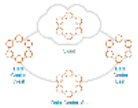

Why Cassandra (C*)?
- Always ON
  - No SPOF
- Data Automatically
  - Partitioned
  - Distributed
  - Replicated
- Linear Scale
- Ease of Admin

All part of Cassandra (C*) Architecture

Q: Cassandra is great for high performance, always-on data store. So, why DataStax?

A: DataStax provides*

Certified Cassandra Integration with:
- Spark
- Solr
- Hadoop

Security
- Kerberos, LDAP, in-flight and on-disk data encryption
- Audit Logging

Certified Drivers: java, C#, Node.js, Ruby, C/C++, Spark Connector, Spark ODBC, ODBC, Hive ODBC

In-memory option

Tools: OpsCenter, DevCenter

Support

Training*

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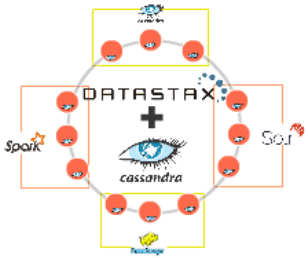

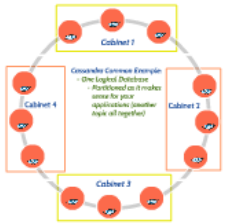

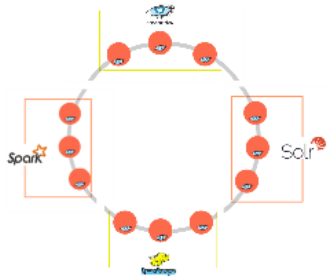

Back to Cassandra and DataStax Enterprise functionality...

Q: How does OSS C* Relate to DataStax Enterprise (DSE) and C*?

With C* 3.0 OSS will be "tick-tock" release cycle
- First month feature release, next bug fixes. Rinse. Repeat*.

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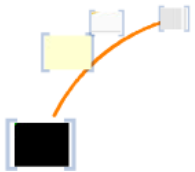
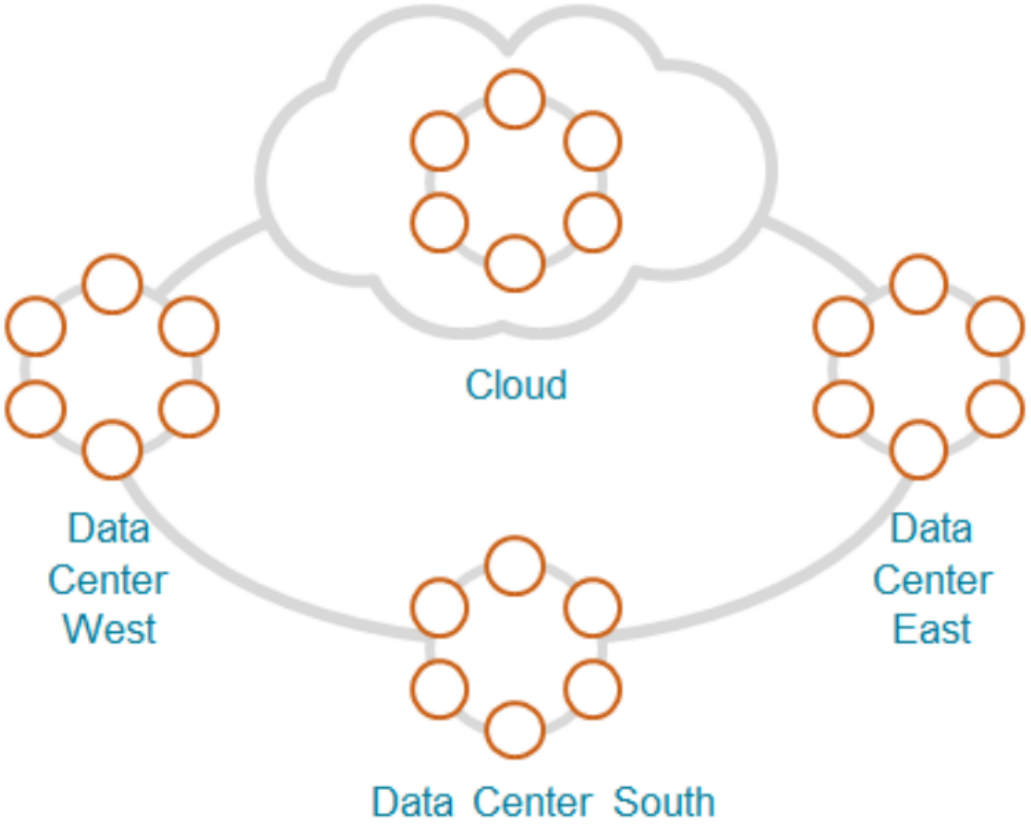



