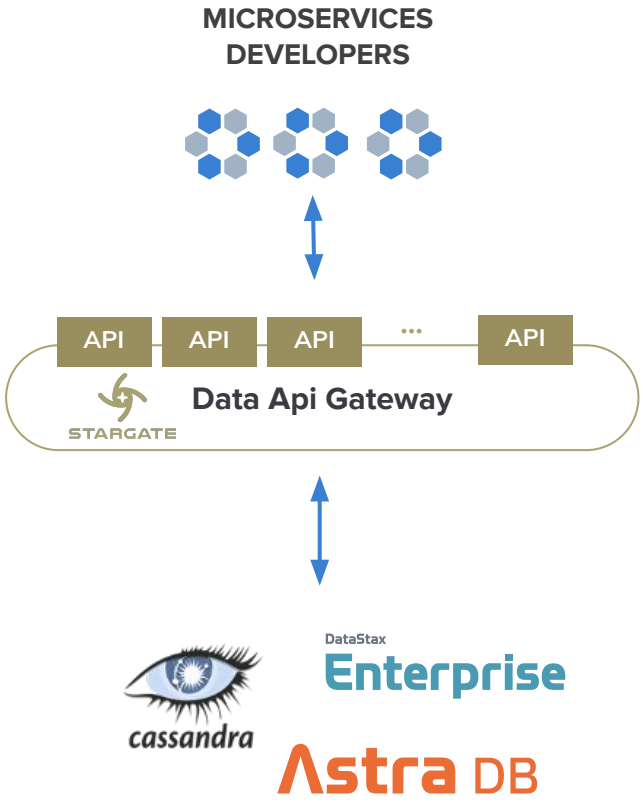
Cassandra Day
2022

Stargate – An OSS API Layer for Cassandra

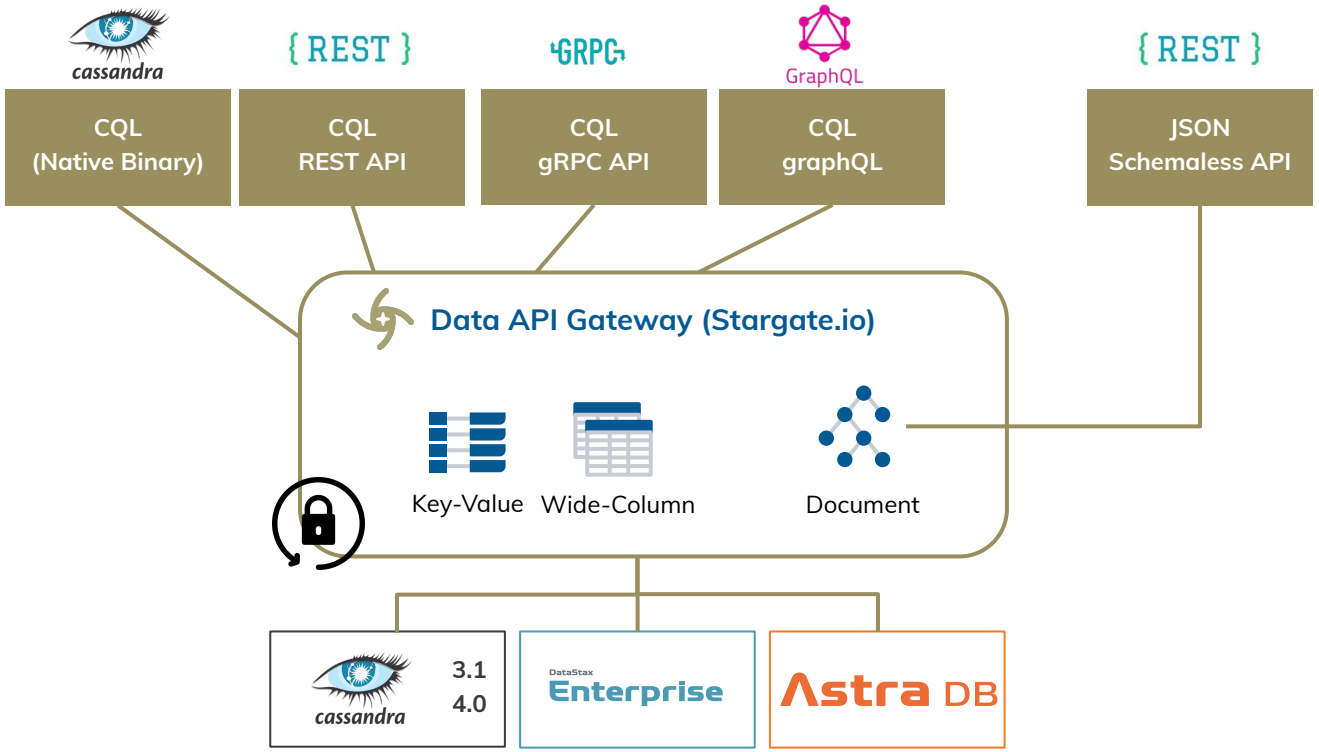
Sponsored by DataStax

What is Stargate ?

- Data API gateway
- Sits between applications and Cassandra
- Translates API calls into CQL
- Extensible, open source project on GitHub
- Apps/microservices can use more than one API



Stargate Data Gateway



Operators

Shield developers from tight coupling of applications to databases

