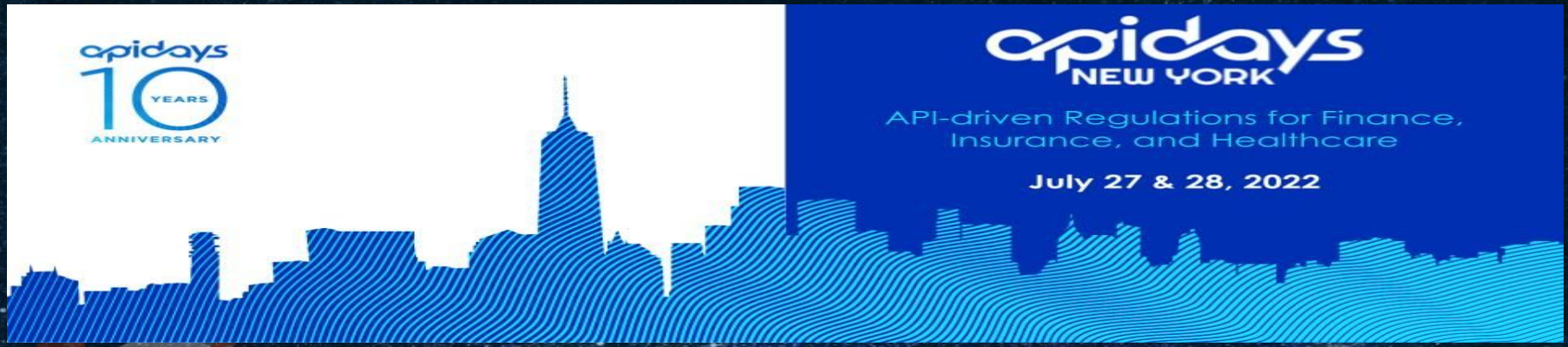


Expose Rest,Graphql,Grpc Apis on Top for Your Databases

STARGATE

DataStax Developers

Cédrick Lunven

Director Developer Relations

@clunven

@clun

- Trainer
- Public Speaker
- Developers Support
- Developer Applications
- Developer Tooling

SDK

- Creator of ff4j (ff4j.org)
- Maintainer for 8 years+

- Happy developer for 14 years
- Spring Petclinic Reactive & Starters
- Implementing APIs for 8 years

apidays

DataStax Developers

Aaron Ploetz

DBRE/Developer Advocate

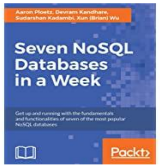
@aaronploetz

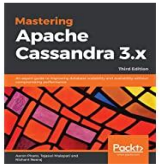
@aploetz

@aploetz

cassandra

stack overflow





- DB Engineer, Author
- Former SWE/DevOps/DB Lead @ W.W. Grainger & Target
- Rep leader of S.O. “Cassandra” tag
- Worked as an author on:
  - Mastering Apache Cassandra 3.x
  - Seven NoSQL Databases in a Week

apidays

DataStax Developers

Materials for today

https://github.com/datastaxdevs/conference-Expose-Rest-Graphql-Grpc-Apis-for-Databases

Agenda

01
Data Api
What, Why

02
Rest, GraphQL, gRPC
SWOT

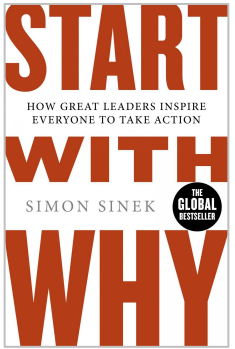
03
Data Gateway
Why and How

04
Stargate.io
Architecture

05
Demo
Api and Tooling

05
What's NEXT ?
Resources

Data API : Start with Why



- **Developers**
  - Do you like learning query languages (CQL, N1QL, GQL, cypher, gremlin….)
    - **No**. Save my JSON, give it to me back when I need it
    - ORM / Spring Data are so popular nowadays
  - Do you care about how your data is stored ?
    - Physical data model part of the interface…yikes
    - Create structures based on queries
  - Do you like installing and running databases locally
    - especially distributed databases
    - especially with datasets and integration tests

Data API : Start with Why


Me when devs ask for admin access to the database.

- **Operators and Databases Administrators**...
  - Do you allow developers to execute direct queries against your DB ?
  - Do you like opening port ranges like 0-65536 to allow communications with applications, especially in the cloud.
  - Do you like creating dedicated projects and hiring people just to create APIs to expose an existing treatment (digital transformation FTW)
  - Security,Monitoring,Throttling

Agenda

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What's NEXT ?
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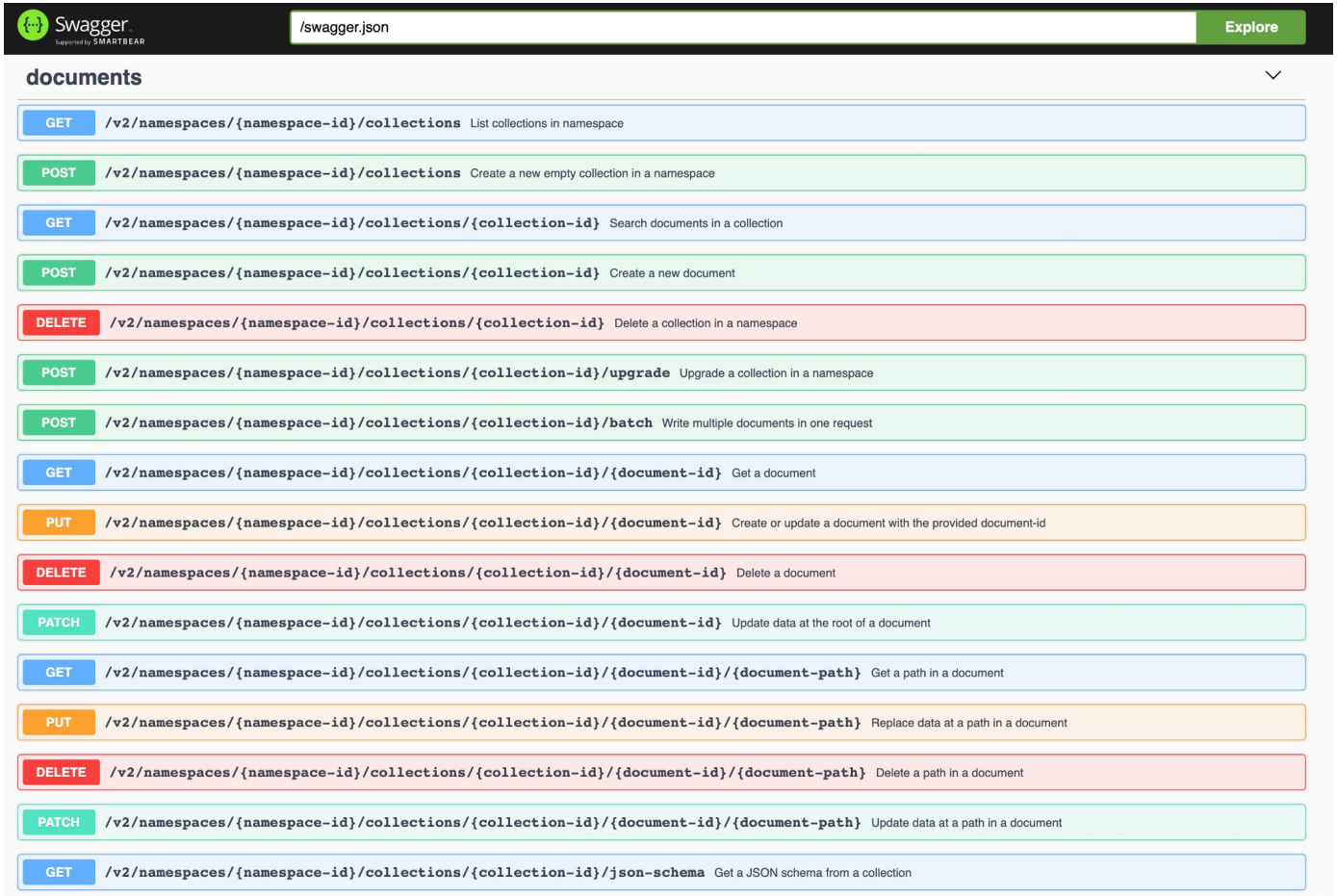
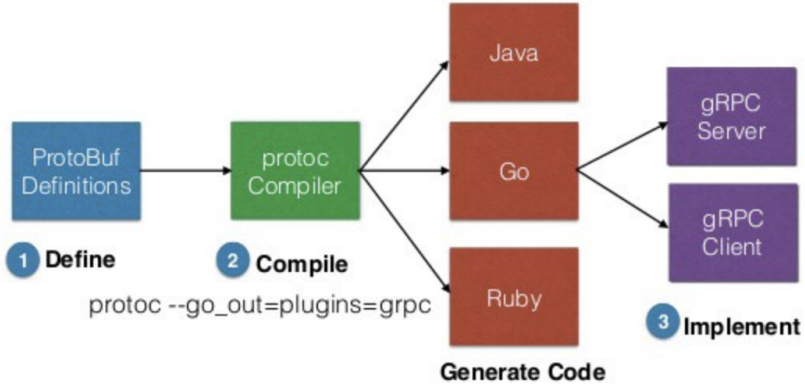
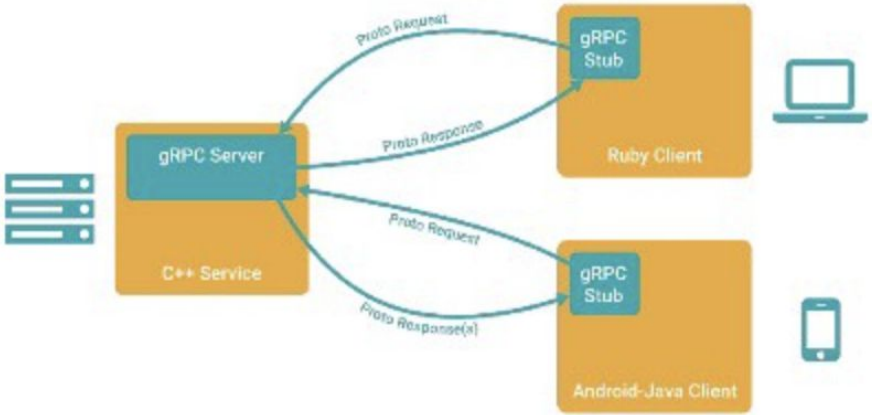
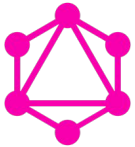
{ REST }