DATASTAX
cassandra



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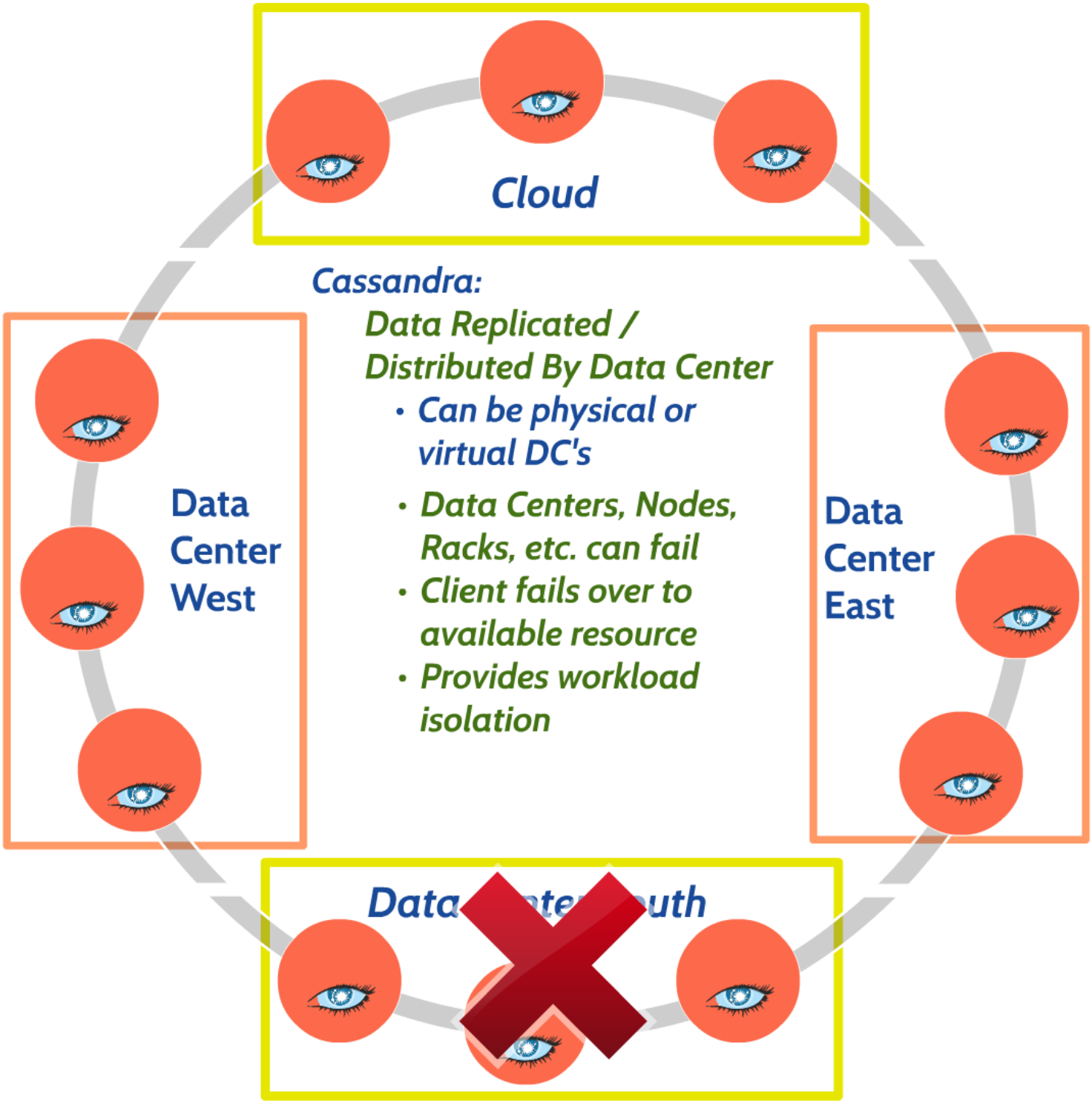
Cloud
Cassandra:
Data Replicated /
Distributed By Data Center
• Can be physical or virtual DC's
• Data Centers, Nodes, Racks, etc. can fail
• Client fails over to available resource
• Provides workload isolation
Data Center West
Data Center East

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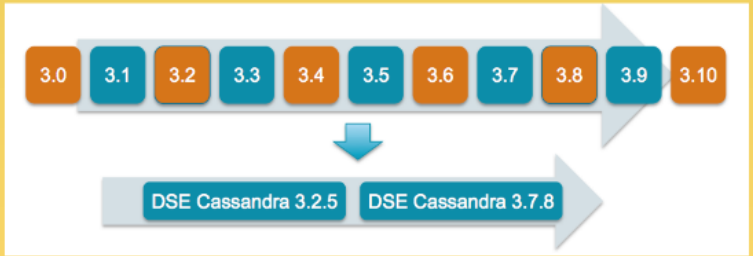