Drop in scale and performance tuning flexibility for Apache Cassandra

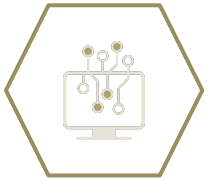
Deploys to anything and is K8s native

Developers

Easily connect apps, functions, services over HTTP across a range of use cases

JSON Document DB without having to use another DBMS platform/design

Upgrade default Cassandra security

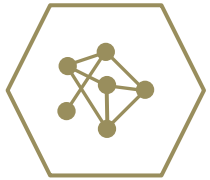


Ecosystem

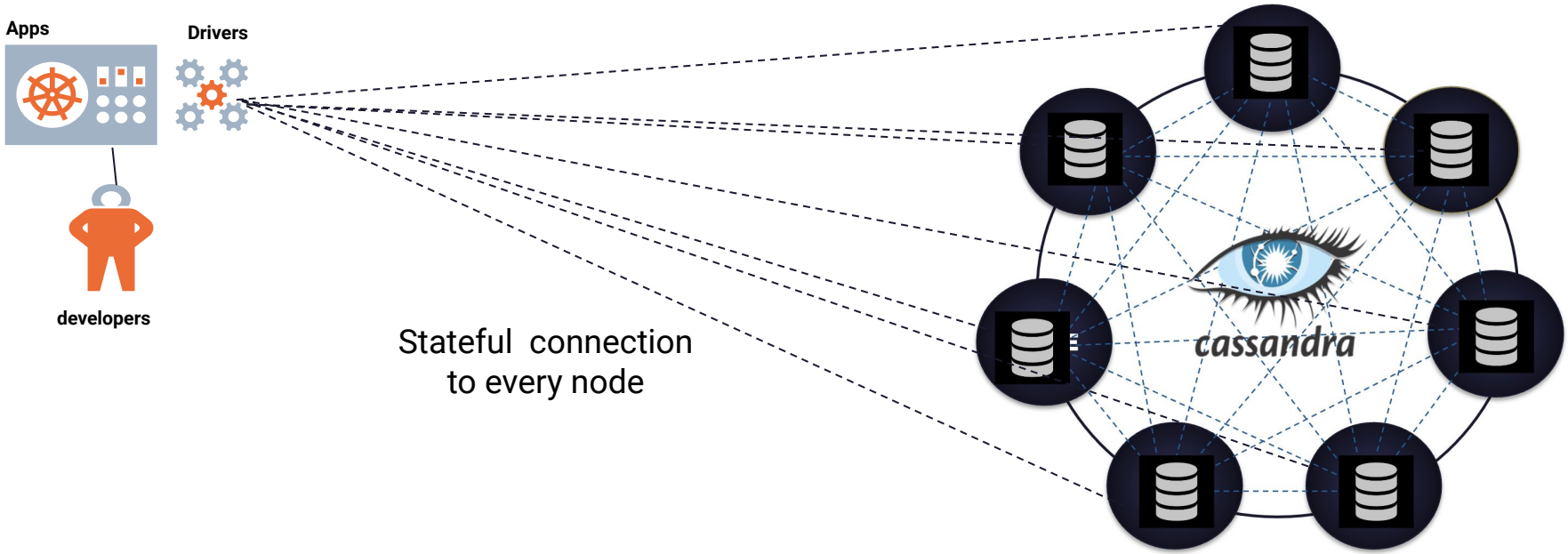
Extend Cassandra/Stargate to the APIs and data serialization formats you need

