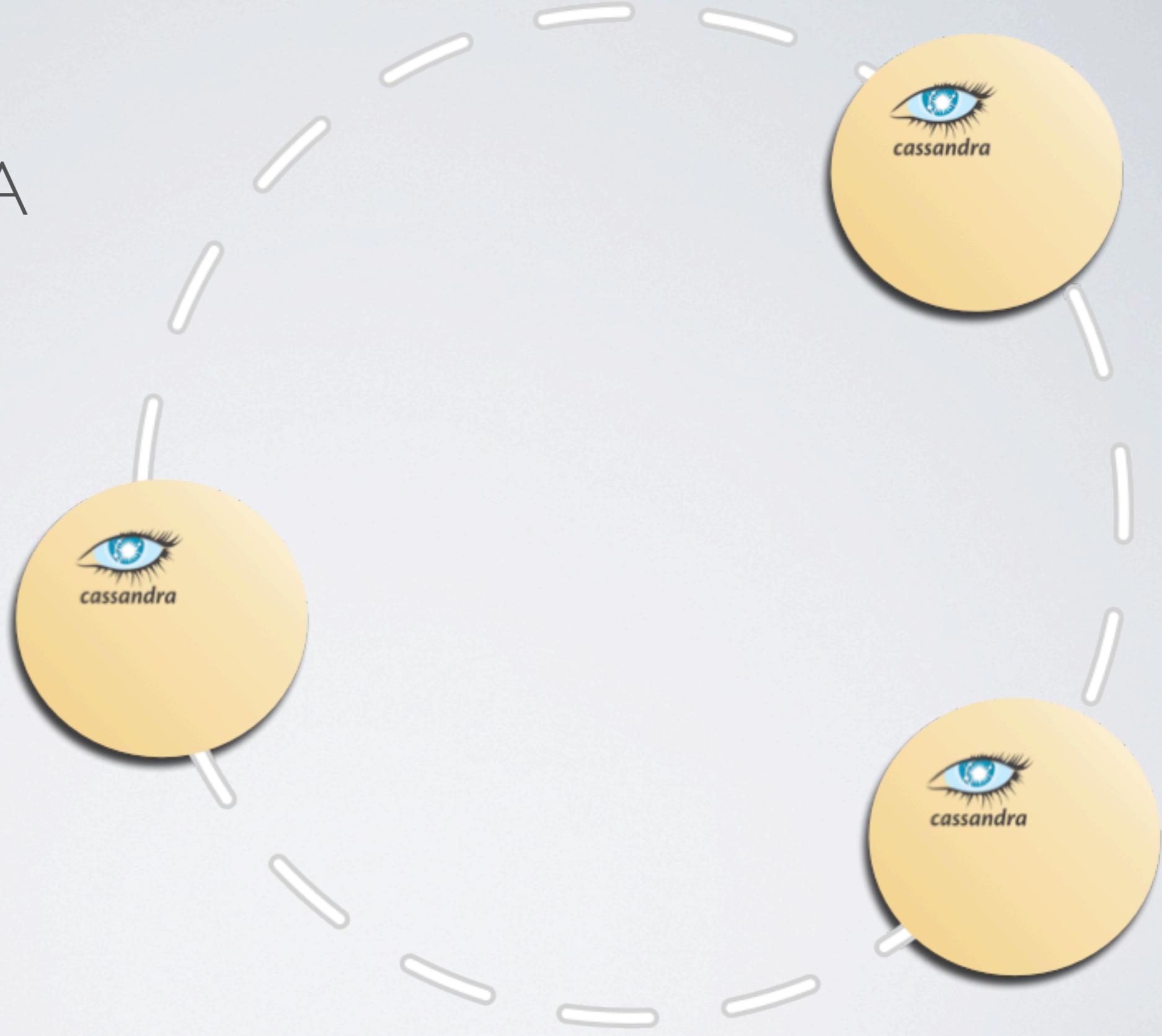
CASSANDRA

Created at Facebook to power inbox search

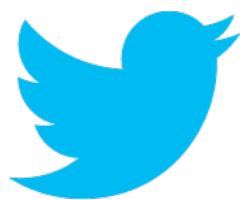
Distributed data store run on commodity servers

Highly available

No one single point of failure



WHO USES CASSANDRA?



SEARCH + CASSANDRA, I

- First implementation: Solandra (originally Lucandra)
- Based on Solr
- Replaced Lucene index with Cassandra column families

SEARCH + CASSANDRA, 2

- DataStax Enterprise Search
- Uses native Lucene index
- All data is retrieved from Cassandra

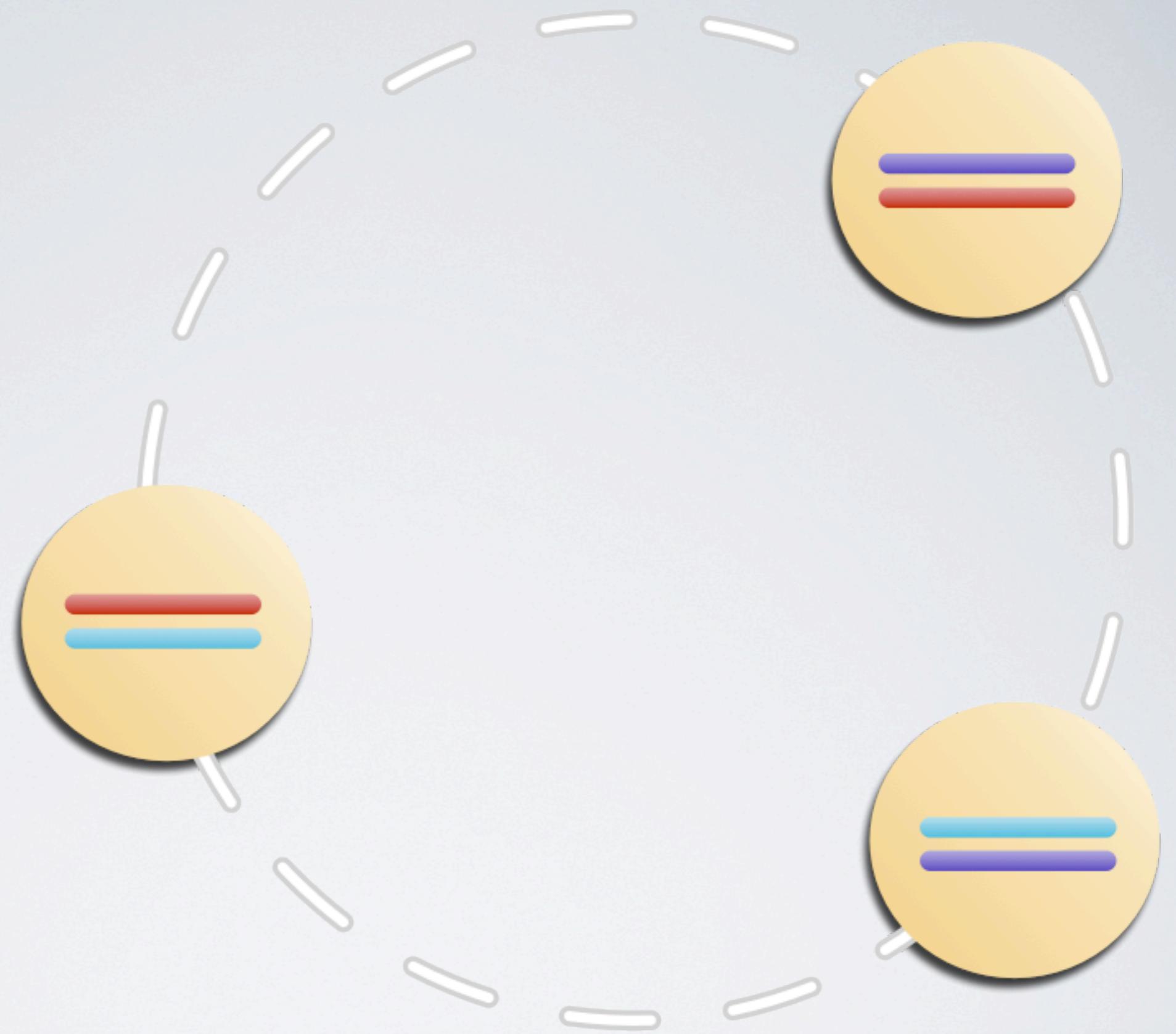
Distributed
Linearly Scalable
Highly Available
Eventually Consistent
Full-text search
Aggregation