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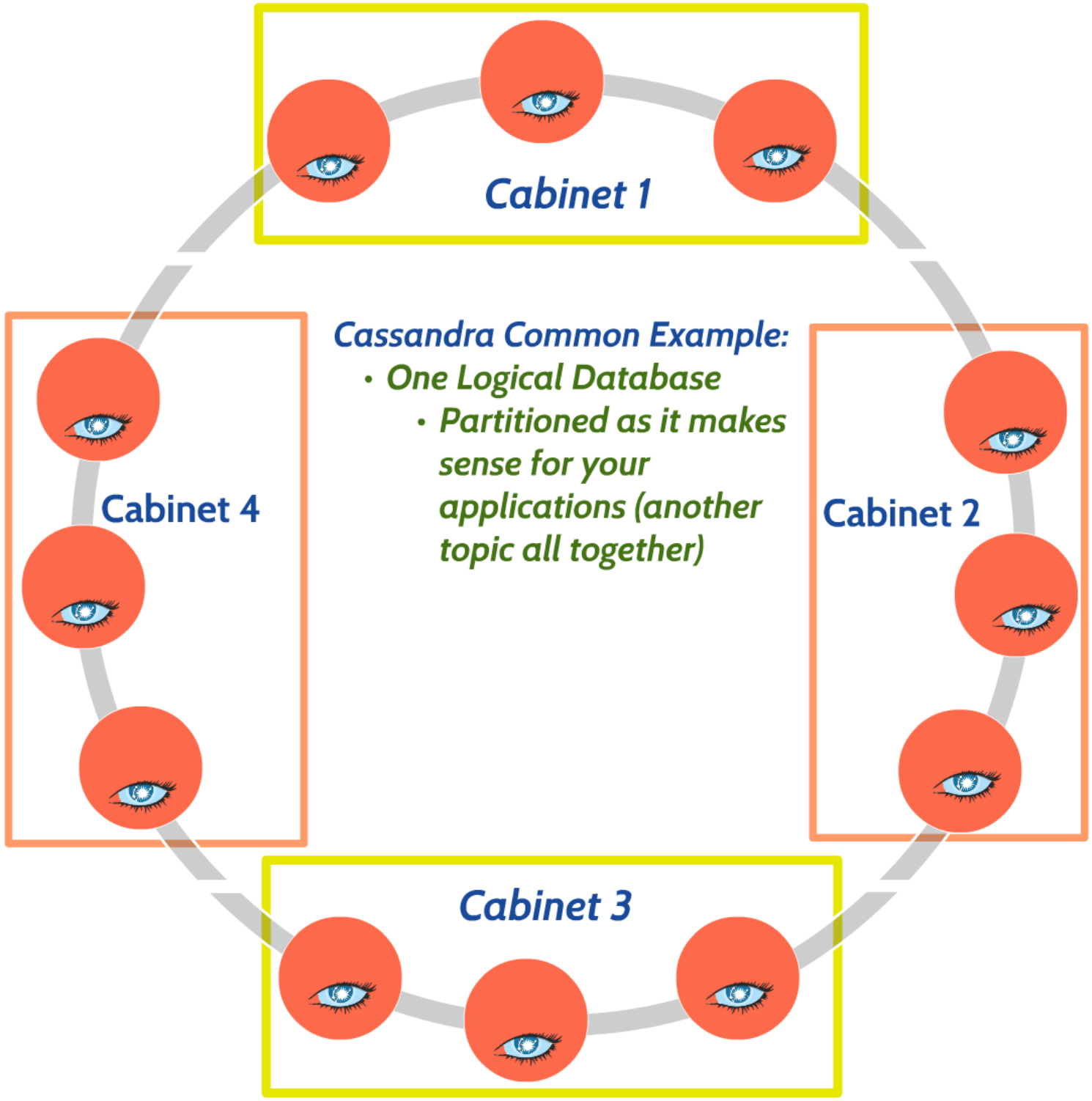