Transparent discussion and community support for ecosystem developers

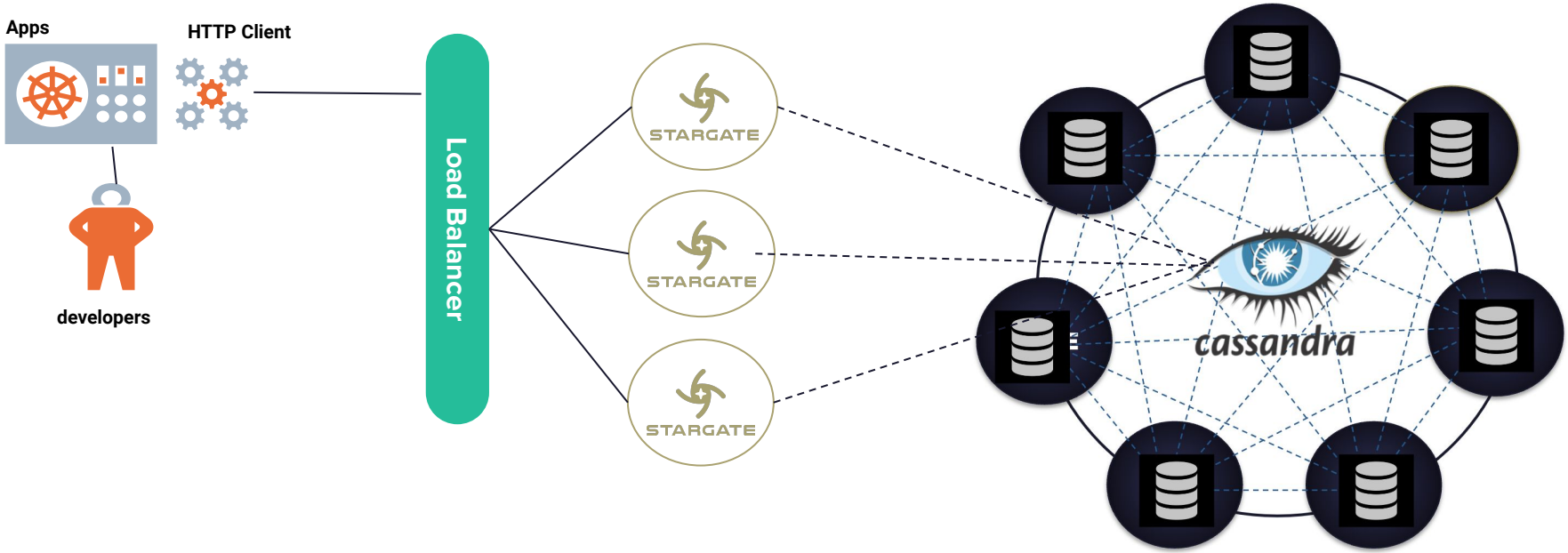