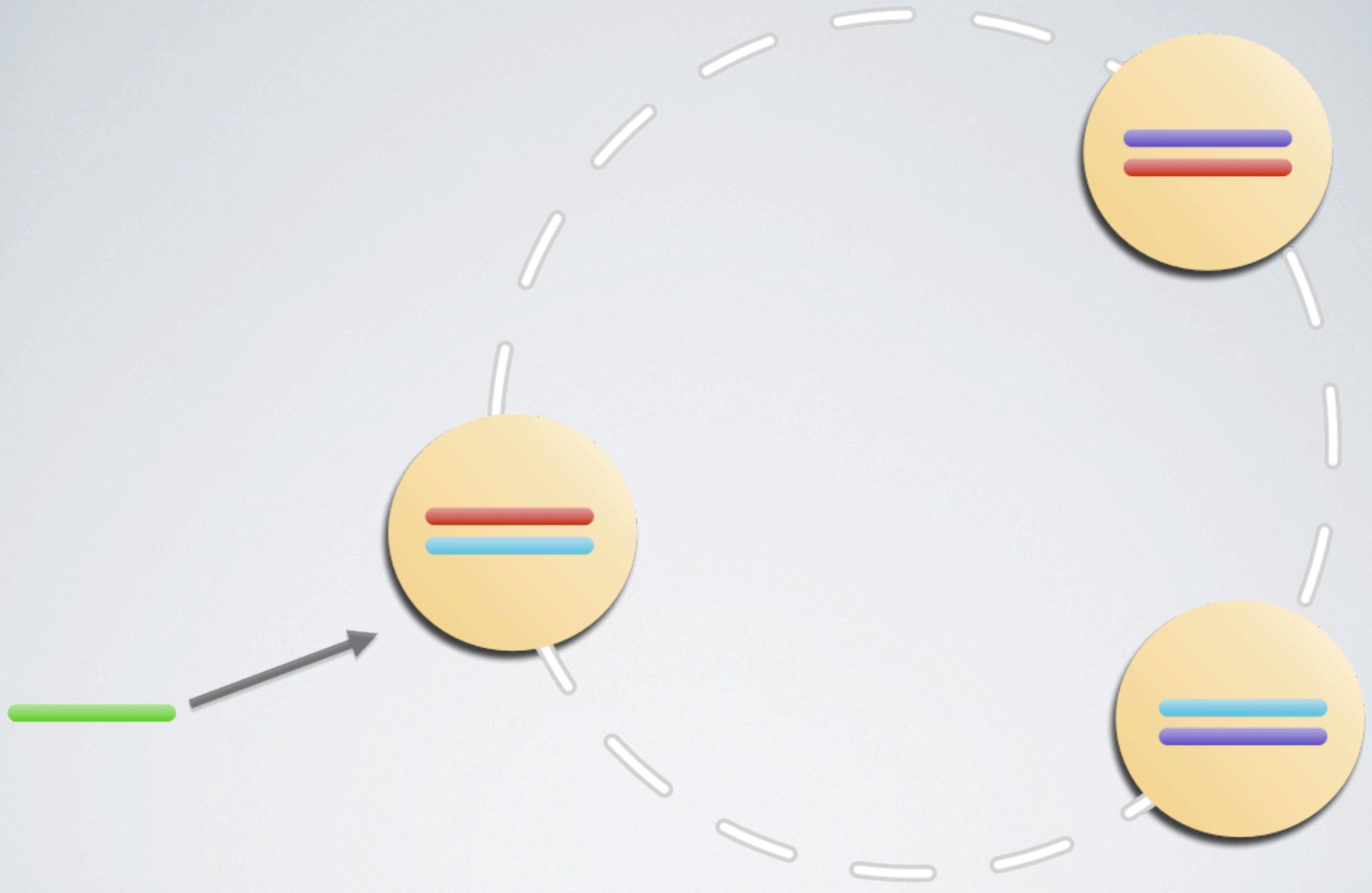
Datastax Enterprise Search Cluster

WRITING TO CLUSTER

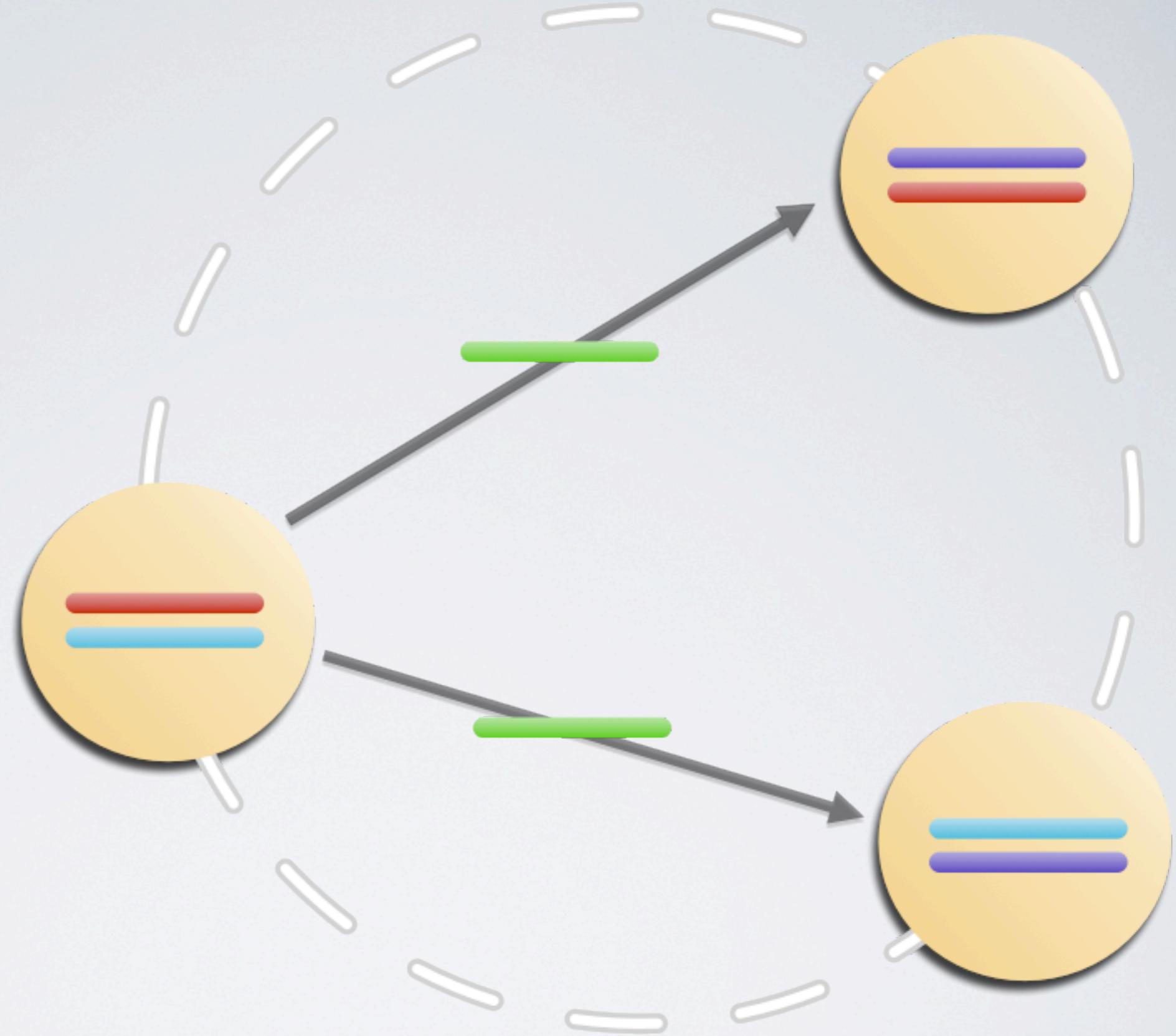
- Write to either Cassandra clients or Solr API
- Write process is the same
- True atomic updates to Cassandra



Information is distributed among Cassandra nodes.