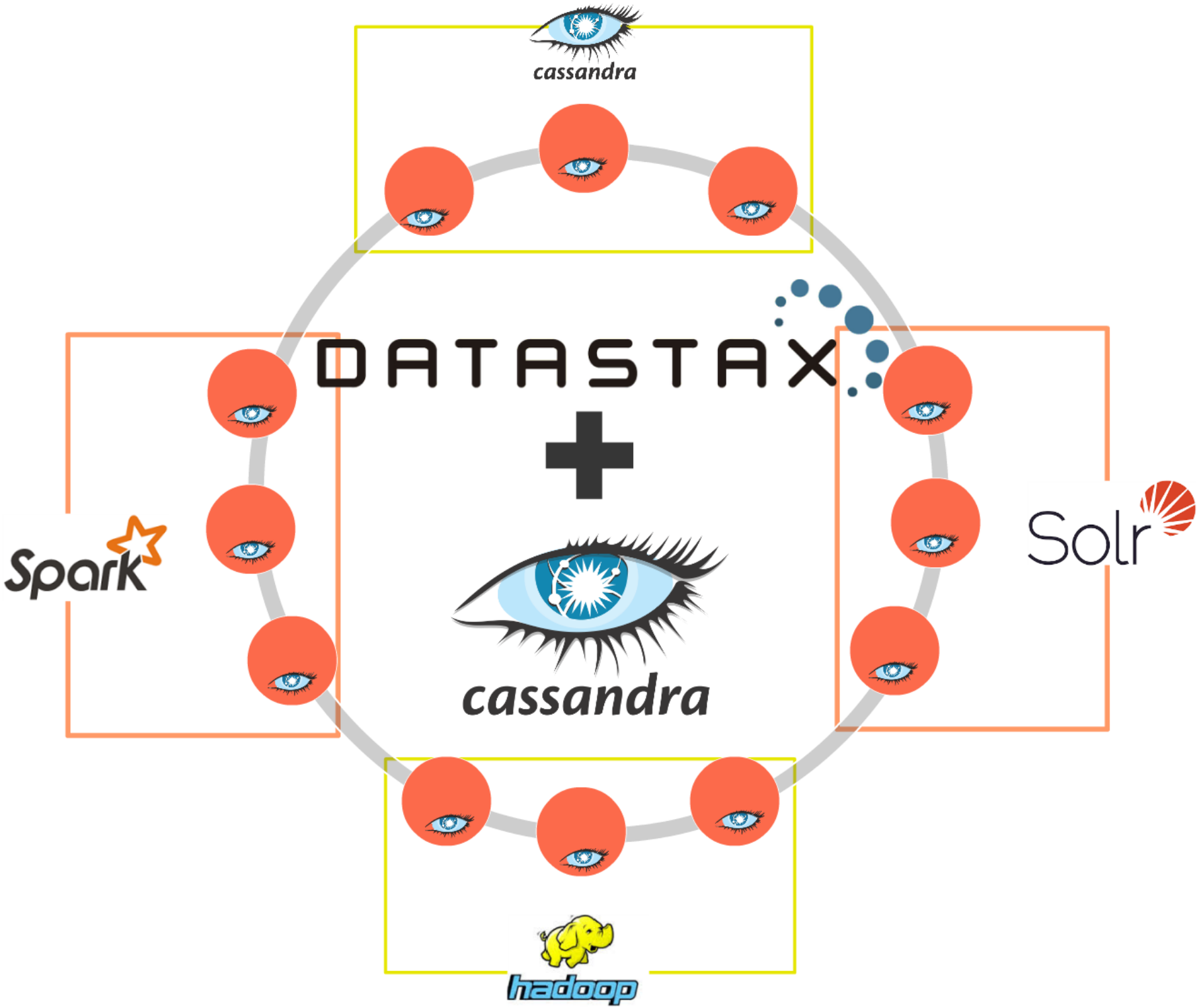
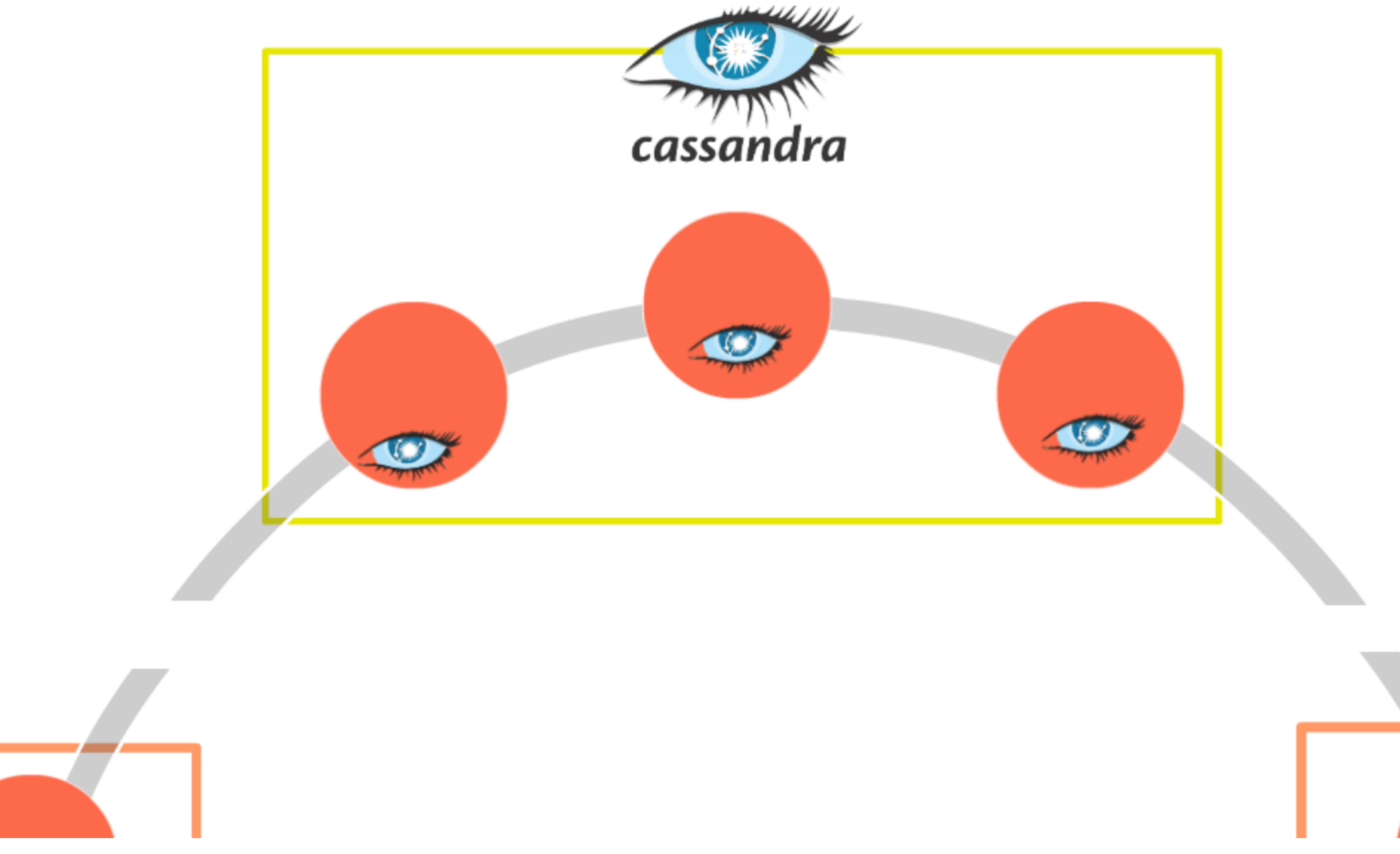