Swagger
Supported by SMARTBEAR
/swagger.json
Explore
documents
GET /v2/namespaces/{namespace-id}/collections List collections in namespace
POST /v2/namespaces/{namespace-id}/collections Create a new empty collection in a namespace
GET /v2/namespaces/{namespace-id}/collections/{collection-id} Search documents in a collection
POST /v2/namespaces/{namespace-id}/collections/{collection-id} Create a new document
DELETE /v2/namespaces/{namespace-id}/collections/{collection-id} Delete a collection in a namespace
POST /v2/namespaces/{namespace-id}/collections/{collection-id}/upgrade Upgrade a collection in a namespace
POST /v2/namespaces/{namespace-id}/collections/{collection-id}/batch Write multiple documents in one request
GET /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id} Get a document
PUT /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id} Create or update a document with the provided document-id
DELETE /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id} Delete a document
PATCH /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id} Update data at the root of a document
GET /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id}/{document-path} Get a path in a document
PUT /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id}/{document-path} Replace data at a path in a document
DELETE /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id}/{document-path} Delete a path in a document
PATCH /v2/namespaces/{namespace-id}/collections/{collection-id}/{document-id}/{document-path} Update data at a path in a document
GET /v2/namespaces/{namespace-id}/collections/{collection-id}/json-schema Get a JSON schema from a collection

gRPC


ProtoBuf Definitions
protoc Compiler
Java
Go
Ruby
gRPC Server
gRPC Client
1 Define
2 Compile
protoc --go_out=plugins=grpc
3 Implement
Generate Code


Proto Request
Proto Response
Proto Request
Proto Response(s)
gRPC Server
C++ Service
gRPC Stub
Ruby Client
gRPC Stub
Android-Java Client



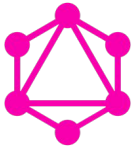
GraphQL

It is a web protocol (HTTP) that specifies the way we build and query remote APIs using a **Tree/JSON Syntax.**

```
incomingWorkshops {
    title
    abstract
    speakers
}
```

Based on a **strongly typed** language named GraphQL SDL (Schema Definition Language)

```
type Workshop {
    title: String!
    abstract: String
    speakers: [Speaker]
    releaseYear: int
}
```



GraphQL

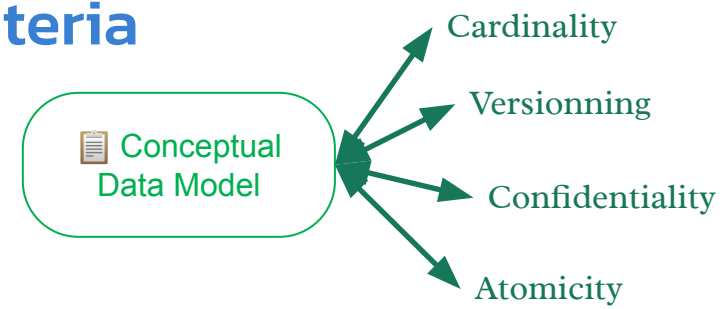
A protocol that allows the client to specify exactly **what** data it needs from a model

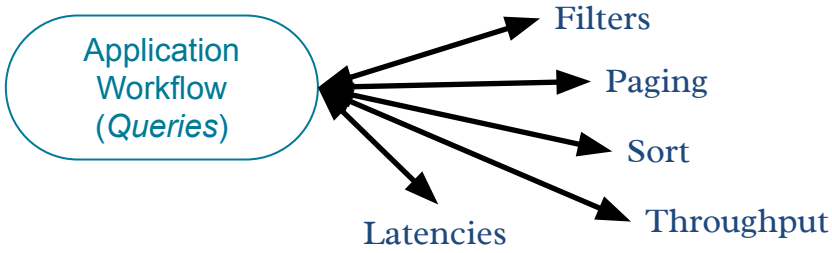
```
incomingWorkshops {
    title
}
```

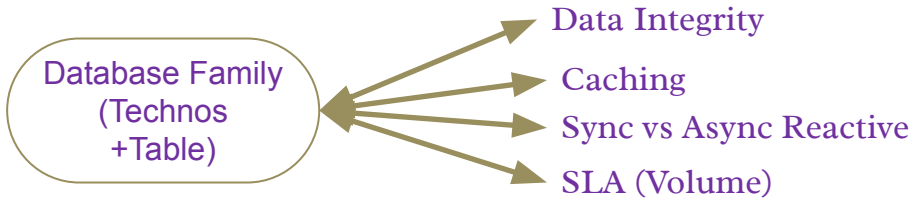
It allows one to aggregate data from **multiple relations** in a single query

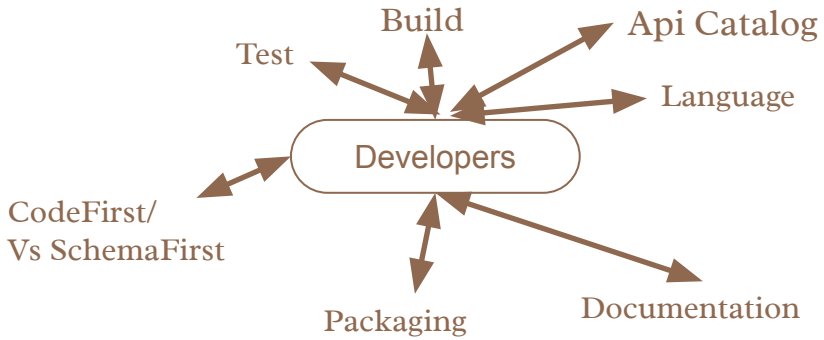
```
incomingWorkshops {
    title: String!
    abstract: String
    speakers: {
       name
    }
    releaseYear: int
}
```

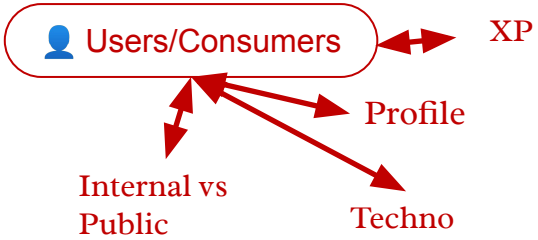
Criteria


Conceptual Data Model
Cardinality
Versionning
Confidentiality
Atomicity


Application Workflow (Queries)
Filters
Paging
Sort
Throughput
Latencies


Database Family (Technos +Table)
Data Integrity
Caching
Sync vs Async Reactive
SLA (Volume)

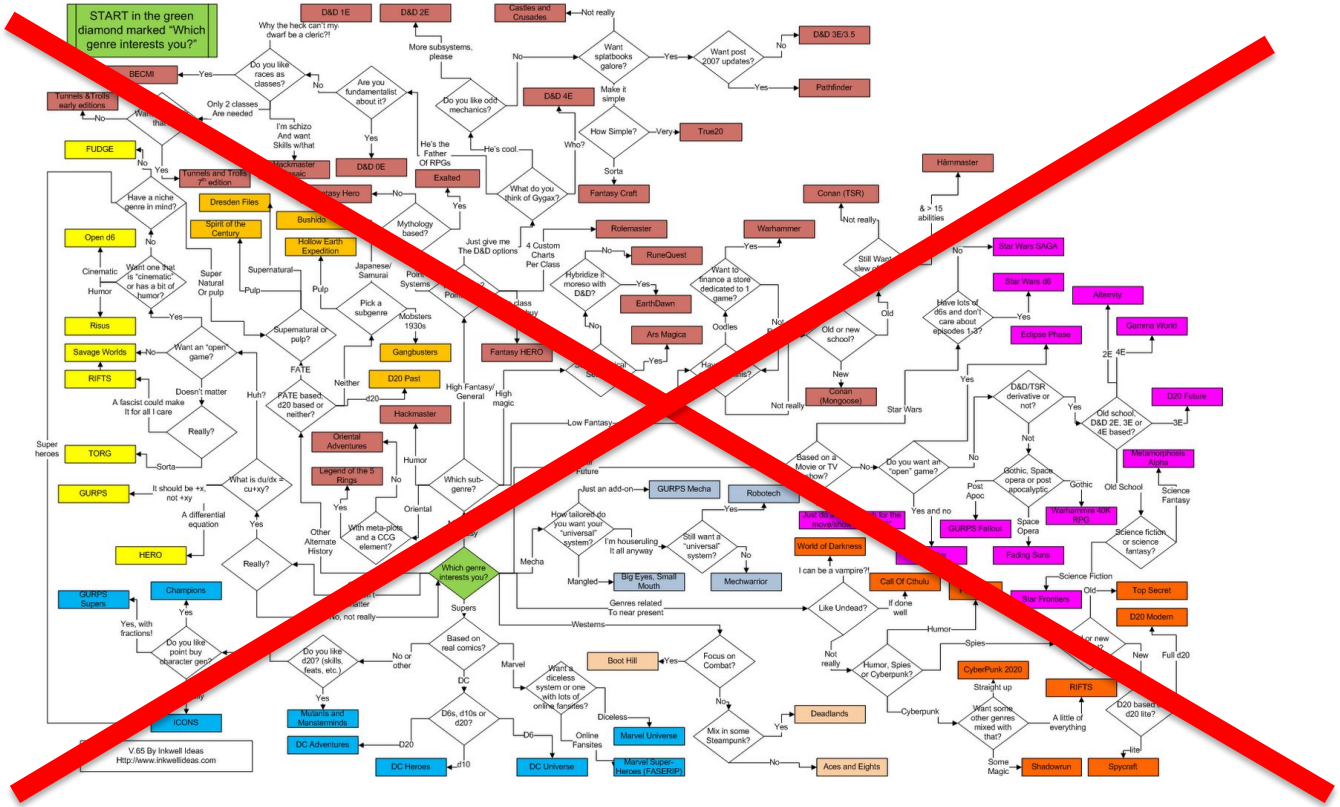

Developers
Test
Build
Api Catalog
Language
CodeFirst/
Vs SchemaFirst
Packaging
Documentation