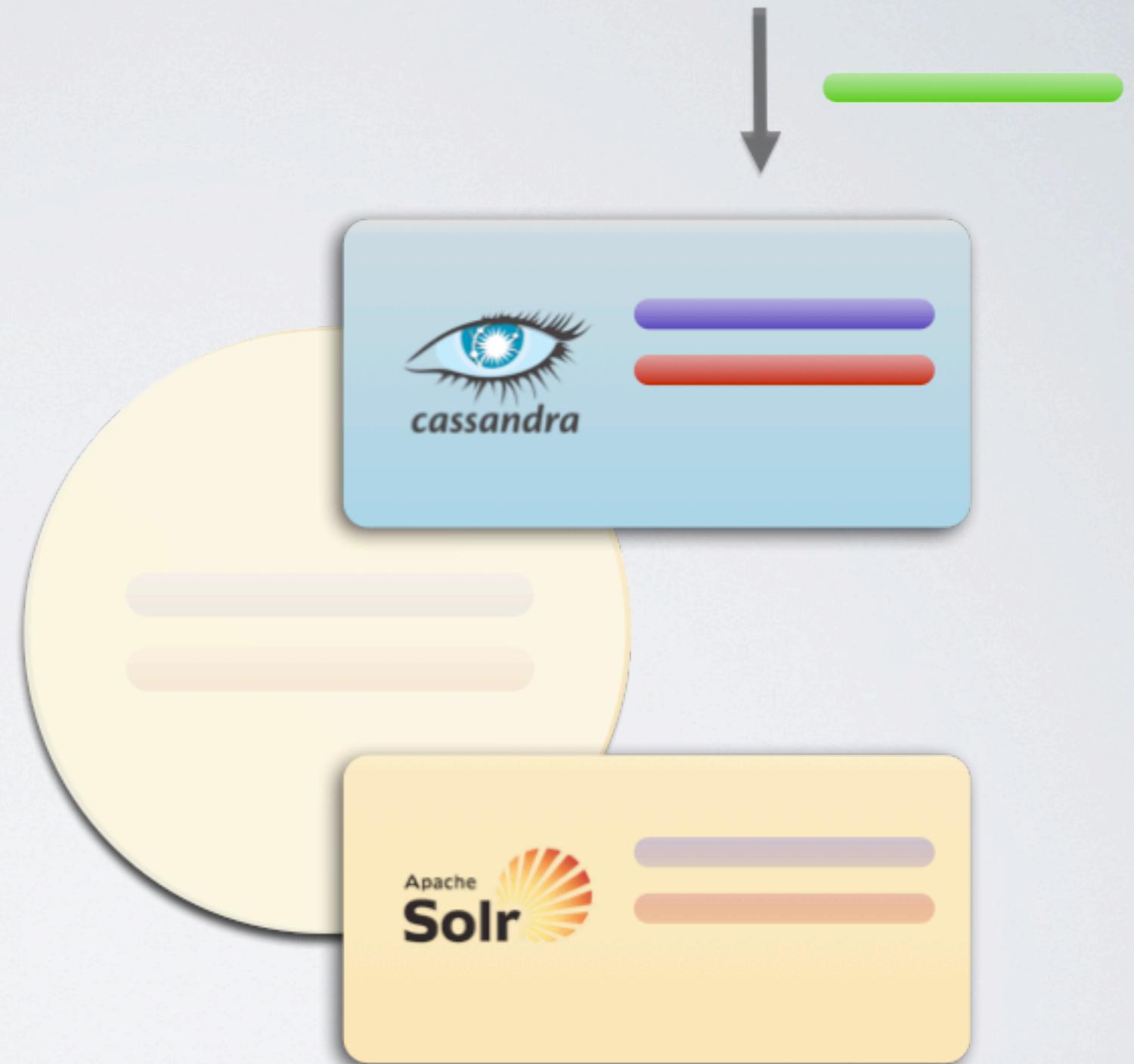


Data can be written directly to Cassandra

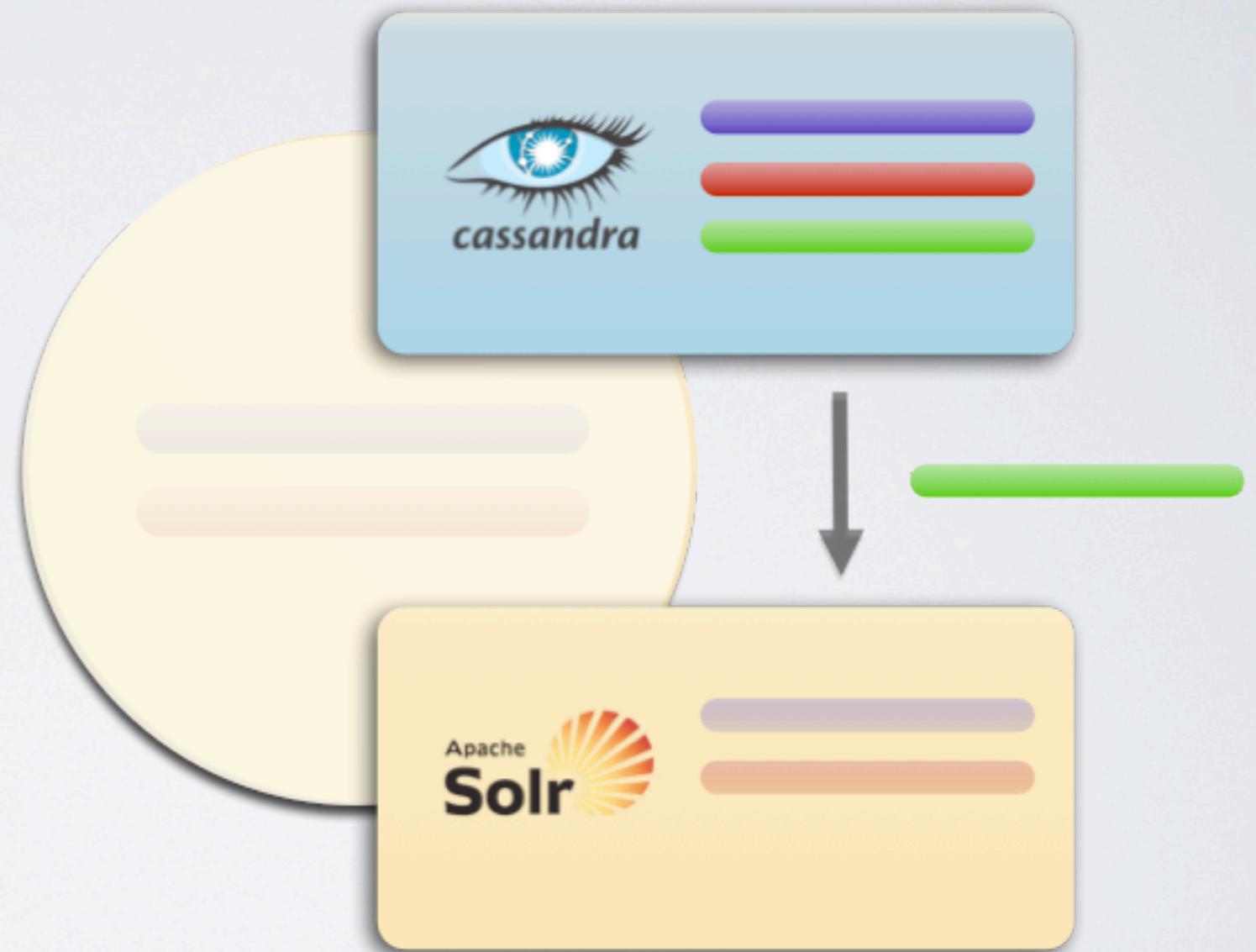


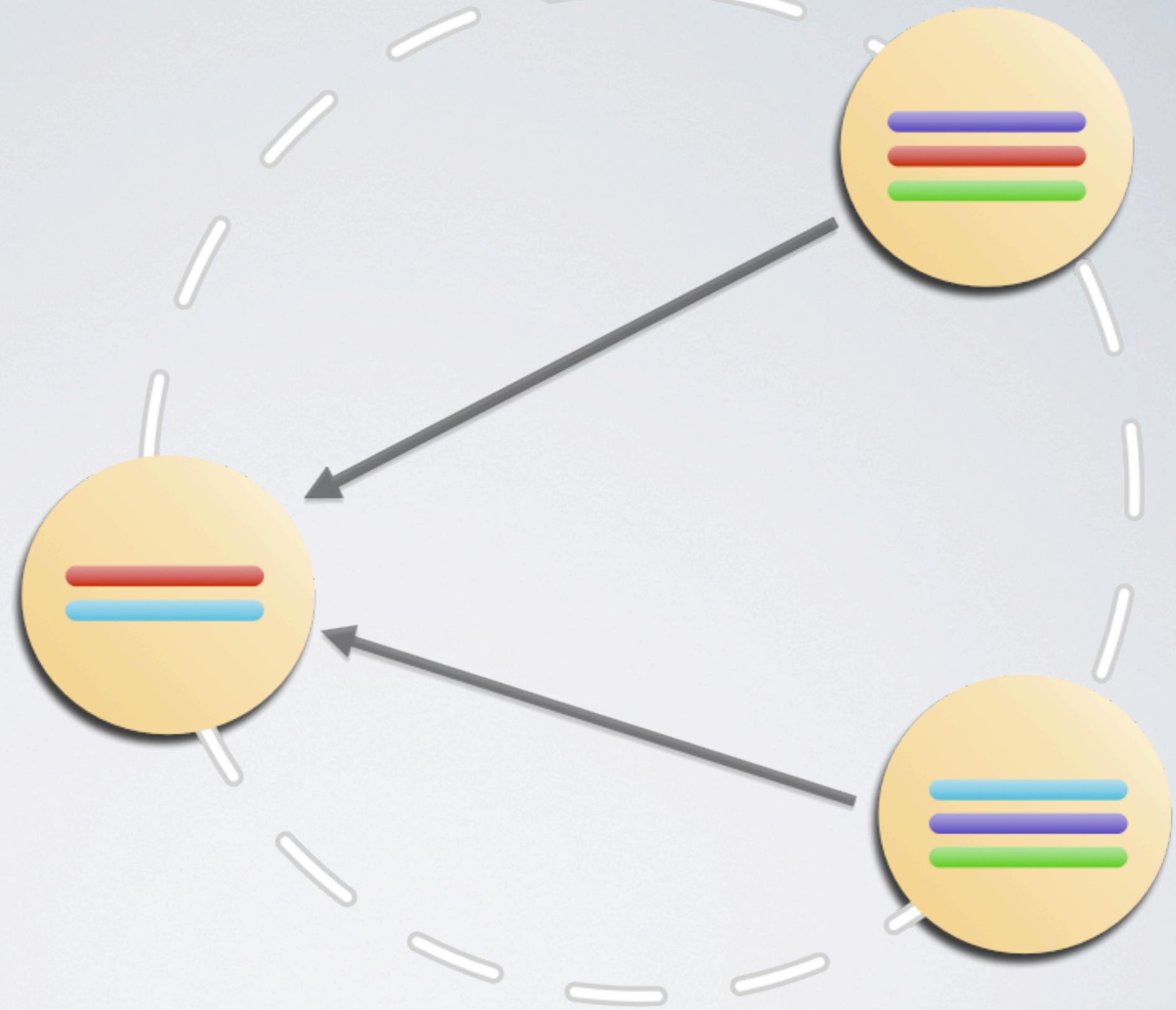
Data is distributed according to row key hash and replication factor