Cabinet 1
Cabinet 2
Cabinet 3
Cabinet 4
Cassandra Common Example:
• One Logical Database
• Partitioned as it makes sense for your applications (another topic all together)


cassandra
DATASTAX
+
cassandra
Spark
Solr
hadoop


cassandra

DataStax Enhancements For C* Environment

DSE Operational Enhancements

Automatic Management Services

- Capacity Planning Service
  - History used to forecast future resource needs
- Performance Service
  - Collects performance statistics by:
    - Slow queries by time threshold
    - Database, keyspace (schema), table
    - Cluster, data center, node
    - System (thread pool, etc.)
    - User activity
    - Histogram summaries
    - Solr statistics (as above, and Solr specific)
    - Data stored in tables for custom queries
- Backup / Restore Service
  - Slow queries by time threshold
  - Database, keyspace (schema), table
  - Cluster, data center, node
  - System (thread pool, etc.)
  - User activity
- Repair Service
- Best Practice Service

DSE Security

Automatic Management Services

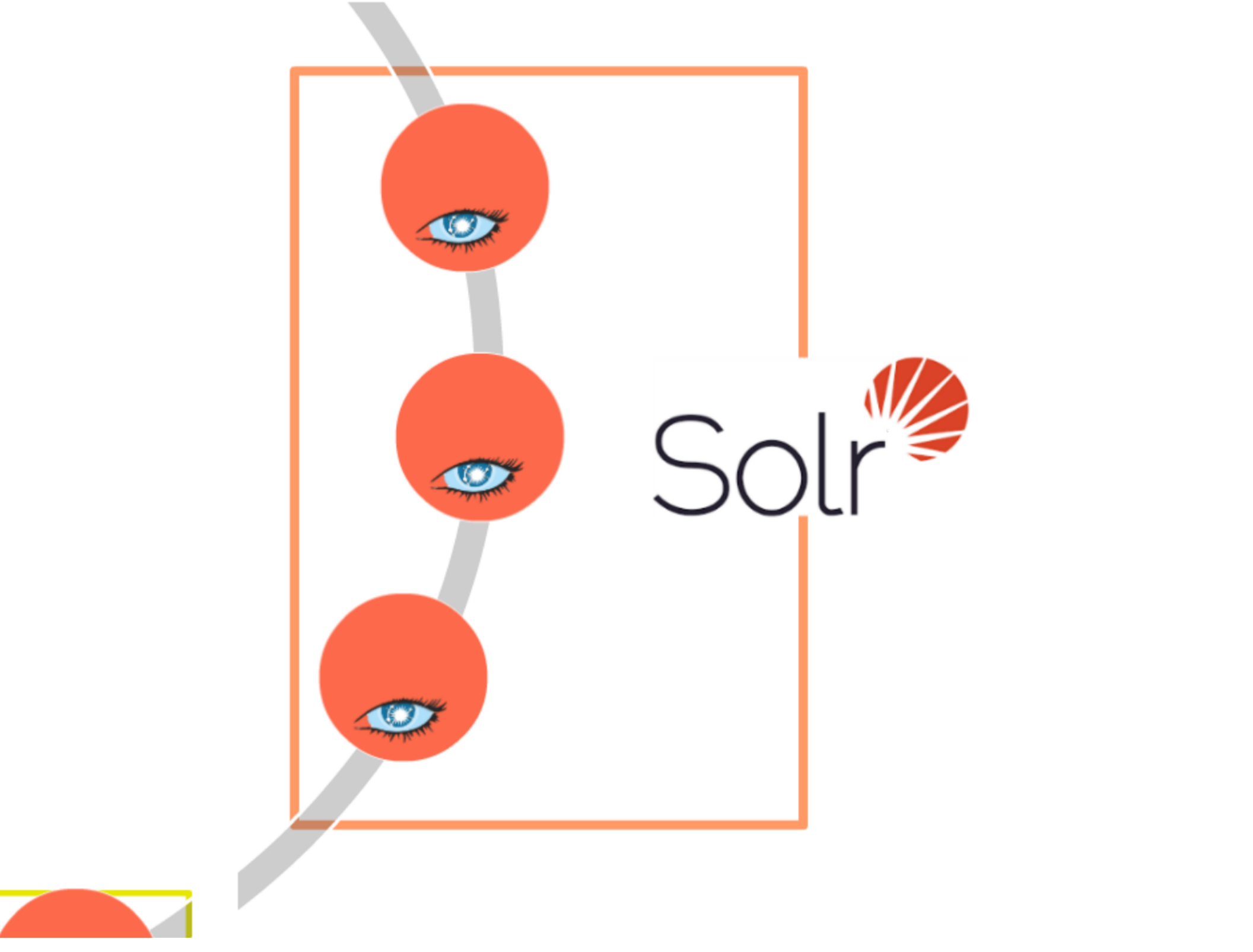
- Authentication
  - LDAP
  - Kerberos
- Authorization
- Encryption
  - Client-to-node
  - Node-to-node
  - At-rest
    - Data tables
    - System level (Vormetric)
- Audit Logging
  - CQL activity

DSE In-Memory Tables

Used for smaller, heavily trafficked tables
Commonly used for overwrite workloads