Users/Consumers
XP
Profile
Internal vs
Public
Techno

Matrix Analysis

Concept	GraphQL	REST	gRPC
Modèle conceptuel de données (Entités, Relations)			
Cardinalite	1	5	3
Versionning	1	8	9
Confidentialite	6	9	1
Atomicite	6	7	0
Parcours Applicatifs			
Filtres	2	3	4
Pagination	3	3	6
Tris	4	4	6
Throughput	4	3	6
Latence	6	4	6
Base de donnees	2	3	6
Integrite	6	4	7
Cache	7	0	6
Sync vs Async vs Reactive	1	2	4
SLA	6	3	4
Development			
Language	1	4	5
Api Catalog	6	7	8
Test	3	2	0
Build	4	5	6
Packaging	4	6	7
Code first / Schema Frist	5	7	8
Documentation	2	5	1
Client			
XP	1	4	7
Profil	3	3	9
Techno	4	5	7
Interne vs Extern	4	5	8

Decision Tree



{ REST }

- Decoupling Client / Server (*Schema on read*)
- Api Lifecycle (*Versioning*)
- Tooling (*API Management, Serverless*)

- Verbose payloads (*json, xml*)
- No discoverability
- Not suitable for command-like (functions) API

- CRUD superstar
- Relevant for mutations (OLTP)
- Public and web APIs
- Limited Business Scope

gRPC

- High Performances (*http/2 – binary serialisation*)
- Multiple stubs : Sync, Async, Streaming
- Multi languages - Interoperability

- Strongly coupled (*schema with proto files*)
- No discoverability
- *Protobuf* serialization format

- Distributed network of services (no waits)
- High throughput & streaming use cases
- Command-like (*eg: slack*)

GraphQL

- Discoverability, documentation
- Custom payloads
- Match standards (Json | Http)

- Single endpoint (*versioning, monitoring, security*)
- Complex implementation (*tooling, still young*)
- Nice for customers nasty for DB (*N+1 select*)

- Backend for frontend (JS)
- Service aggregation | composition (*joins*)
- When volume matters (*mobile phones*)

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Why and How

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Stargate.io
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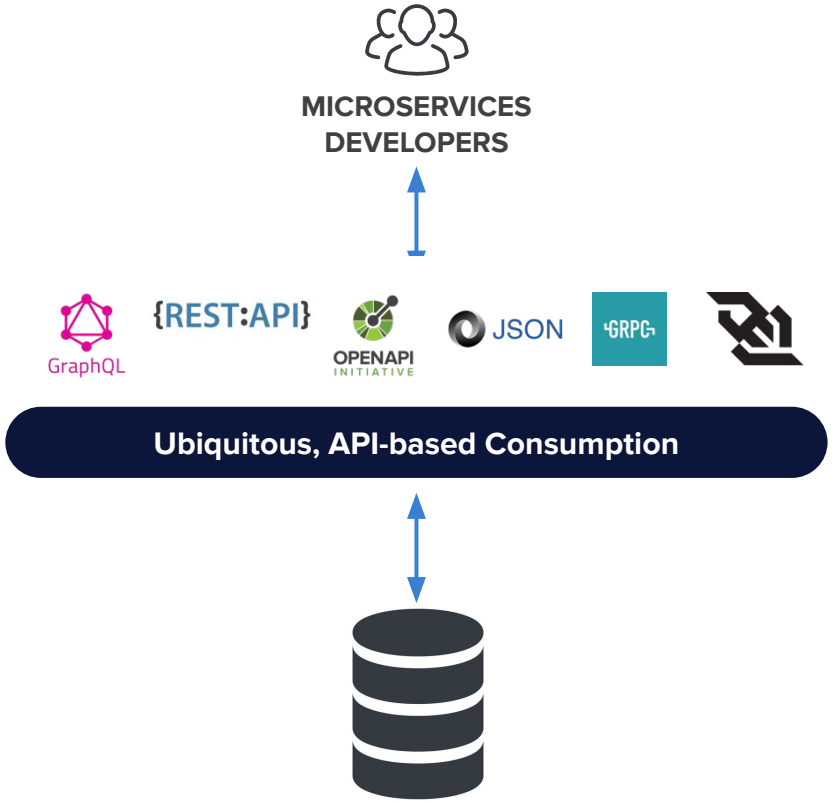
What's NEXT ?
Resources

Data Gateway

Developers want the option to use modern APIs and development gateways.

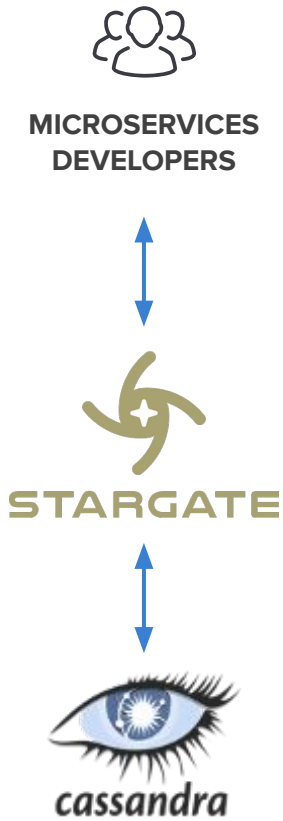
Apache Cassandra is a distributed database designed for the new standard and the associated APIs that facilitate the first choice of developers.



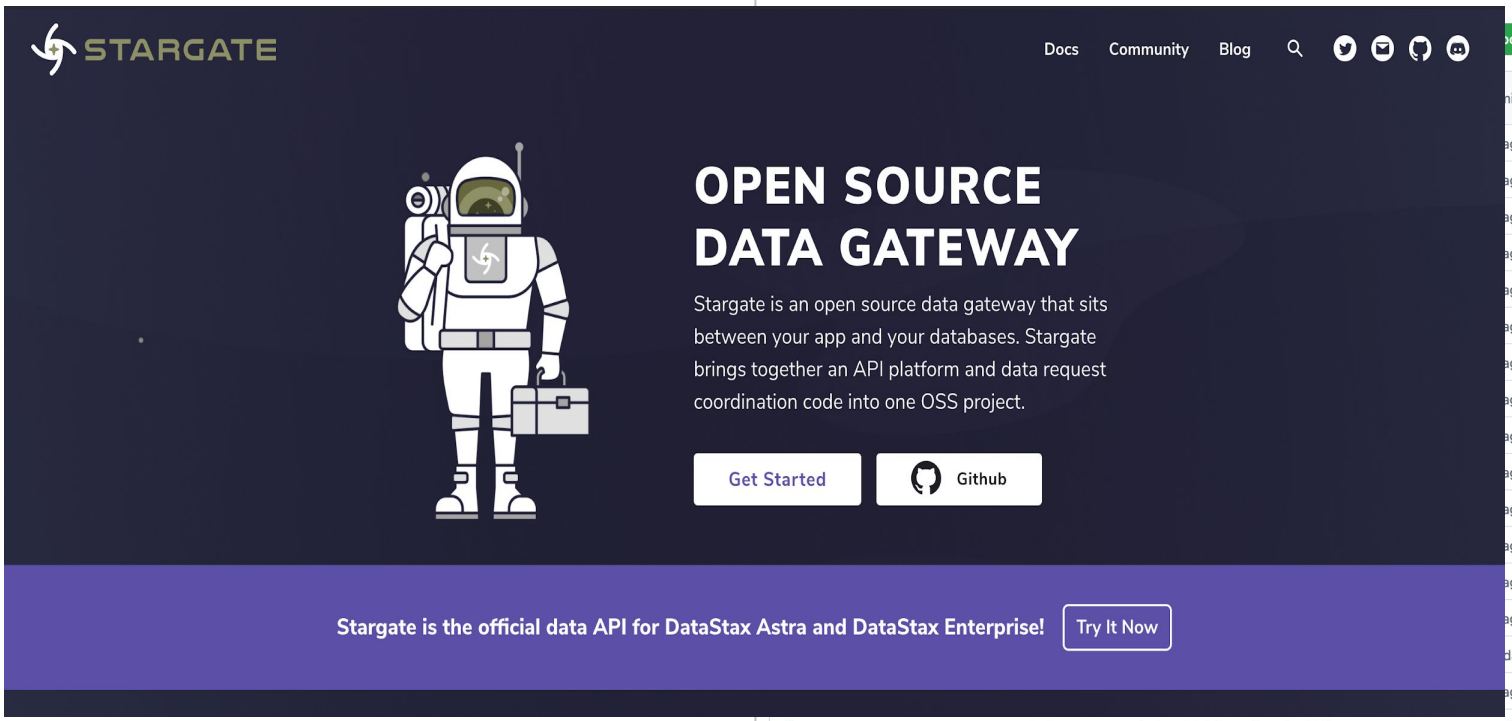
Stargate Overview

An open source API framework for data

Stargate makes it easy to use a database for any application workload by adding plugin support for new APIs, data types, and access methods