DSE first writes to
Cassandra

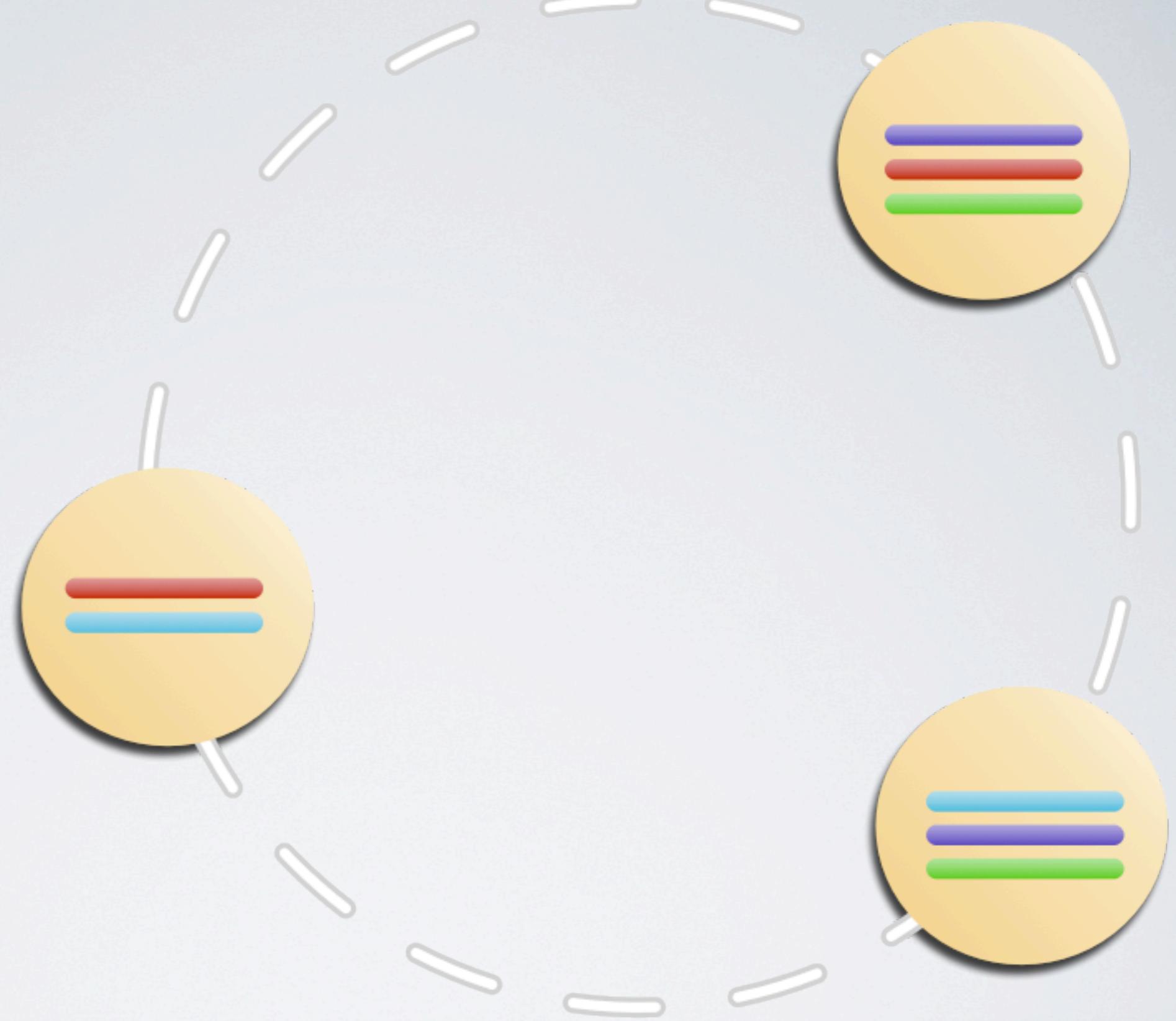


And then updates the
Solr index





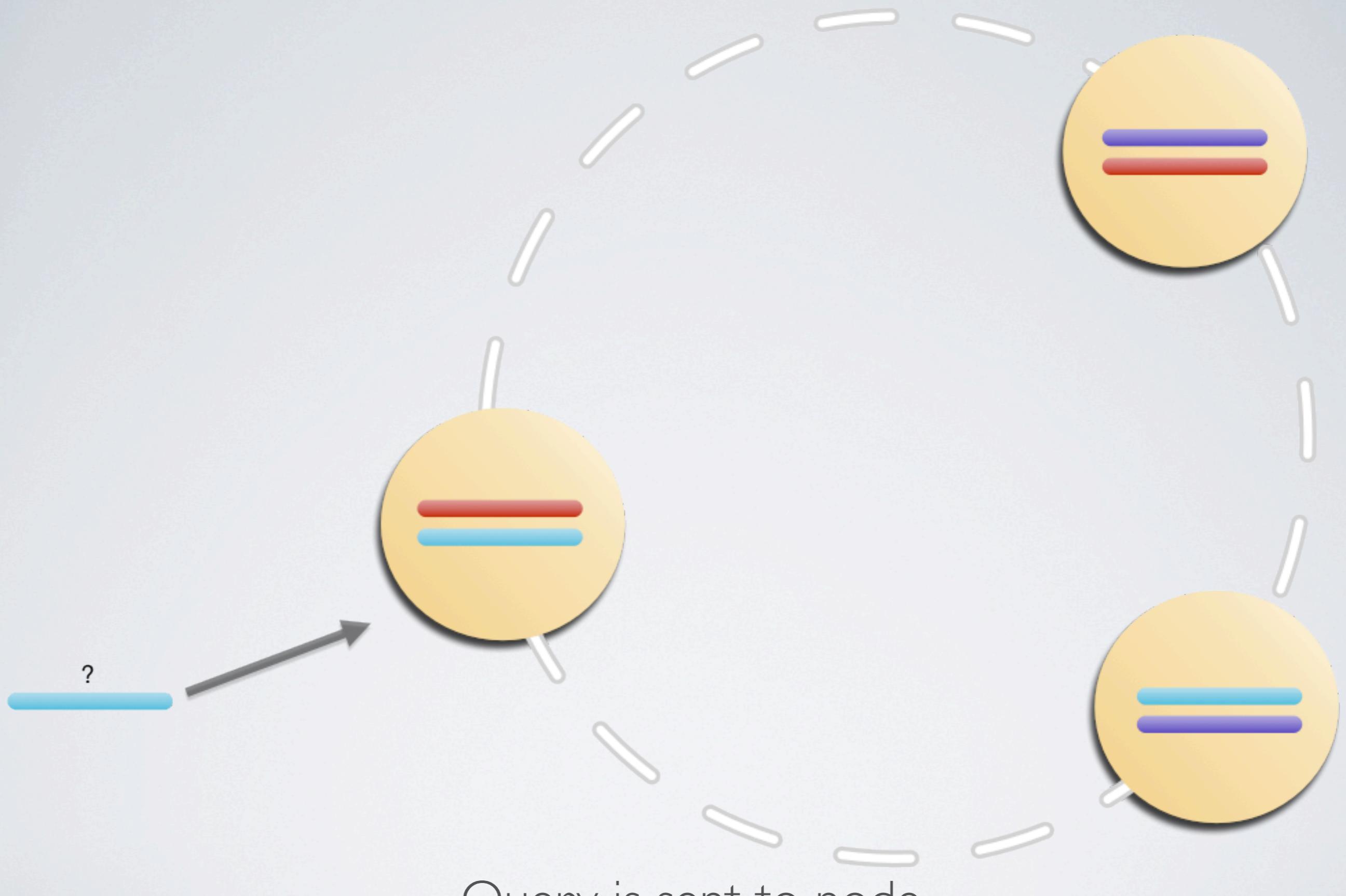
The quorum responds with success / failure