Sqoop For Import / Export

Not the only way to get data in / out


Solr

DataStax Integration with Solr

Solr Backed By C* Datastore

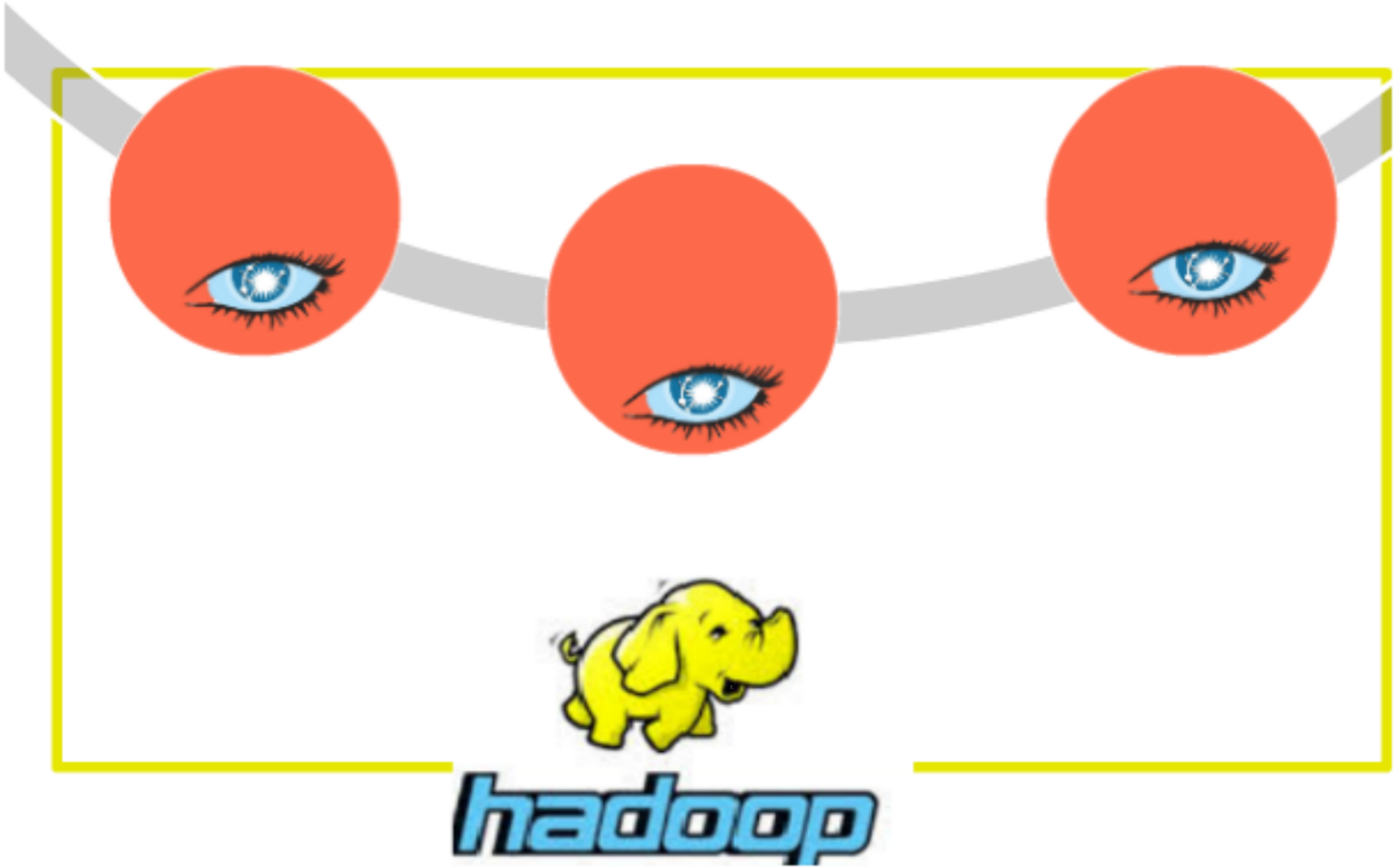
Automatic real-time Solr indexing

- No full re-index when data changes

Using Cassandra Allows For

- Scalability
  - Data part of C*
  - Cluster rebalancing
  - Linear scalability, no SPOF (no Zookeeper!)
- DSE Security
- Traditional Solr interface and CQL interface
  - inserts, updates, deletes apply to the *Cassandra Database* (*mutations* are durable)
  - Solr allows for queries to be run that are not part of the C* access path

It's Solr! Another way to interact with Cassandra stored data. All DSE integrations (Solr, Spark, Hadoop) work with the same Cassandra data.


hadoop

DataStax Integration with Hadoop(s)

C* Data Accessible With Hadoop

Map-Reduce Against C* Data

- No SPOF... and all the other C* goodness
- Run one or more job trackers across multiple data centers (workload isolation)