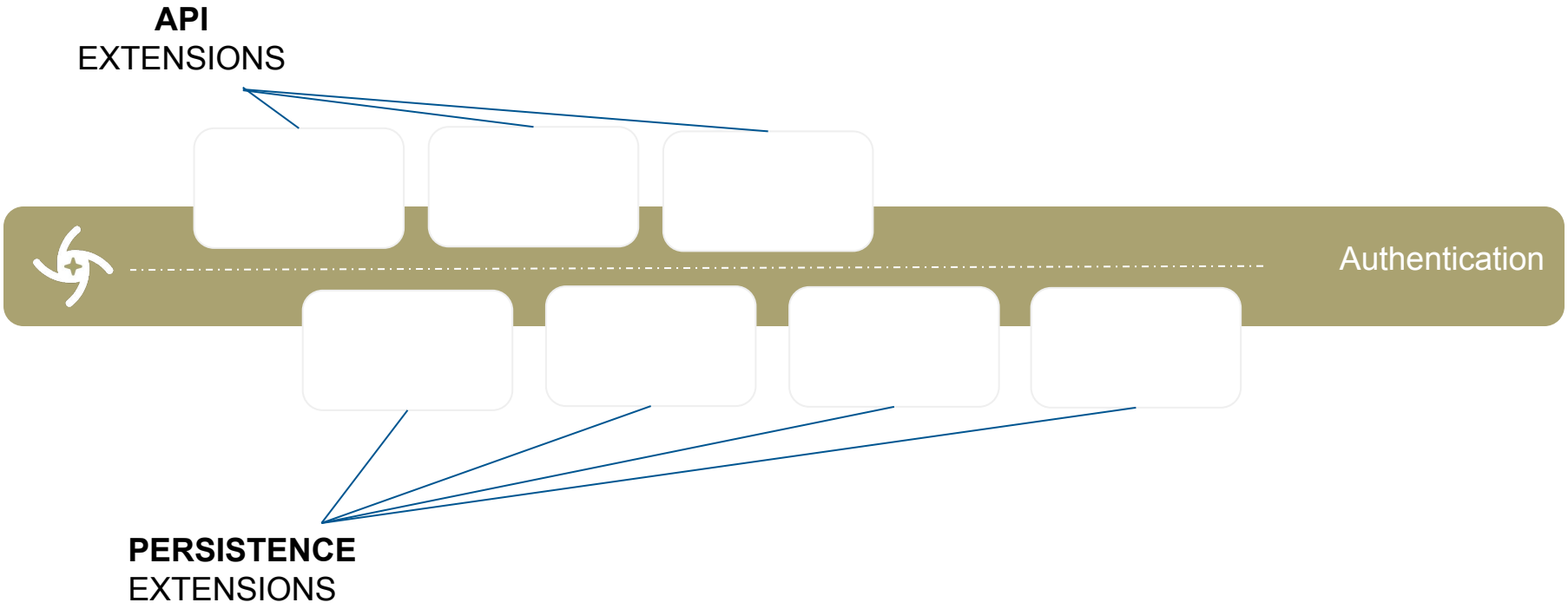


Stargate.io

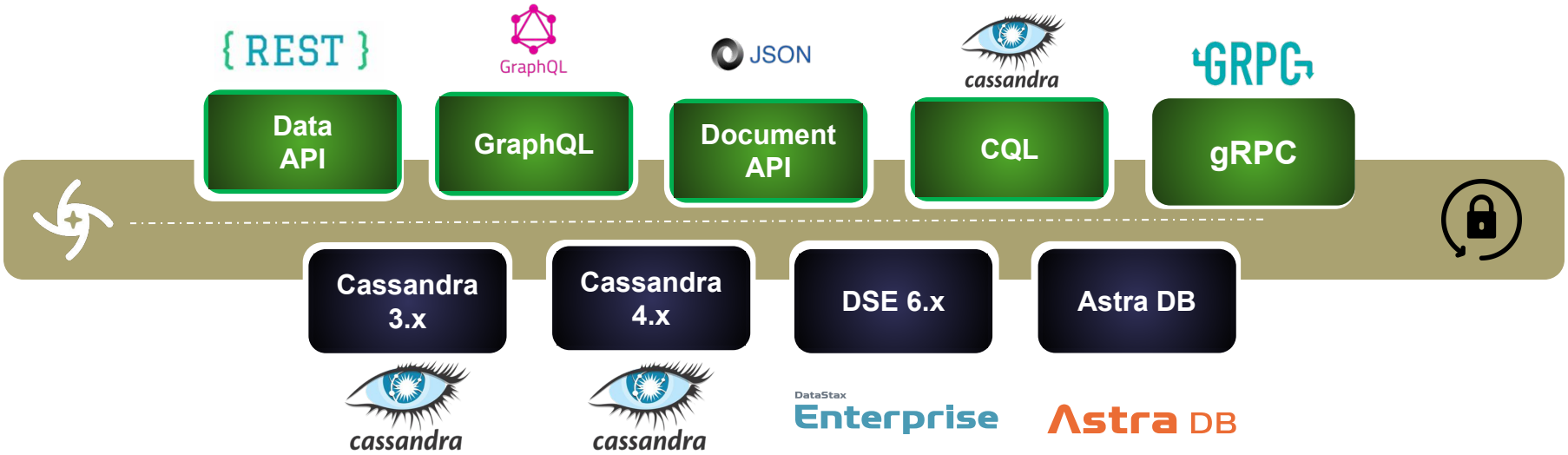

STARGATE
Docs
Community
Blog
OPEN SOURCE
DATA GATEWAY
Stargate is an open source data gateway that sits between your app and your databases. Stargate brings together an API platform and data request coordination code into one OSS project.
Get Started
Github
Stargate is the official data API for DataStax Astra and DataStax Enterprise!
Try It Now

stargate / stargate
Public
Watch 22
Unstar 506
Fork 65
Code
Issues 246
Pull requests 13
Discussions
Actions
Projects
Wiki
About
An open source data gateway
stargate.io
java
graphql
rest
cassandra
cql
Readme
Apache-2.0 License
Releases 62
Release v1.0.32
Latest
25 days ago
+ 61 releases
Packages 13
io.stargate.stargate
io.stargate.db.persistence-api
io.stargate.db.persistence-common
+ 10 packages
Contributors 30
grpc
Reference example for gRPC java client (#1236)
yesterday

API and Persistence Extensions



API Extensions and Persistence Extensions



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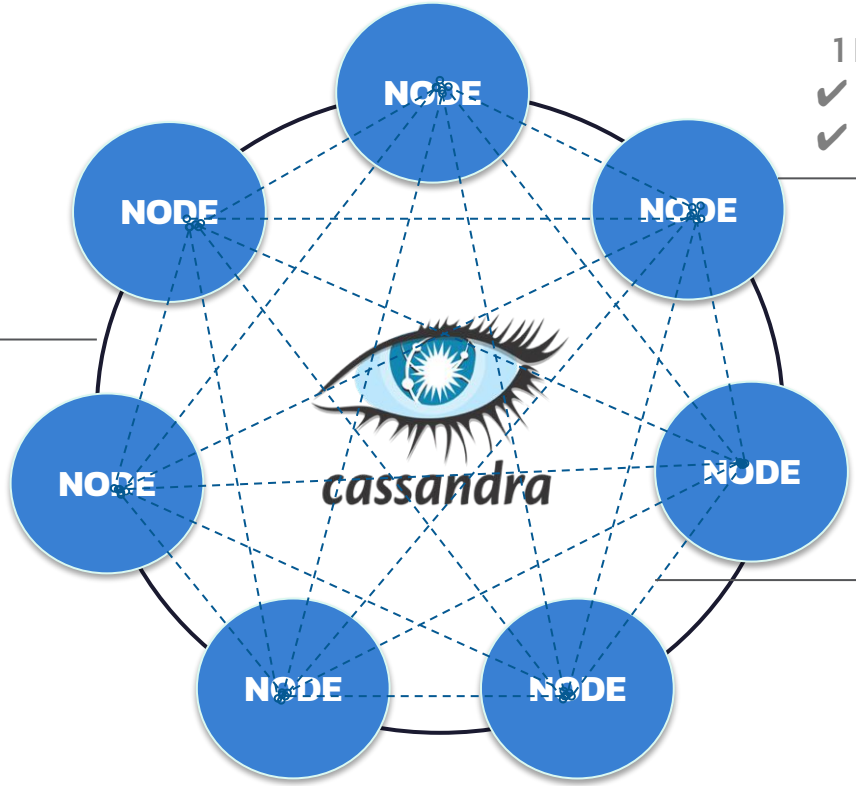
Apache Cassandra™ = NoSQL Distributed Database