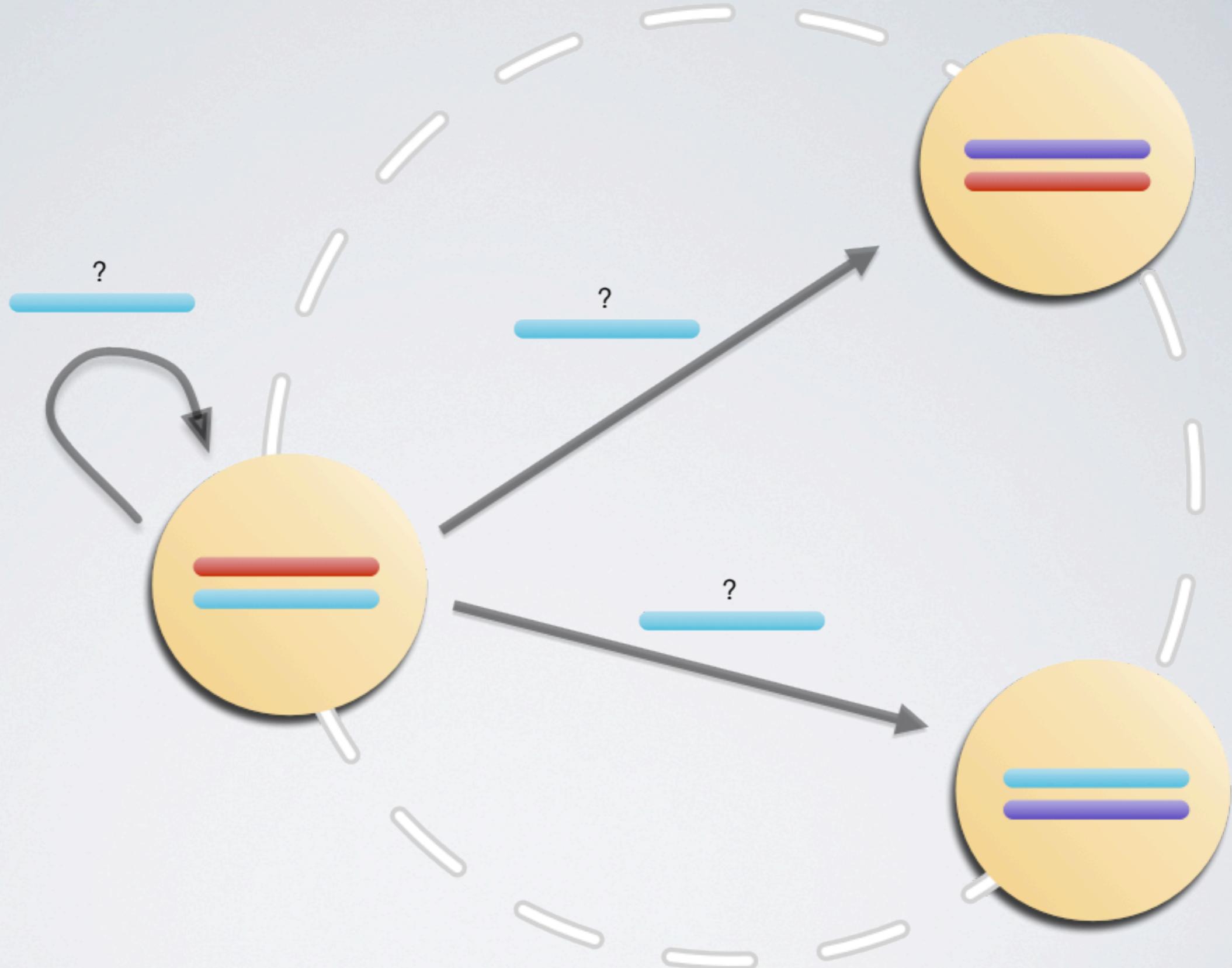
Data is now distributed evenly

READING FROM CLUSTER

- Read either Cassandra-side or through Solr API
 - Cassandra: fast reads*
 - Solr: full-text search
- Read direction affects performance
- Data is stored in Cassandra



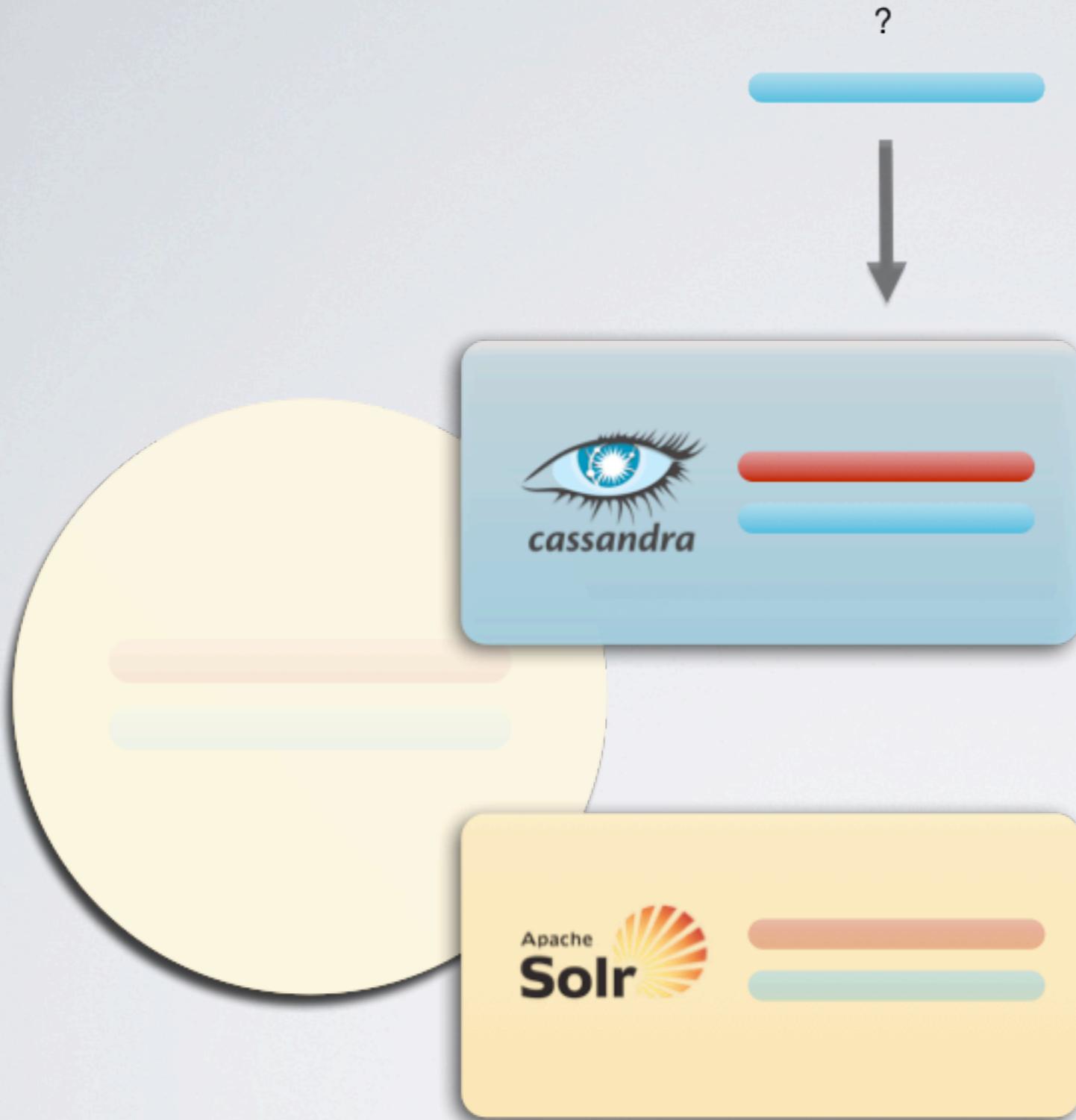
Query is sent to node



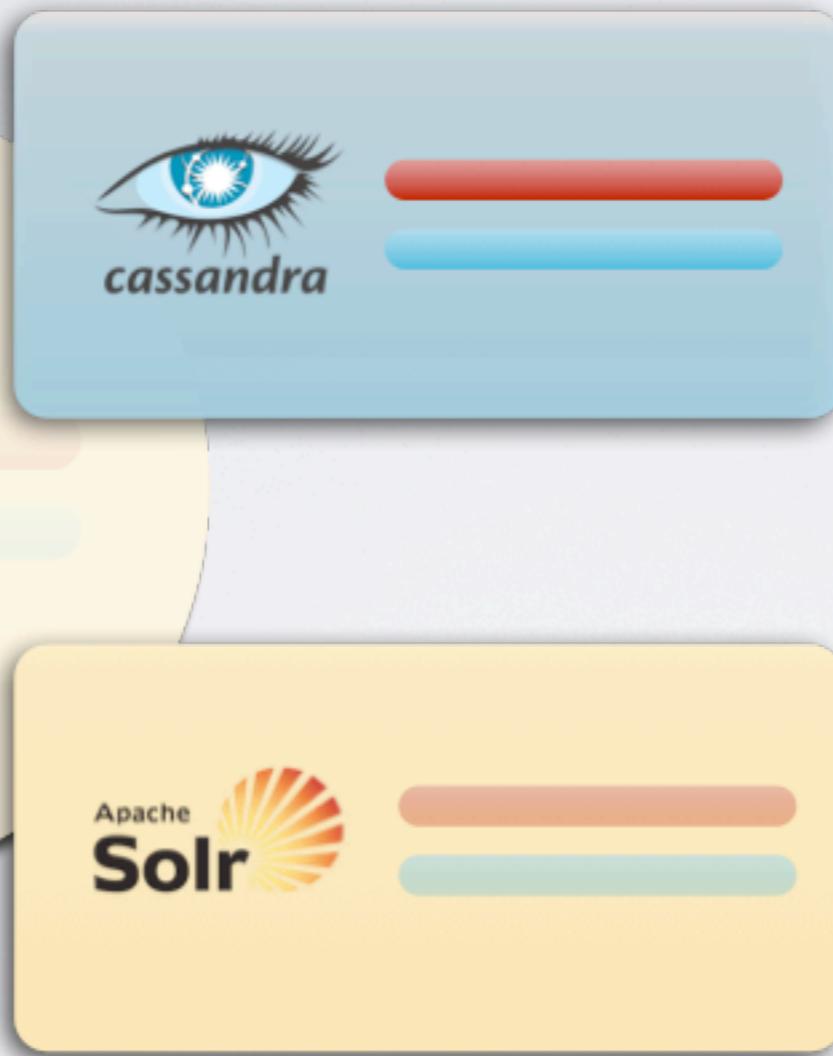
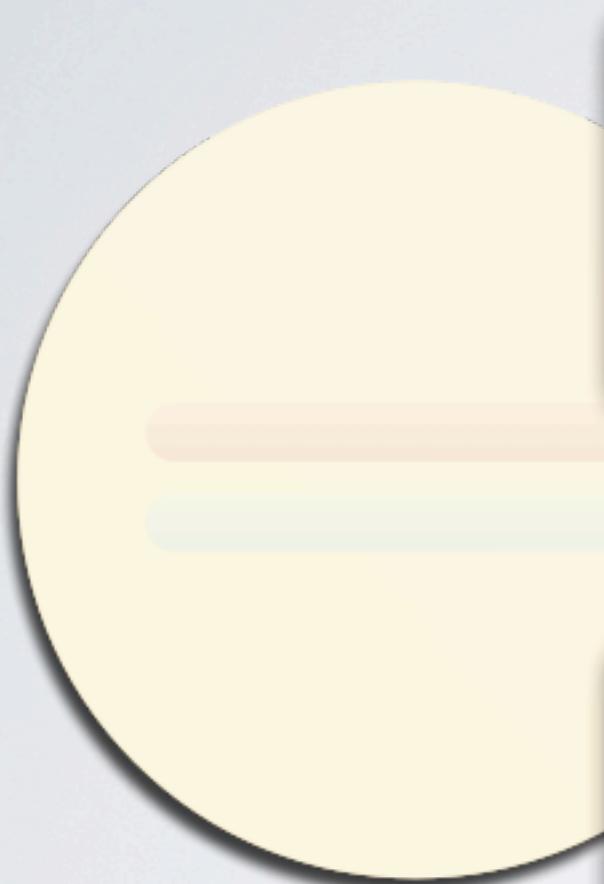
Node uses GOSSIP to find who has the information