API Compatibility for other DBMS, ORMs



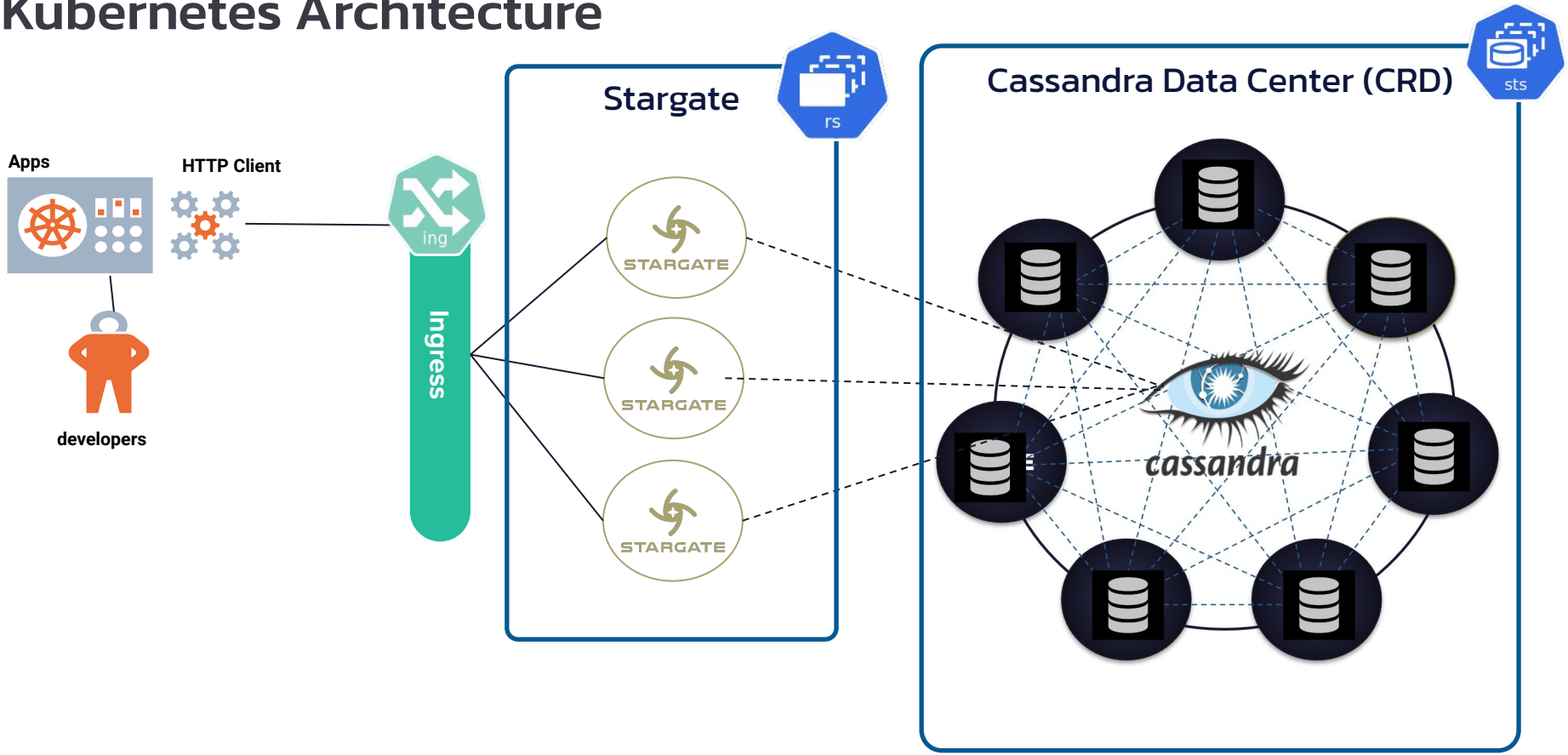
Architecture



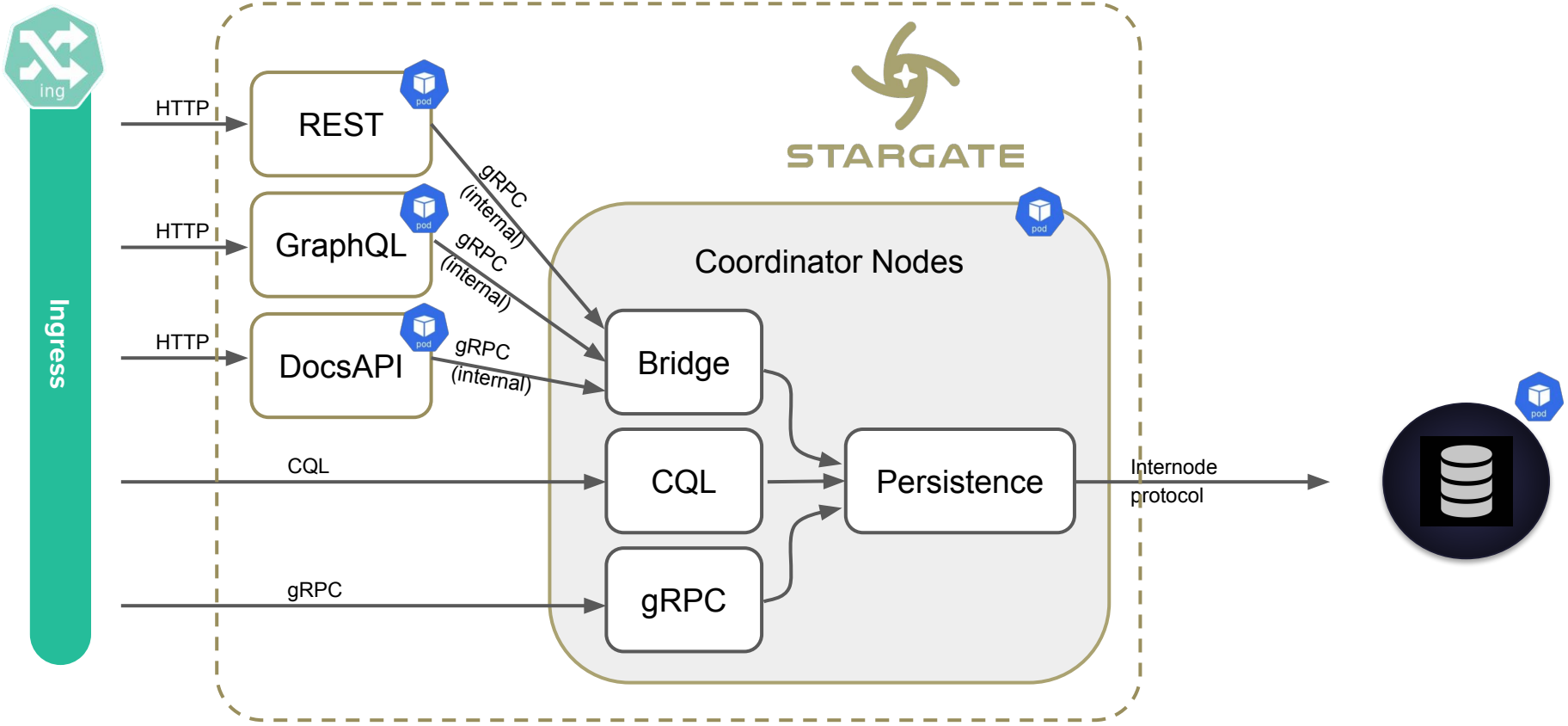