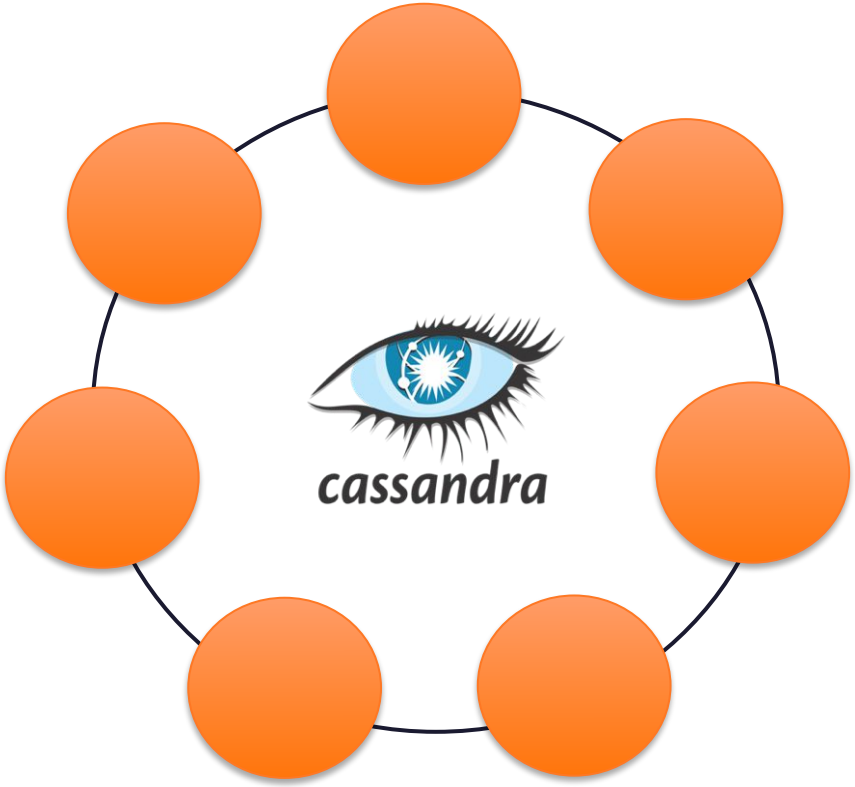


1 Installation = 1 NODE
- ✔ Capacity = ~ 2-4TB
- ✔ Throughput = LOTS Tx/sec/core

DataCenter | Ring

Communication:
- ✔ Gossiping

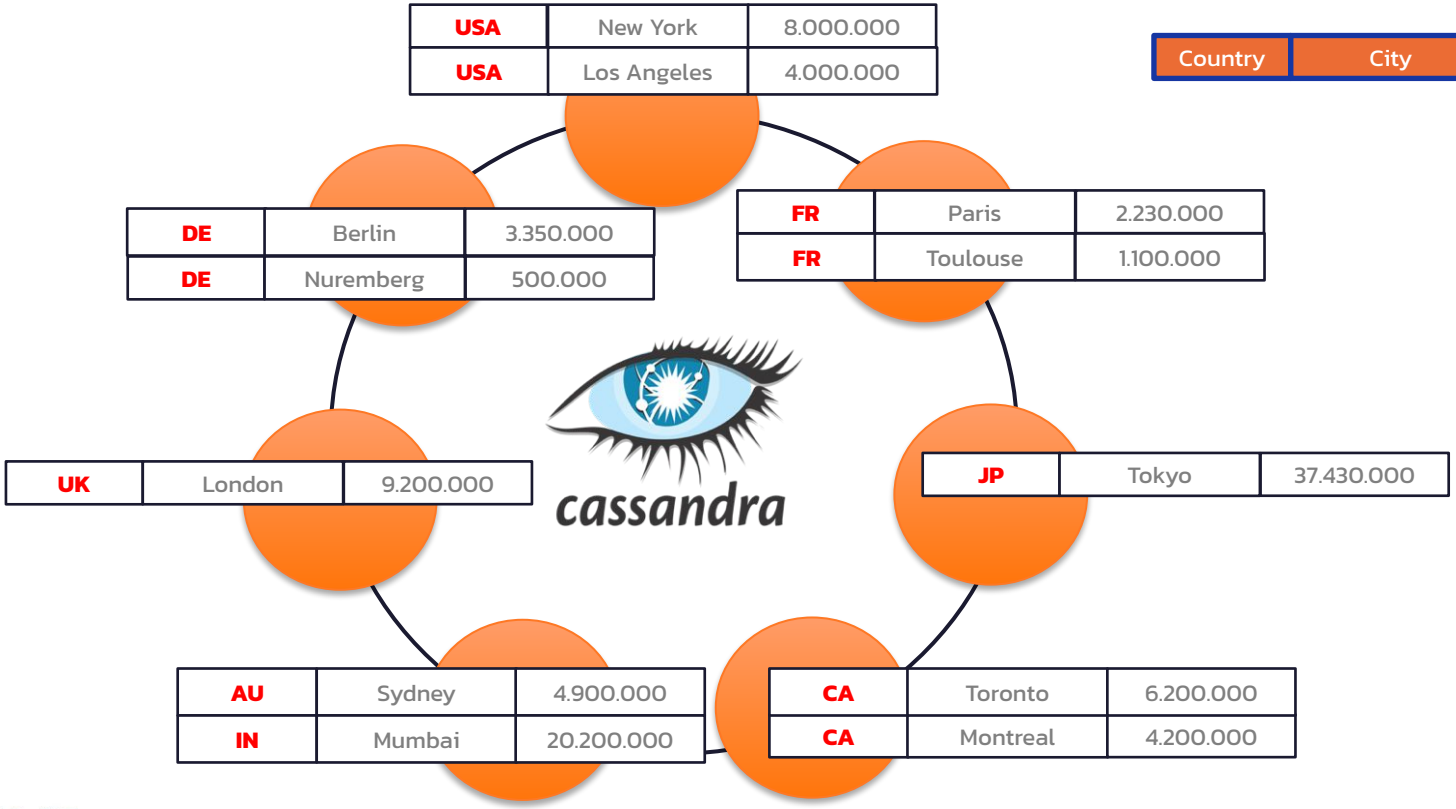
Data is Distributed



Country	City	Population
USA	New York	8.000.000
USA	Los Angeles	4.000.000
FR	Paris	2.230.000
DE	Berlin	3.350.000
UK	London	9.200.000
AU	Sydney	4.900.000
DE	Nuremberg	500.000
CA	Toronto	6.200.000
CA	Montreal	4.200.000
FR	Toulouse	1.100.000
JP	Tokyo	37.430.000
IN	Mumbai	20.200.000