QUERYING CASSANDRA

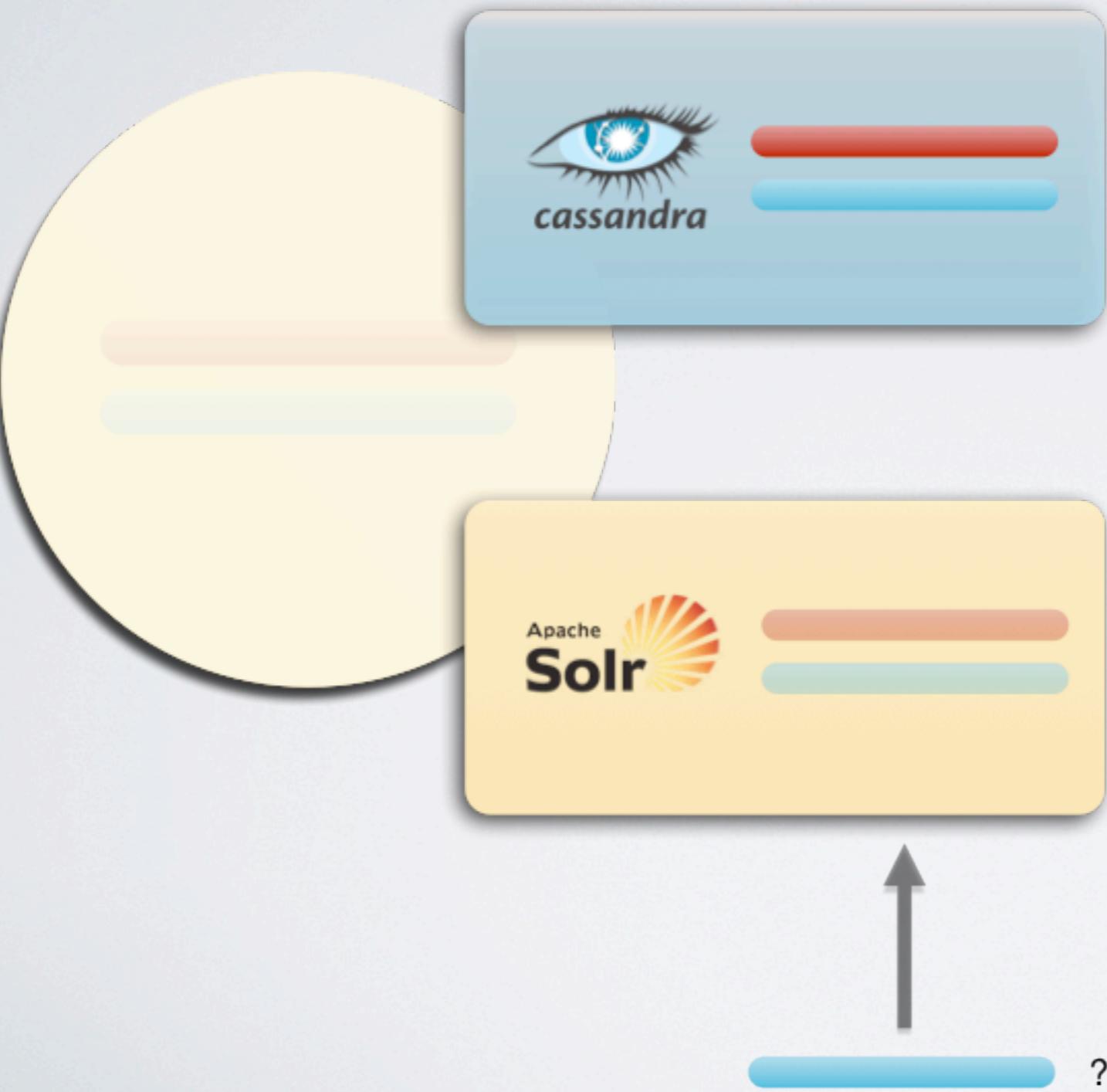
- Can query Solr or Cassandra directly
- Limited syntax with CQL, can use `solr_query` parameter



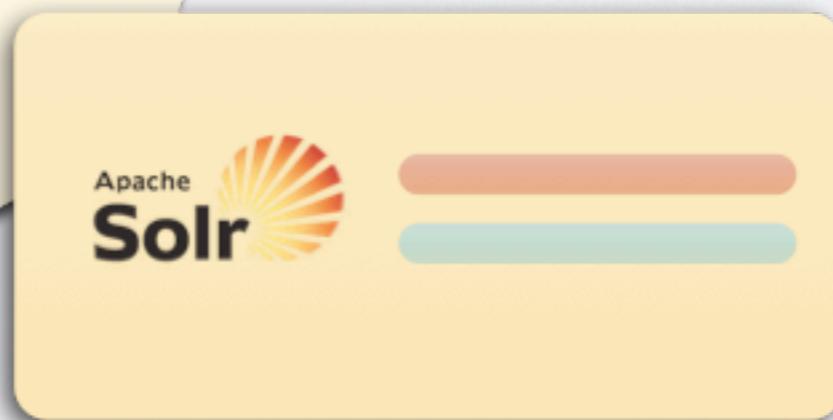
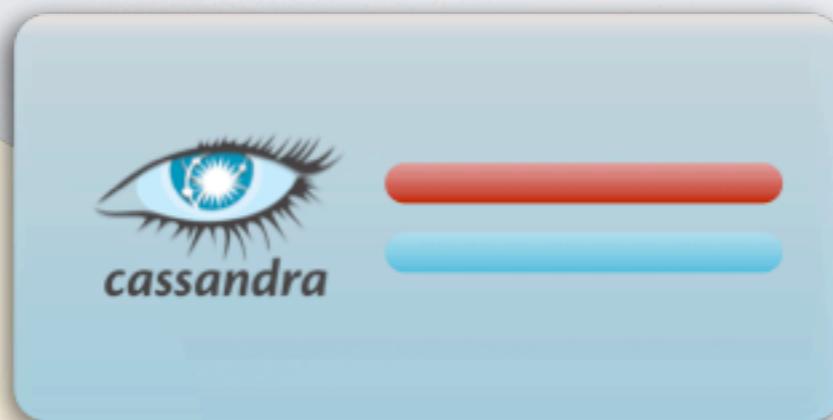
Querying Cassandra
directly