Architecture with Stargate



Kubernetes Architecture



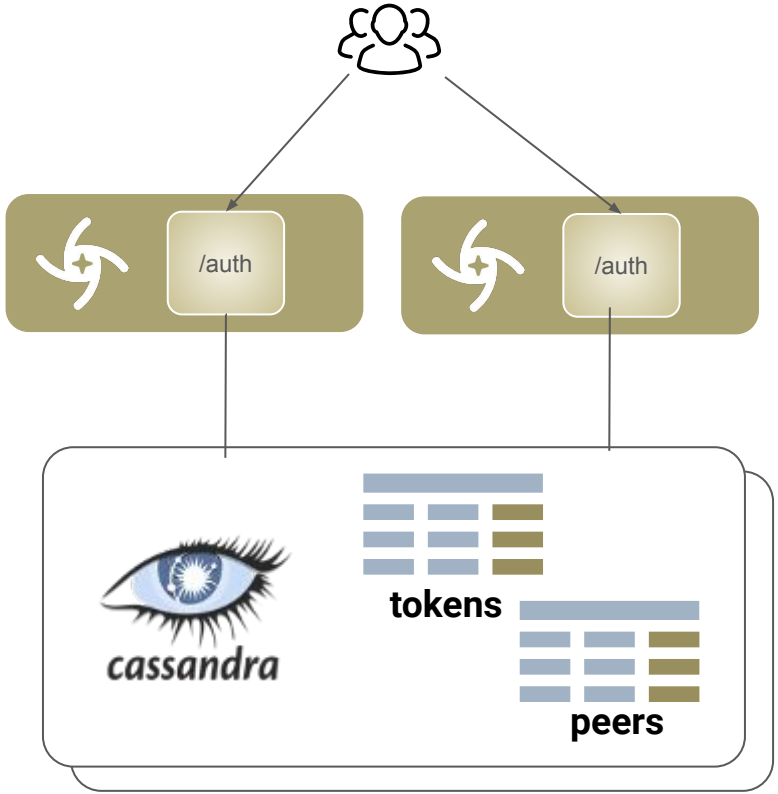
Kubernetes Architecture (bis)