Partition Key

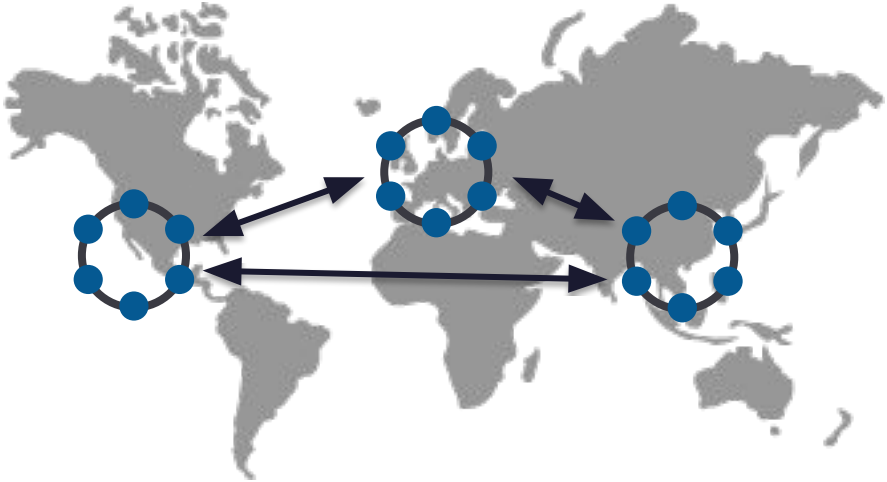
Data is Distributed



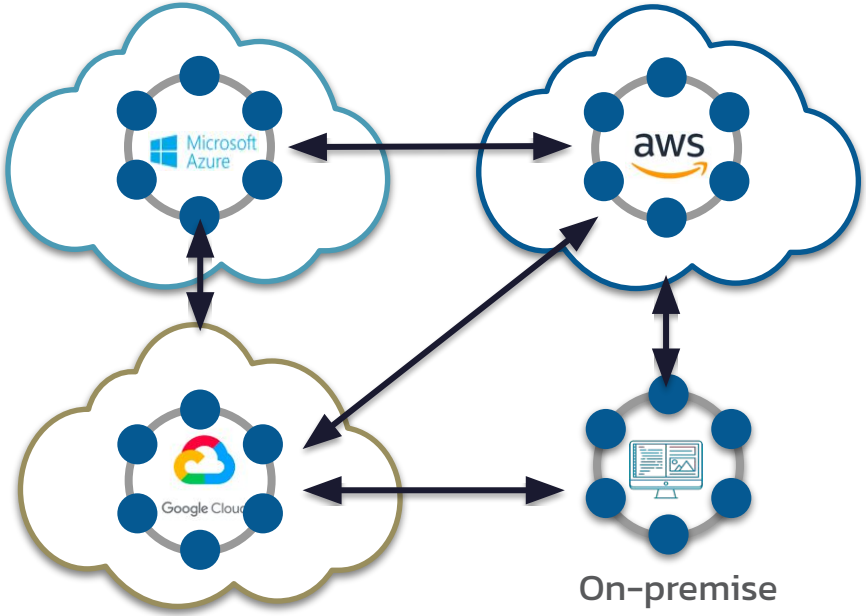
Country	City	Population

Data Distributed Everywhere

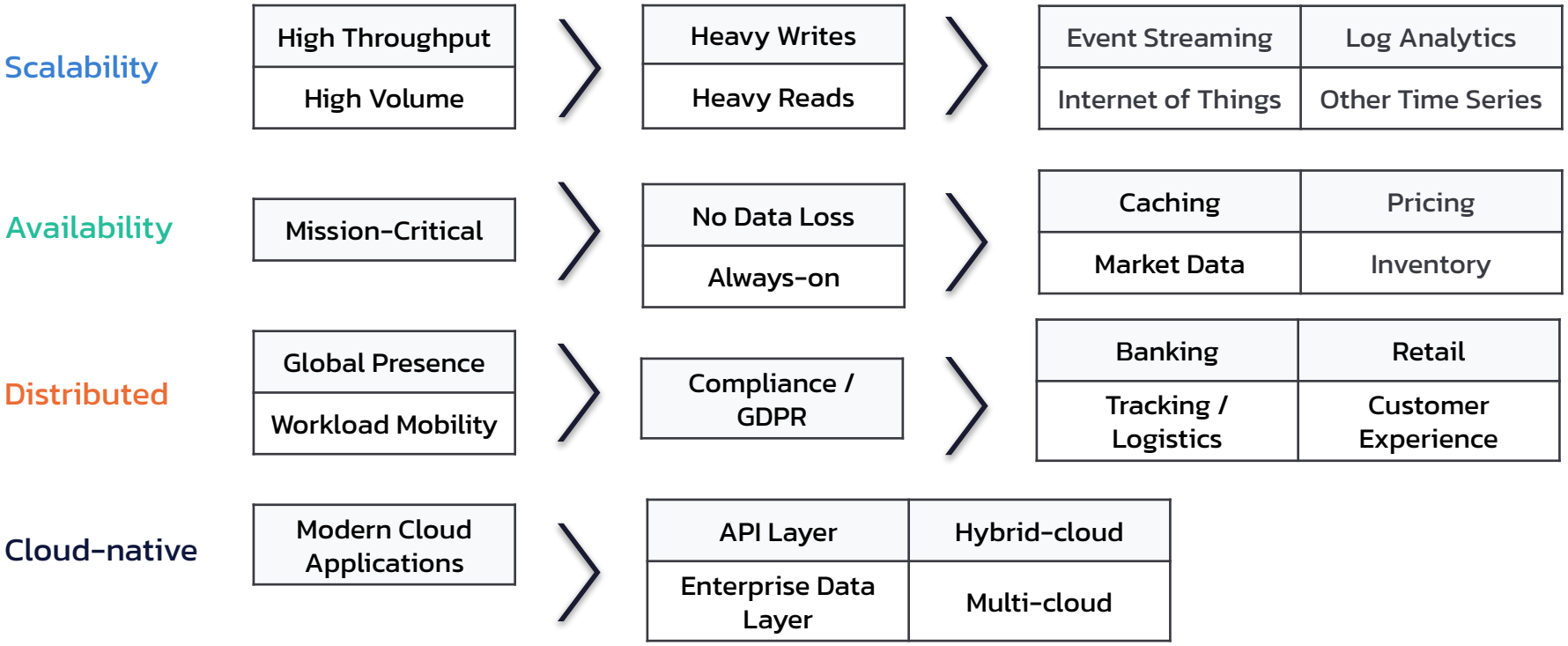
- Geographic Distribution



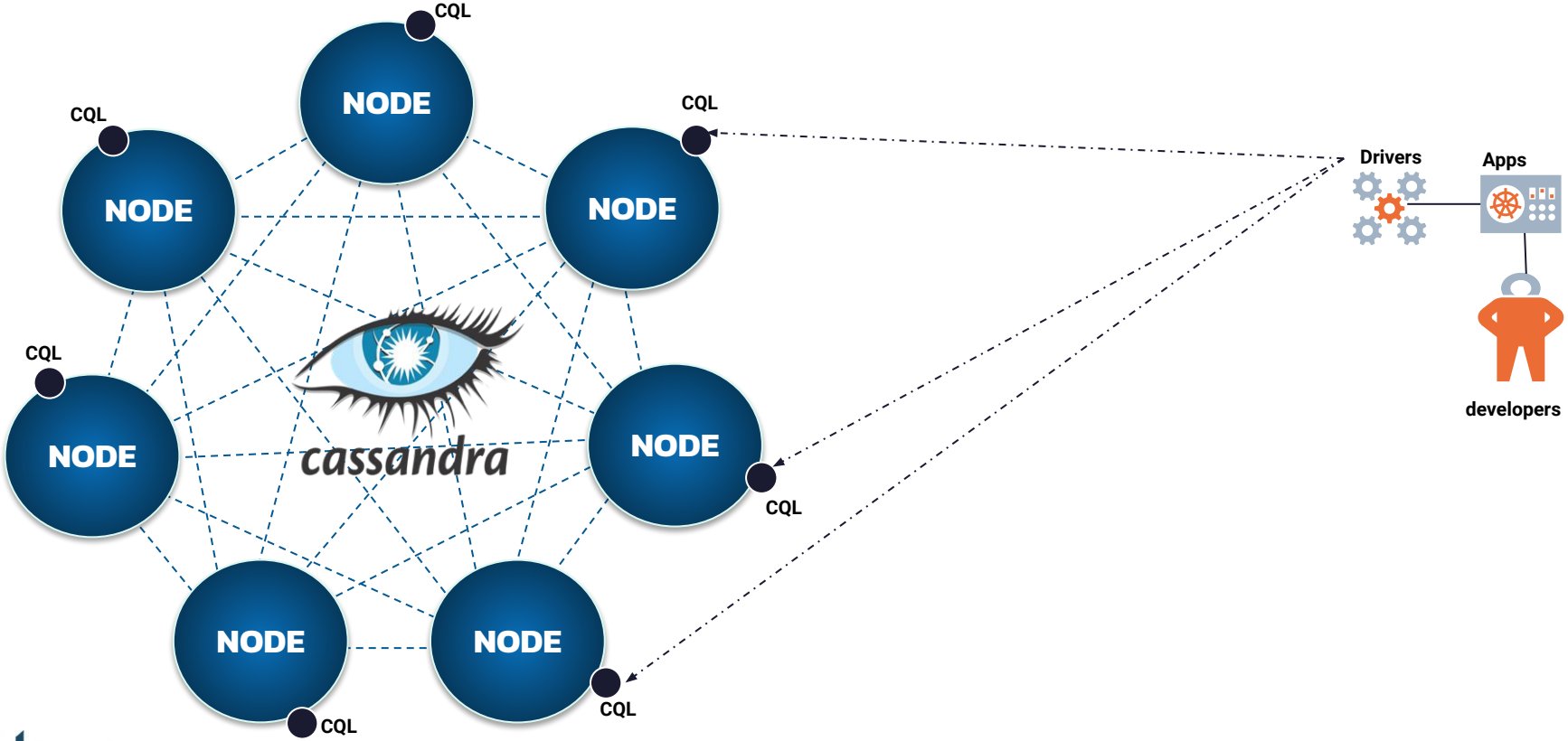
- Hybrid-Cloud and Multi-Cloud



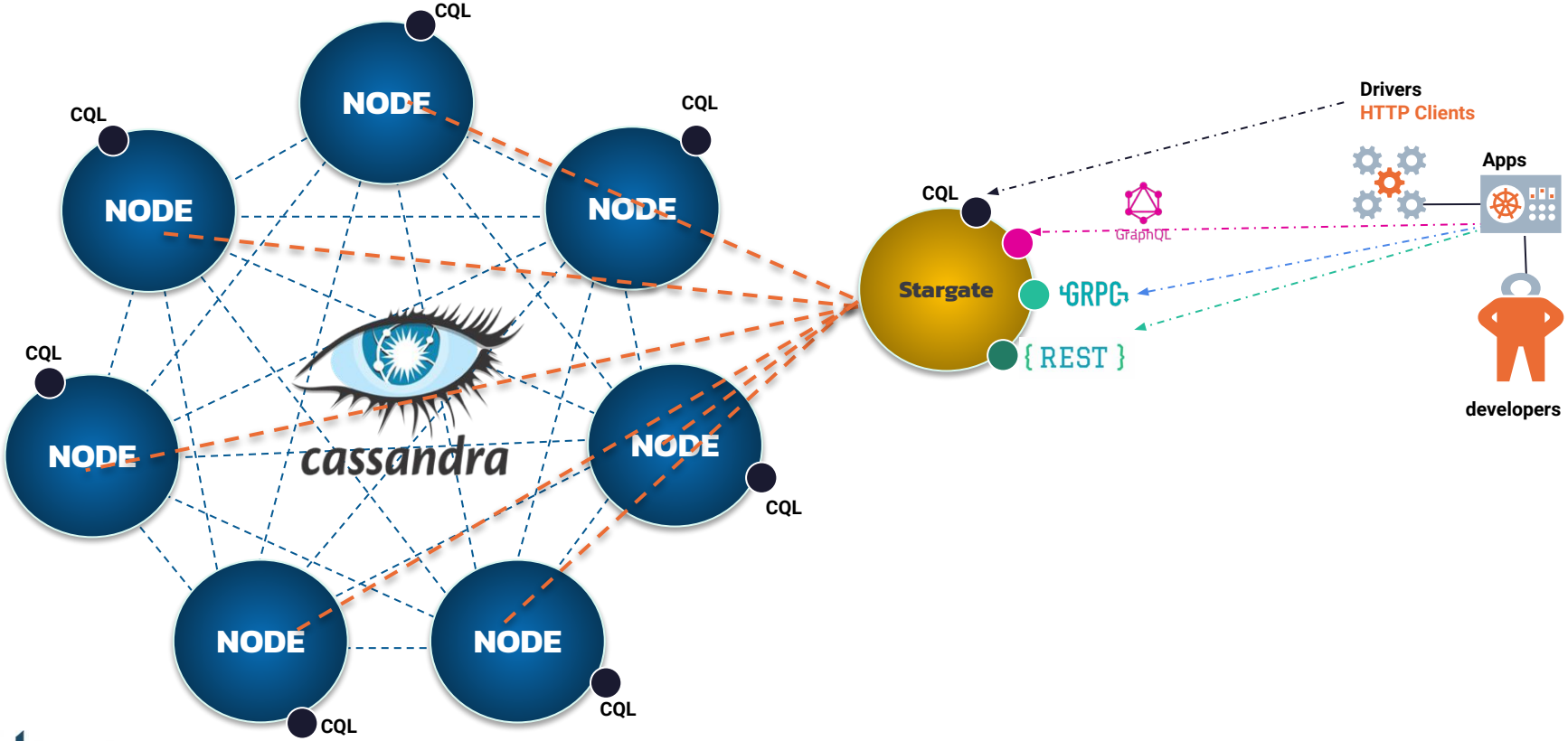