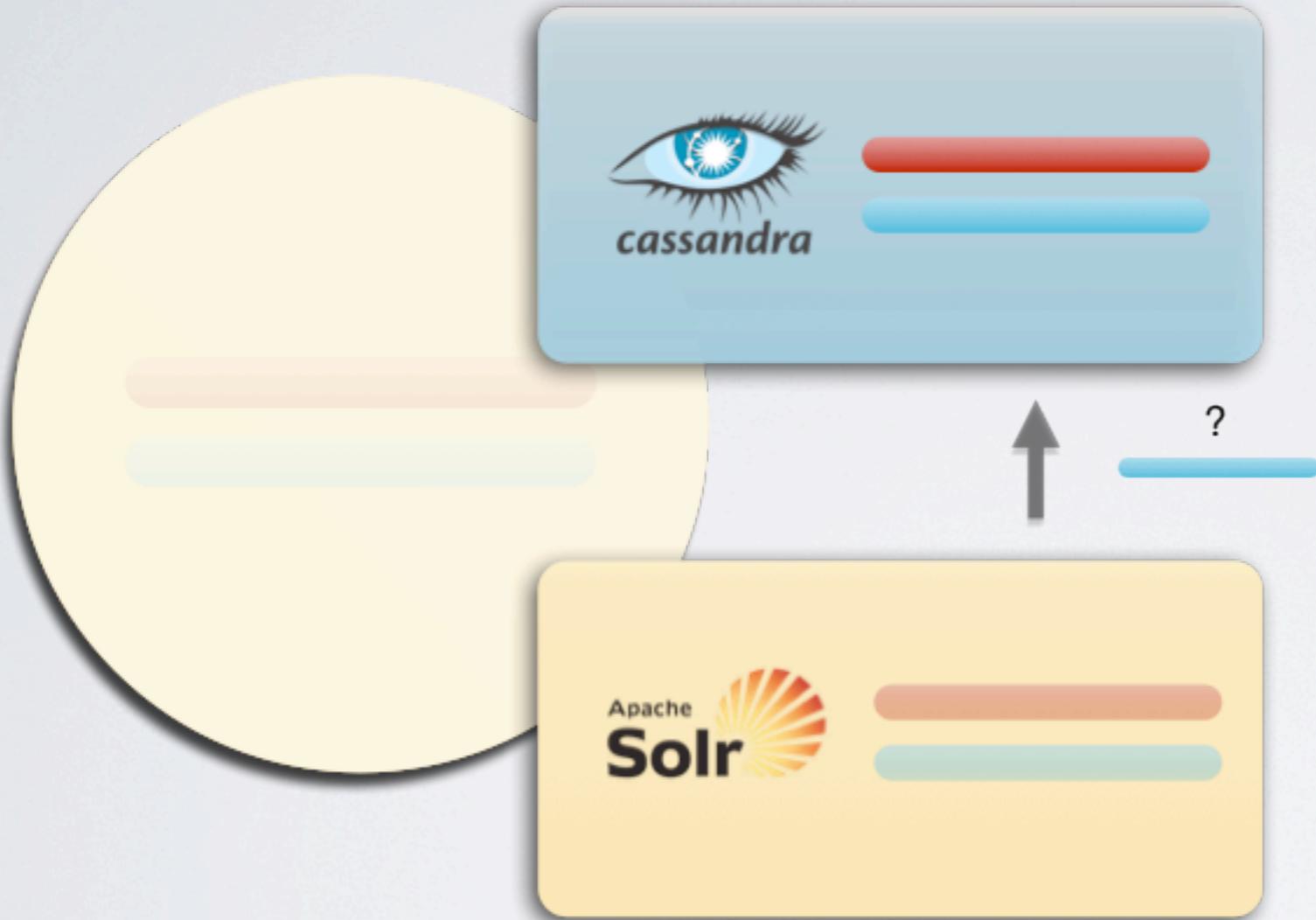
Cassandra retrieves
information from column
family



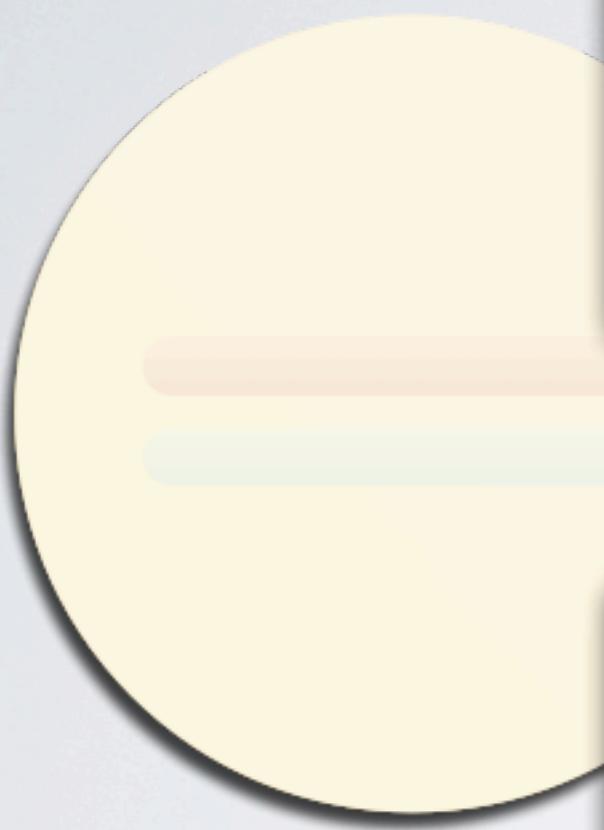
Querying Solr index



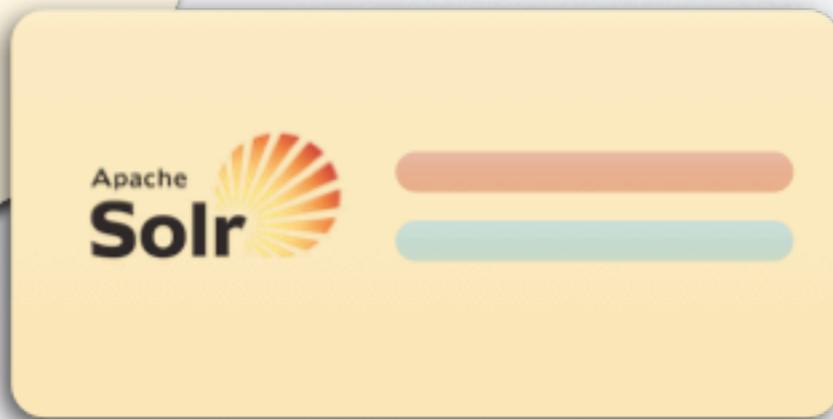
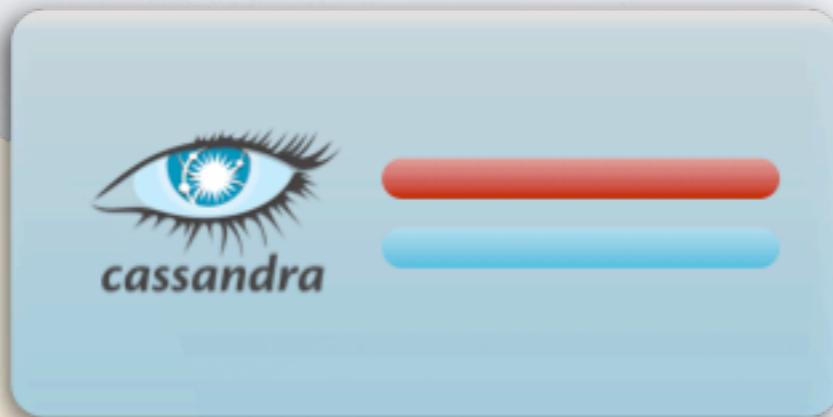
?



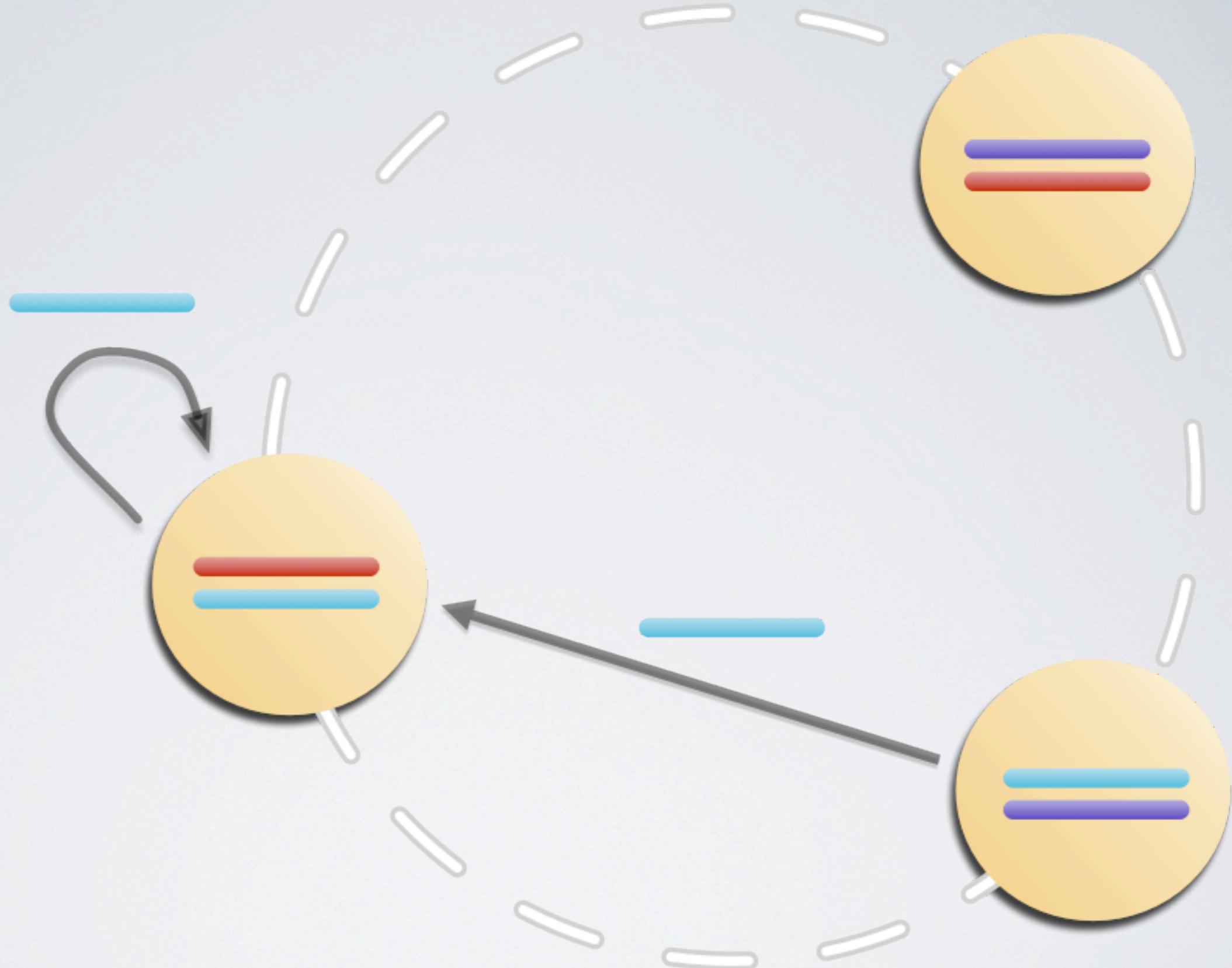
Solr checks its index, and queries Cassandra for stored data