Authentication

- Use Auth and get tokens (user+pwd)
- Tokens shared across instances
- Leverage on Cassandra roles (RBAC)
- `-Dstargate.auth_tokenttl` =X

```
curl -L -X POST 'http://localhost:8081/v1/auth' \
  -H 'Content-Type: application/json' \
  --data-raw '{
    "username": "cassandra",
    "password": "cassandra"
}'
```



CQL Native Drivers

Exposes native Cassandra Query Language (CQL) syntax

Uses same CQL syntax, tools and native language drivers

Used with DataStax official drivers for developing applications in any language

Can also be used with standalone cqlsh using Docker

Highest performance way to use Cassandra

CQL REST API

Greater flexibility and faster development

{REST}

Schema

The Schema API allows you to interact with keyspaces and tables in your database

Data

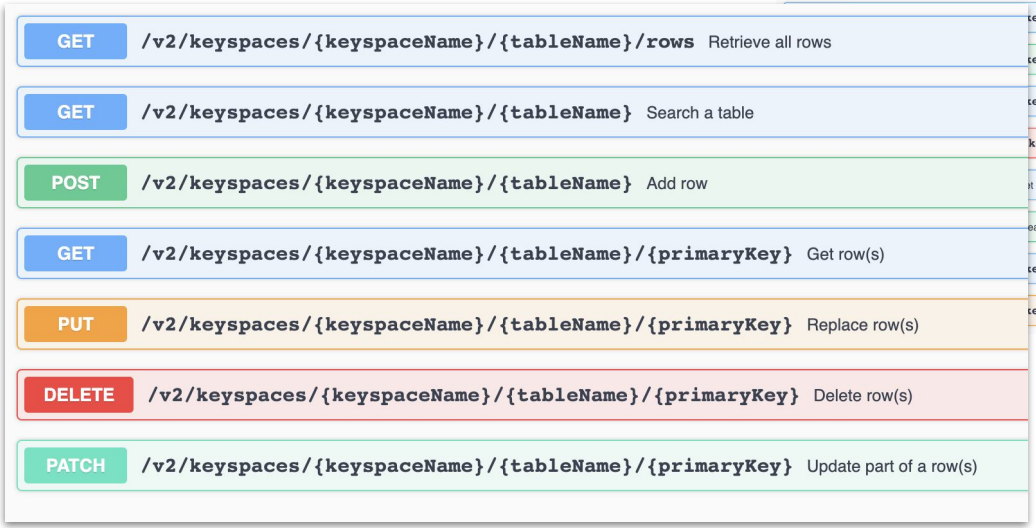
The Data API allows you to add, update, read and delete rows in your database

Supports verbs - Create, Read, Update, Delete

Stargate Rest Api

Cassandra as a Web API

{REST}



CQL gRPC Api

CQL access from any language, no driver required

Alternative to native drivers

Faster than other HTTP APIs

Lighter weight than native drivers

Easier to learn, maintain, and update than native drivers

Clients fully supported by DataStax:

Java

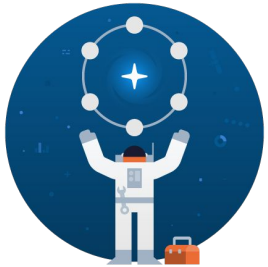
Go

Node.js

gRPC, High performance with Stargate

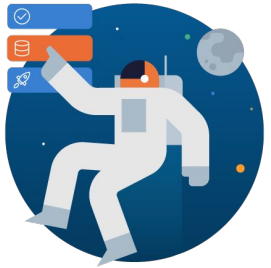
Cloud Friendly

Cloud friendly HTTP makes networking easy, without sacrificing native driver performance



Empowers developers

Reduce the need to learn network operations just to configure a driver



More connectivity options

gRPC makes it easier for DataStax and customers to generate clients in any language