Understanding Use Cases



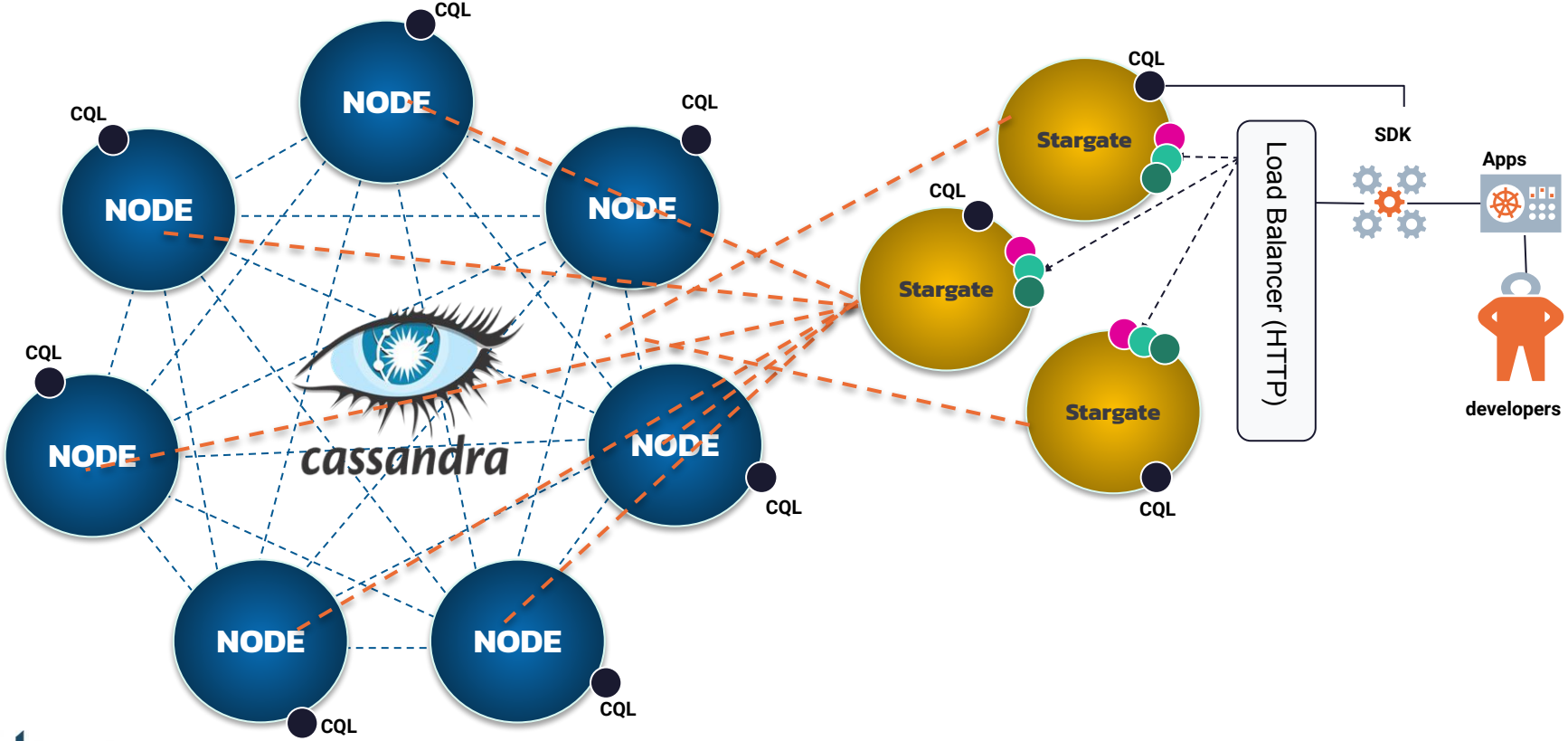
Connecting to your cluster (Before)



Connecting to your cluster (with Stargate)



Connecting to your cluster (with Stargates)



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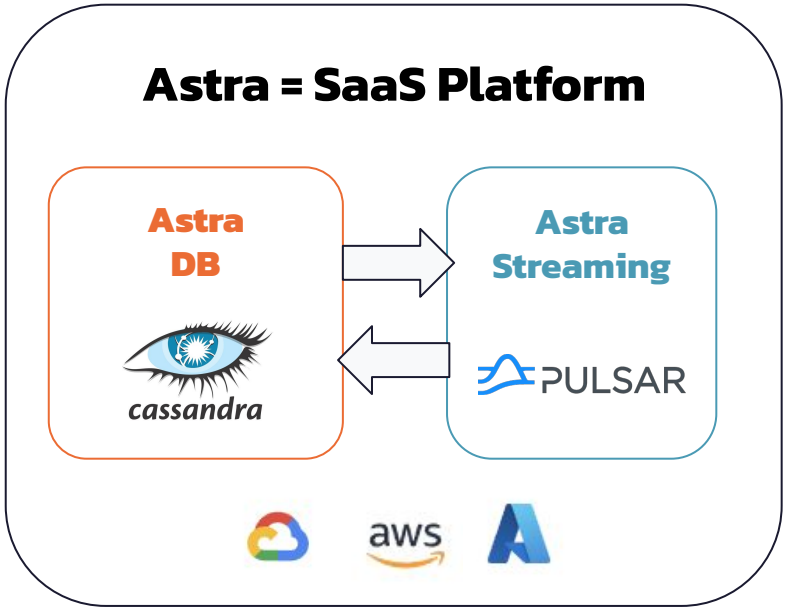
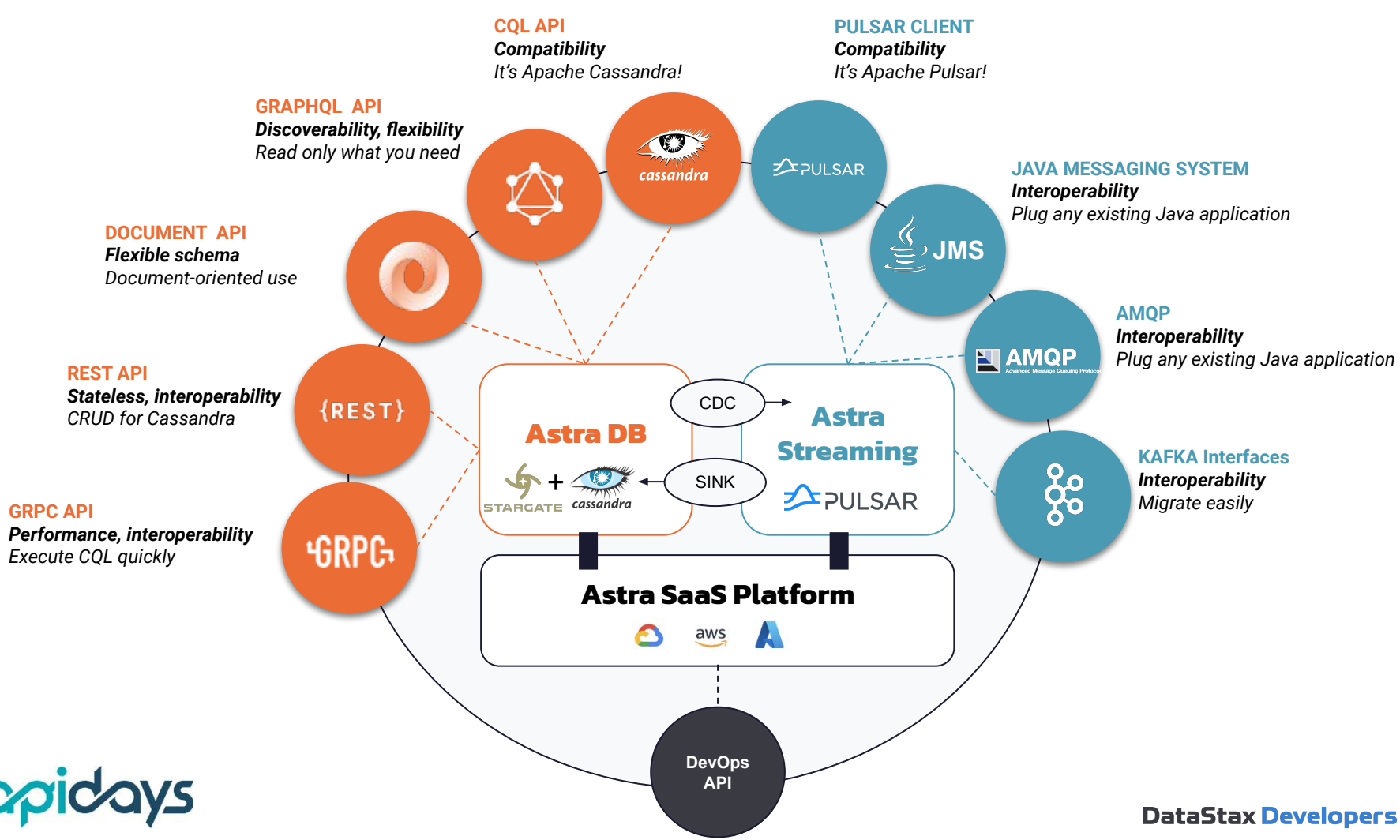
DataStax