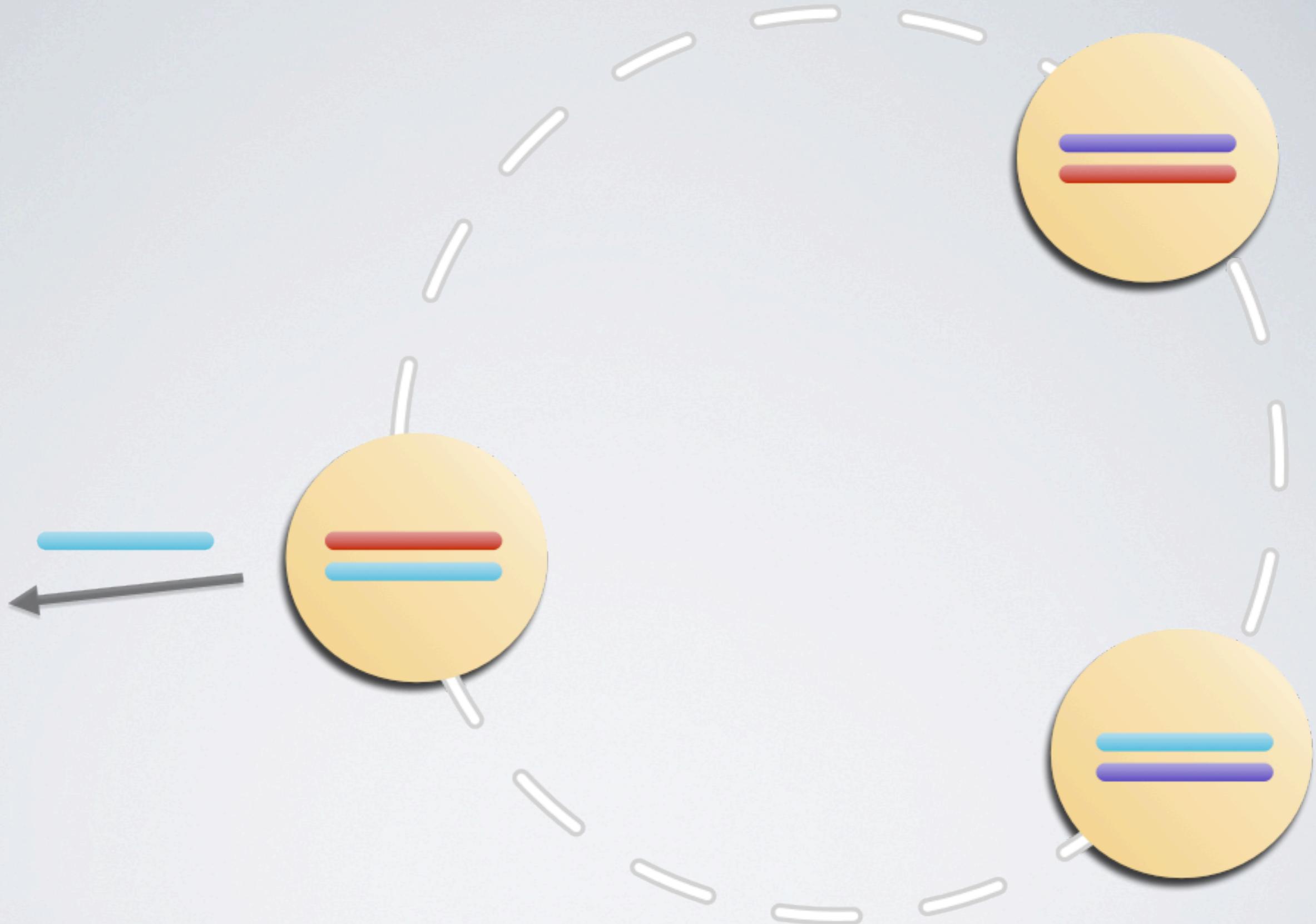
Cassandra node checks its column family



Data is always synced (as long as node is in sync)



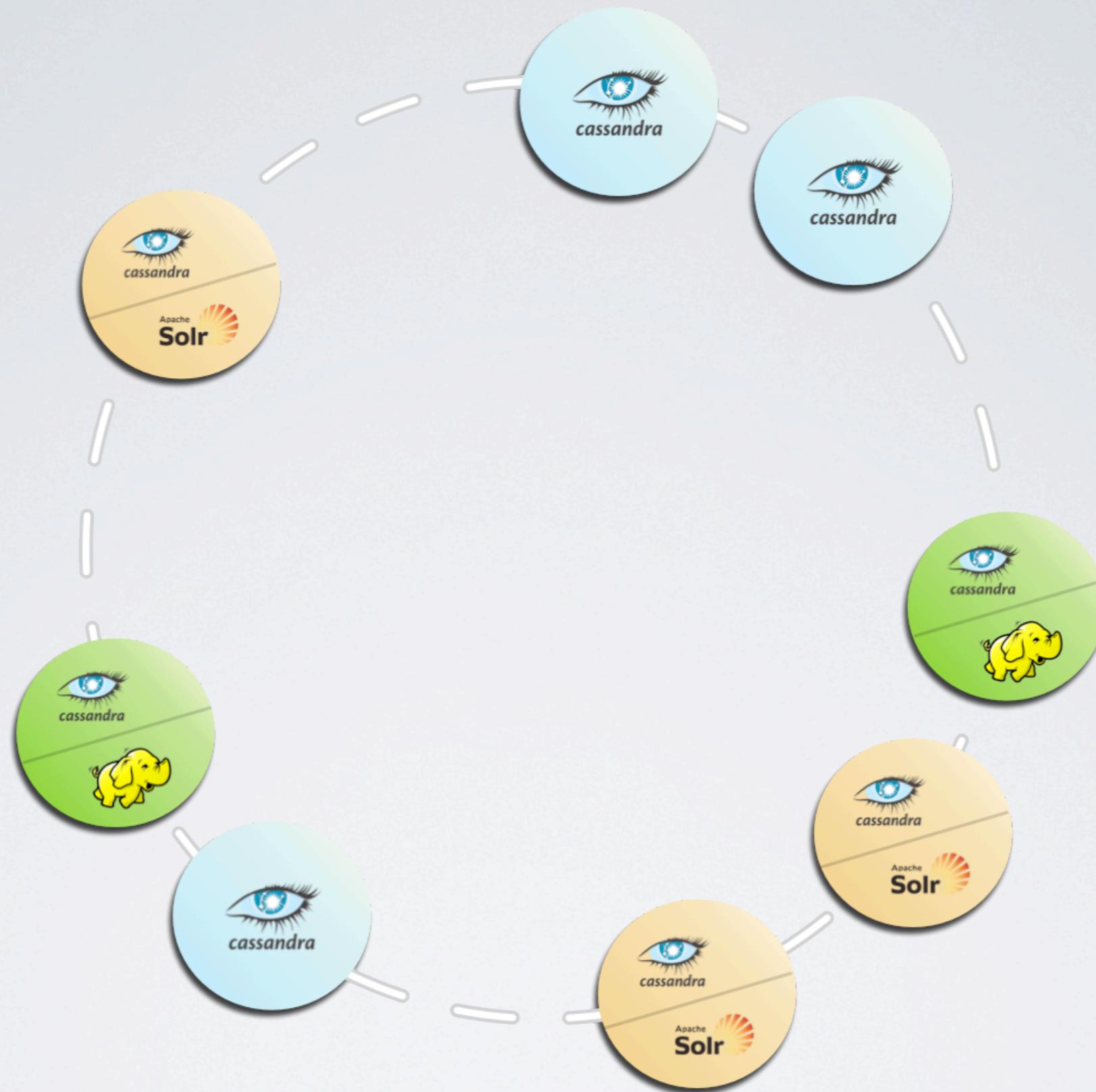
Both nodes respond with information



Updates can be committed and searched over in real time

PRODUCTION USE

- Will want a mix of analytics, search nodes



An OLTP - OLAP integrated solution

TRADEOFFS

- Cassandra is no longer schema-optimal: changing the Solr schema requires reindex (standard for Solr)
- No multi-valued fields or composite columns
- All fields must be strings: no date facets for Solr; no counters for Cassandra

CONCLUSION

- Useful for real-time text-only searches
- DSE is promising, but needs to address drawbacks

Q&A

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