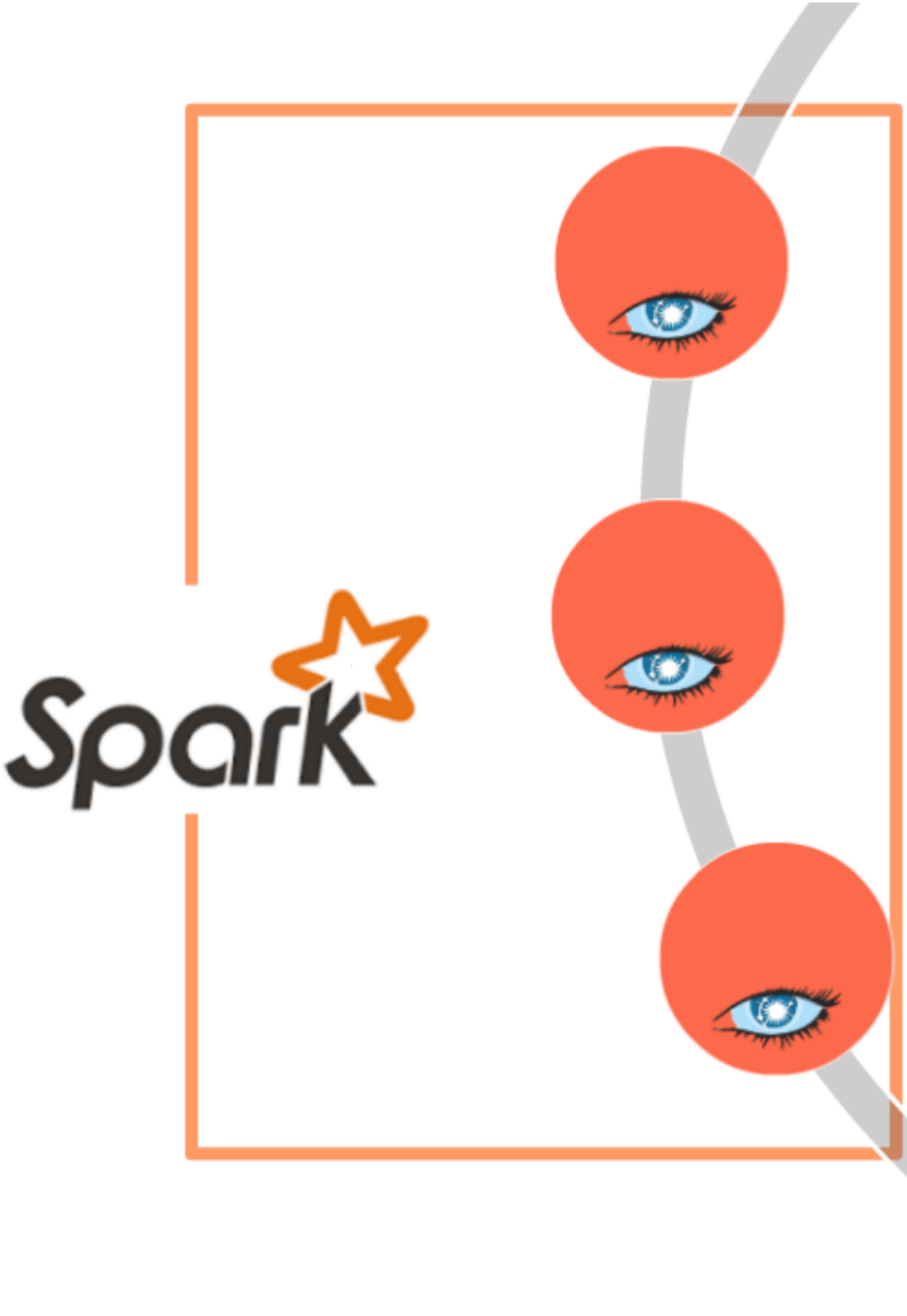
Two Integration Flavors

- Bring Your Own Hadoop (BYOH)
  - Integration with Cloudera and Hortonworks
- Apache Hadoop
  - Ships with DSE

Tools integration

- Hive / Hive ODBC
- Pig
- Mahout

Again, another way to interact with Cassandra stored data. All DSE integrations (Solr, Spark, Hadoop) work with the same Cassandra data.


Spark

DataStax Integration with Spark

Spark on C*

- Server-Side filters (where clauses)
- Cross-table operations (JOIN, UNION, etc.)
- Data transformation, aggregation, etc.

Spark Leverages C*

- Data location aware (speed)
- Spark Master leverages C* (no Zookeeper!)

Integration includes

- Spark streaming
- Scala support
- Spark Java API support
- Spark Python API (PySpark) support
- Spark SQL support

Databricks ODBC Driver

Much is OSS

... another way to interact with Cassandra stored data. All DSE integrations (Solr, Spark, Hadoop) work with the same Cassandra data.

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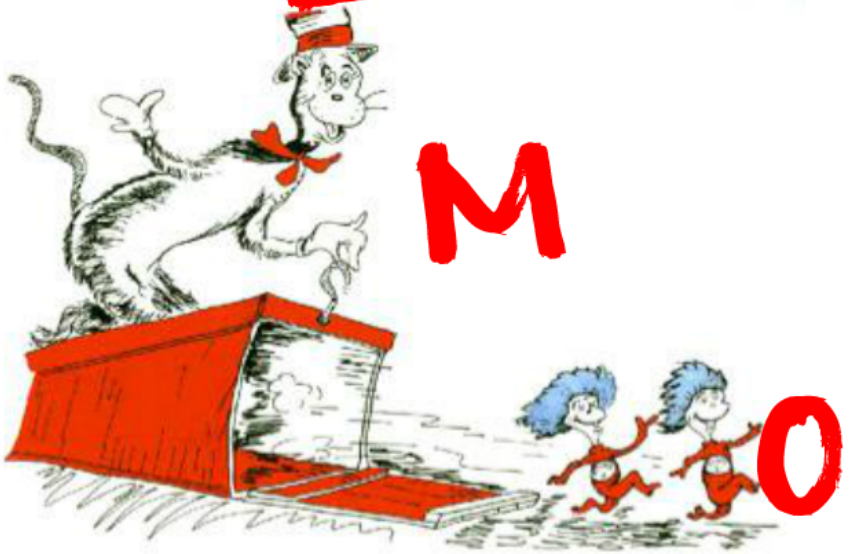
DEMO