Astra DB




CQL API
Compatibility
It's Apache Cassandra!
PULSAR CLIENT
Compatibility
It's Apache Pulsar!
GRAPHQL API
Discoverability, flexibility
Read only what you need
JAVA MESSAGING SYSTEM
Interoperability
Plug any existing Java application
DOCUMENT API
Flexible schema
Document-oriented use
AMQP
Interoperability
Plug any existing Java application
REST API
Stateless, interoperability
CRUD for Cassandra
KAFKA Interfaces
Interoperability
Migrate easily
GRPC API
Performance, interoperability
Execute CQL quickly
cassandra
PULSAR
JMS
AMQP
{REST}
GRPC
Astra DB
STARGATE
cassandra
CDC
SINK
Astra Streaming
PULSAR
Astra SaaS Platform
aws
DevOps API

HouseKeeping

DataStax Astra DB

- Instructions and Slide
  - https://github.com/datastaxdevs/conference-Expose-Rest-Graphql-Grpc-Apis-for-Databases
- Runtime
  - https://astra.datastax.com

1. Create Astra Instance

`ASTRA` is the simplest way to run Cassandra with zero operations at all - just push the button and get your cluster. No credit card required, $25.00 USD credit every month, roughly 5M writes, 30M reads, 40GB storage monthly - sufficient to run small production workloads.

✅ Register (if needed) and Sign In to Astra https://astra.datastax.com: You can use your `Github`, `Google` accounts or register with an `email`.

Make sure to chose a password with minimum 8 characters, containing upper and lowercase letters, at least one number and special character

✅ Create a "pay as you go" plan

Follow this guide, to set up a pay as you go database with a free $25 monthly credit.

- **Select the pay as you go option**: Includes $25 monthly credit - no credit card needed to set up.

You will find below which values to enter for each field.

- **For the database name** - `free_db.` While Astra allows you to fill in these fields with values of your own choosing, please follow our recommendations to ensure the application runs properly.
- **For the keyspace name** - `free`. It's really important that you use the name "free" for the code to work.

You can technically use whatever you want and update the code to reflect the keyspace. This is really to get you on a happy path for the first run.

- **For provider and region**: Choose and provider (either GCP or AWS). Region is where your database will reside physically (choose one close to you or your users).

Hands-on
#1/2 Getting your instance

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- **For the database name** - `free_db.` While Astra allows you to fill in these fields with values of your own choosing, please follow our recommendations to ensure the application runs properly.
- **For the keyspace name** - `keyspace1`. It's really important that you use the name "free" for the

2. Working with Cassandra

✅ **Check that our keyspace exist**

```
describe keyspaces;
```

✅ **Create Entities**

```
use keyspace1;

CREATE TYPE IF NOT EXISTS video_format (
  width   int,
  height  int
);

CREATE TABLE IF NOT EXISTS videos (
 videoid   uuid,
 title     text,
 upload    timestamp,
 email     text,
 url       text,
 tags      set <text>,
 frames    list<int>,
 formats   map <text,frozen<video_format>>,
 PRIMARY KEY (videoid)
);

describe keyspace1;
```

Agenda

01

Api and Databases
What, Why and How

02

Rest, GraphQL, gRPC
SWOT

03

Data Gateway
Why and How

04

Stargate.io
Architecture

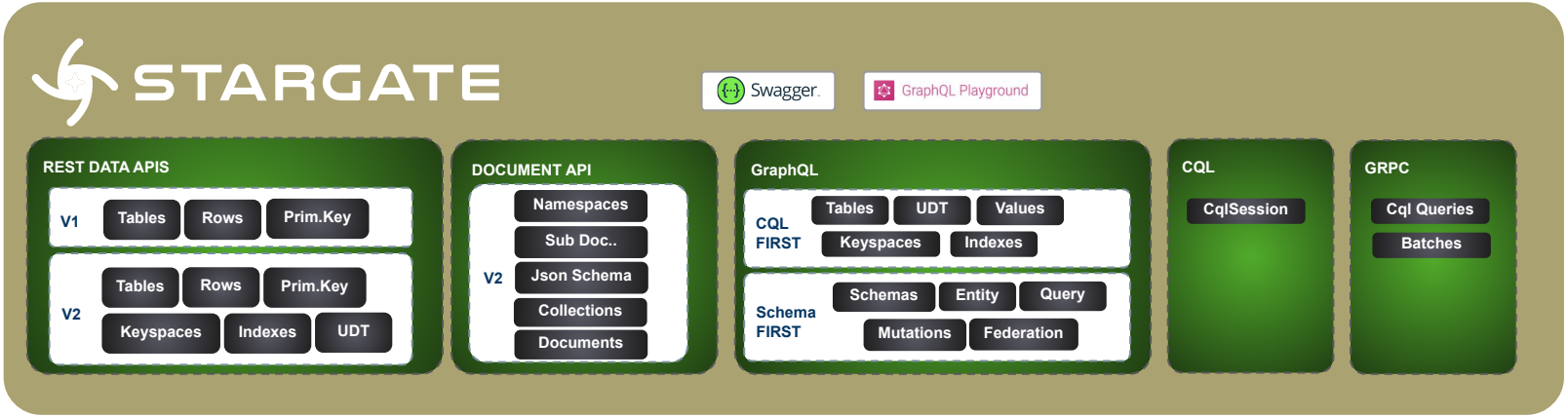
05

Demo
Api and Tooling

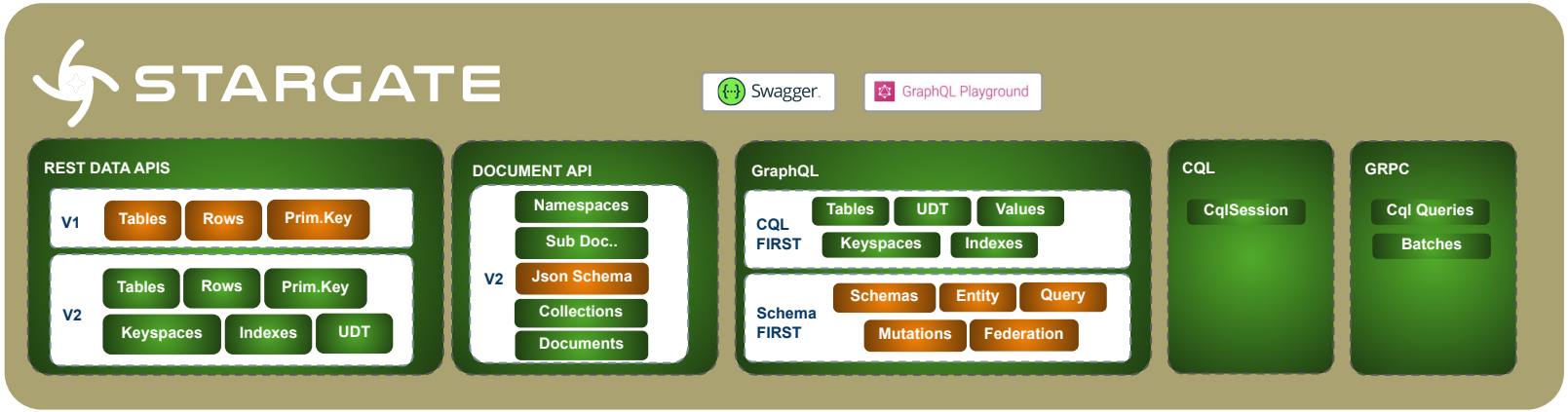
05

What's NEXT ?
Resources

Features Map



SDK in Java, Javascript, Python



Sample Code

```
StargateClient client = StargateClient.builder()
  .username("k8ssandra-superuser")           // Mandatory username
  .password("JxzrPOnvDGqfEOQ0EySQ")          // Mandatory password
  .endPointAuth("http://localhost:8081")     // Mandatory authencation url, defaulting to http://localhost
  .endPointRest("http://localhost:8082")     // Rest and Document Apis
  .endPointGraphQL("http://localhost:8080")  // GraphQL Api

  // Cqlsession Only
  .addCqlContactPoint("127.0.0.", 9042)      // Contact Point
  .localDc("dc1")                            // Local Datacenter is mandatory driver 4x+
  .keypace("ks1")                            // (optional) Set your keyspace
  .build();
```

Sample Code

```
// Retrieve an object and marshall
Optional<Address> address = colPersonClient
   .document("e8c5021b-2c91-4015-aec6-14a16e449818")
   .findSubDocument("address", Address.class);
```

```
// Building query {"age": {"$gte":30},"lastname": {"$eq":"PersonAstra2"}}
SearchDocumentQuery query = SearchDocumentQuery.builder()
                    .where("age").isGreaterOrEqualsThan(30)      // First filter to use where()
                    .and("lastname").isEqualsTo("PersonAstra2")  // Any extra filter to use and()
                    .withPageSize(10)                            // Default and max pageSize are 20
                    .build();

// Retrieve PAGE 1
DocumentResultPage<Person> currentPage = colPersonClient.findPage(query,  Person.class);

// Retrieve PAGE 2 (if any)
if (currentPage.getPageState().isPresent()) {
  query.setPageState(currentPage.getPageState().get());
}
DocumentResultPage<Person> nextPage = colPersonClient.findPage(query,  Person.class);

// Retrieve all documents in one call (with warning in RED ABOVE)
Stream<Person> allPersons = colPersonClient.findAll(query, Person.class)
```

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DataStax Developers

Thank you!

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