Accelerate time to market

CQL GraphQL API

Make queries fast, flexible and client-friendly

GraphQL

Developer can pick exact data the client UI needs

Reduce number of queries by retrieving all relevant data from a single endpoint

GraphQL objects generated for every table

Queries - Read data

Mutations - insert and modify data

Schema API

Create/drop table

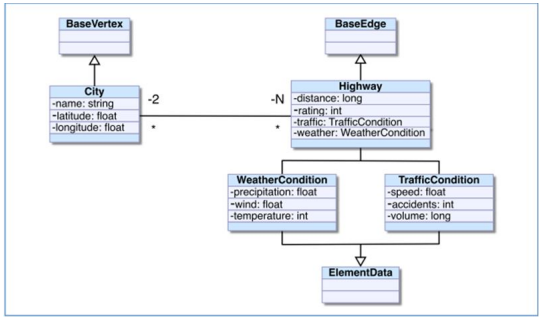
Create/delete schema

Query API

Querying and modifying table data using Graph fields

Stargate Document API

Cassandra as a Document Oriented DB



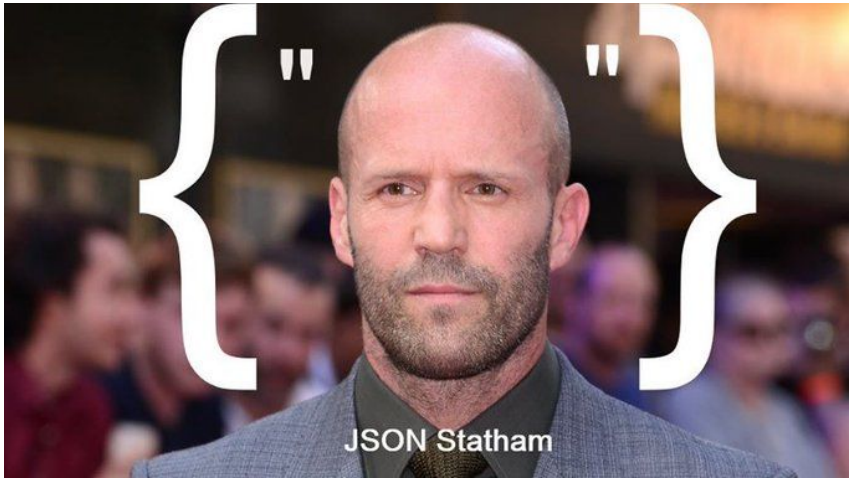
- Cassandra already handles both **JSON** and **nested objects**
  - INSERT JSON, SELECT JSON
  - Set<>, List<>,Map<>, and User Defined type (UDT) even nested
- But...
  - Strongly coupled with a SCHEMA VALIDATION
  - Dangerous with tombstones on updates

```
select json title,url,tags from videos;
```

```
INSERT INTO videos JSON '{
   "videoid":"e466f561-4ea4-4eb7-8dcc-126e0fbfd578",
     "email":"clunven@sample.com",
     "title":"A JSON videos",
     "upload":"2020-02-26 15:09:22 +00:00",
     "url": "http://google.fr",
     "frames": [1,2,3,4],
     "tags":   [ "cassandra","accelerate", "2020"]
}';
```

Stargate Document API

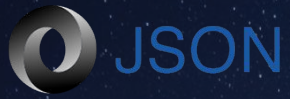
Cassandra as a Document Oriented DB



"What rules ?"

“SCHEMALESS !”

- You want to insert and retrieve any JSON documents efficiently
- Allow "schemaless" (Validation-less)
- Write to a single document is a single batch of statements
- Read from a single document is a single SELECT statement.
- Limit Tombstones with range deletes