Demo Environment

8 Nodes w/ 7 Node Cluster!

- ✓ 6 DSE / C* nodes configured as two Data Centers, named **ORANGE** and **BLUE**.
- ✓ 1 Spark / Solr node configured as Data Center named **SPARK**
- ✓ 1 DataStax **OpsCenter** Node for monitoring

Dang. That sounds impressive!

No, not really impressive...

X-over Cable on USB Ethernet

Laptop

Windows 7 / 16 GB RAM

2x VMWare

- 8 GB RAM
  - Ubuntu
  - DSE 4.6 / Spark / Solr
  - Data Center **SPARK**
  - 2 GB RAM
- Ubuntu
  - DSE 4.6/ OpsCenter
  - Data Center **OpsCenter**

NUC

Ubuntu 16 GB RAM

6x VMWare

- 2 GB RAM
- Ubuntu
- DSE 4.6
- 2 Data Centers, 3 VM's each
  - **BLUE**
  - **ORANGE**

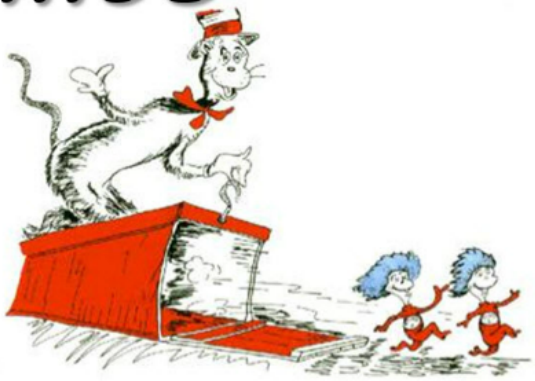
Light Bar

Blink when VM's are running

1st Orange = 1st **ORANGE** Data Center VM, etc.

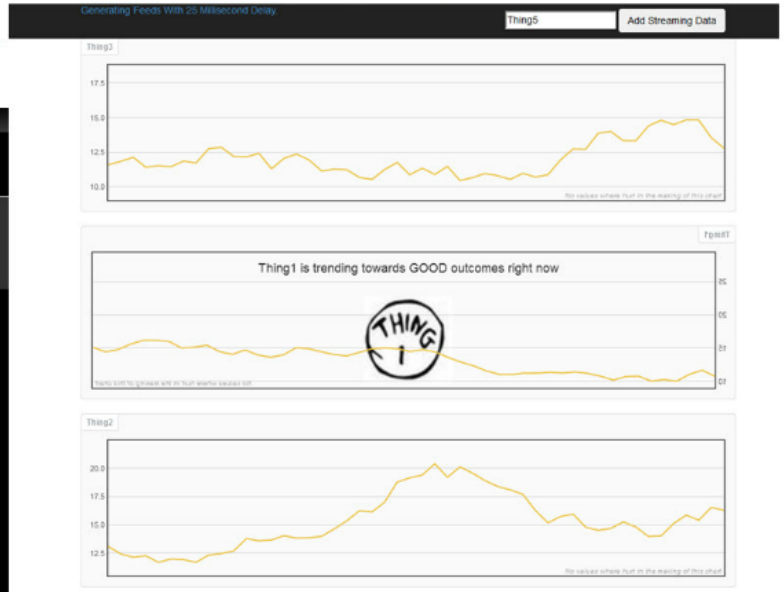
- **ORANGE = Orange DC**
- **BLUE = Blue DC**
- **Green = OpsCenter**

DemoS



Continuous Data Stream

1. Fail nodes
2. Run CQL Queries
3. Run Spark SQL Queries
4. Solr CQL Queries



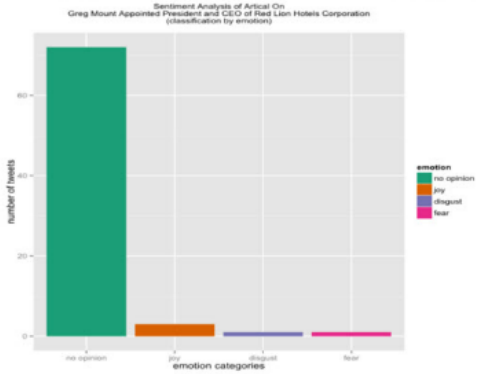
Application uses Play framework, Akka, Scala, java, C* java driver

DemoS

Other Interfaces

1. C* Solr Queries from R
   - R Package
   - Spark ODBC Tableau

```
url<-'http://192.168.73.128:8983/solr/bc1.xn/select?q=txt%3A%22execs+appointed%22~15
in.df<-solr_search(q='*:*', rows=2, fl='id,title,txt', url=url, key=key)
inText<-in.df[1,3]
```



Emotion

Polarity