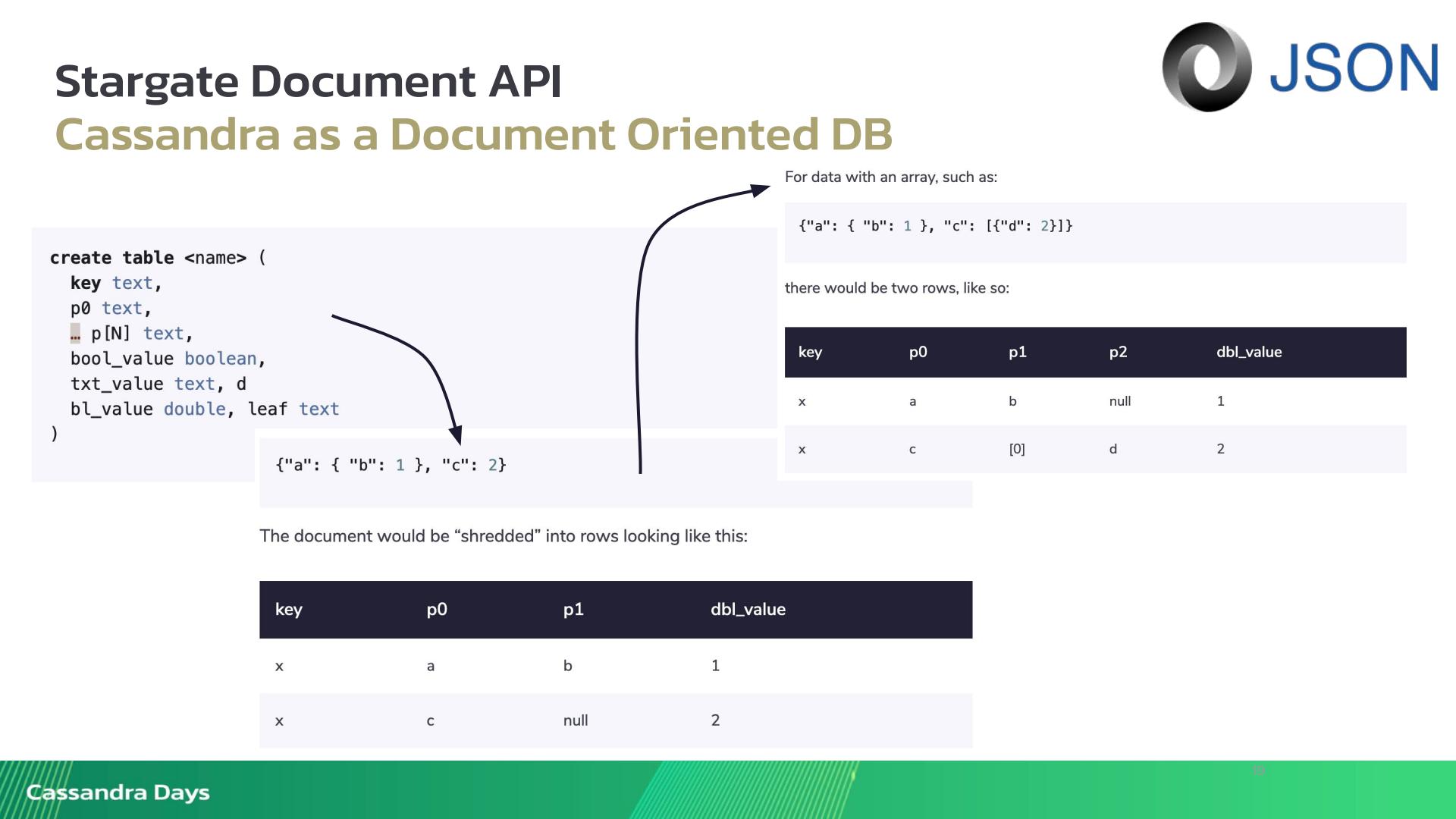
Document API

Save and search schemaless JSON documents without data modeling

- Store JSON documents and automatically create schema
- Fetch all documents in the collection
- Fetch full-document or sub-document
- Update a section of the document without reading the entire document
- Fastest way to get to market

Stargate Document API

Cassandra as a Document Oriented DB




```
create table <name> (
  key text,
  p0 text,
  … p[N] text,
  bool_value boolean,
  txt_value text, d
  bl_value double, leaf text
)
```

```
{"a": { "b": 1 }, "c": 2}
```

The document would be “shredded” into rows looking like this:

key	p0	p1	dbl_value
x	a	b	1
x	c	null	2

For data with an array, such as:

```
{"a": { "b": 1 }, "c": [{"d": 2}]}
```

there would be two rows, like so:

key	p0	p1	p2	dbl_value
x	a	b	null	1
x	c	[0]	d	2

Stargate Api Overview

Cassandra Query Language | **Document !**

Cassandra Query Language

SQL like Table Model

Structured Data

Key-Value Data

Strong Types

Minimal query overhead

gRPC

gRPC

Structured Data (CQL)

Lighter weight

Native driver alternative

Low query overhead

GraphQL

Hierarchy of types and fields

Structured Data

Key-Value Data

Low query overhead

{REST}

REST

Row based

Structured Data

Key-Value Data

Weaker Types

High query overhead

Document

JSON Documents

Semi-Structured Data

Weaker Types

High query overhead

More Performant ← → **More Flexible**

Cassandra Day
2022

Thank you!

Sponsored by DataStax