DataStax

Developers

Api and Microservices with Apache Cassandra™

Bootcamp 2022, week4

Director of Developer Relations

clunven

clunven

clun

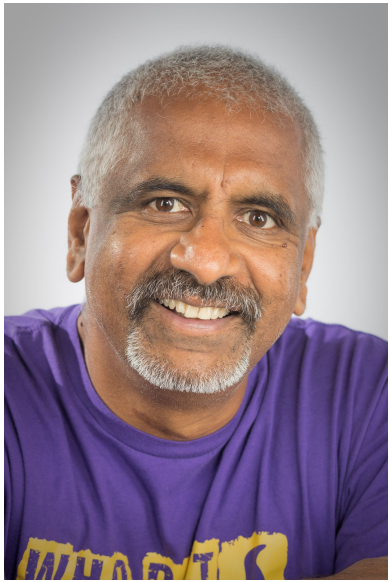
- Trainer
- Public Speaker
- Developers Support
- Developer Applications
- Developer Tooling

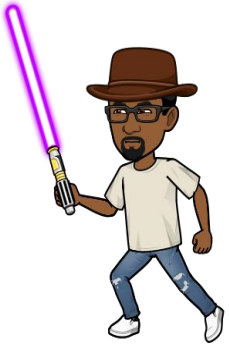
- Creator of ff4j (ff4j.org)
- Maintainer for 8 years+

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

Cédrick Lunven

Developer Advocate





- Developer/Architect
- Mechanical Engineer (so many moons ago)
- Distributed systems
- Love to teach and communicate
- Inner loop == developer productivity

@rags

@ragsns

@ragss

Raghavan “Rags” Srinivas

Cedrick Lunven

Aleksandr Volochnev

Jack Fryer

Kirsten Hunter

Stefano Lottini

David Gilardi

Ryan Welford

Rags Srinivas

Sonia Siganporia

R

S

DataStax Developers Crew

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APIs
Rest, GraphQL, gRPC

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TodoMVC, TodoBackend

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Code Build Package
Building efficient Data Model

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What's next?
Quiz, Homework, Next week

Agenda

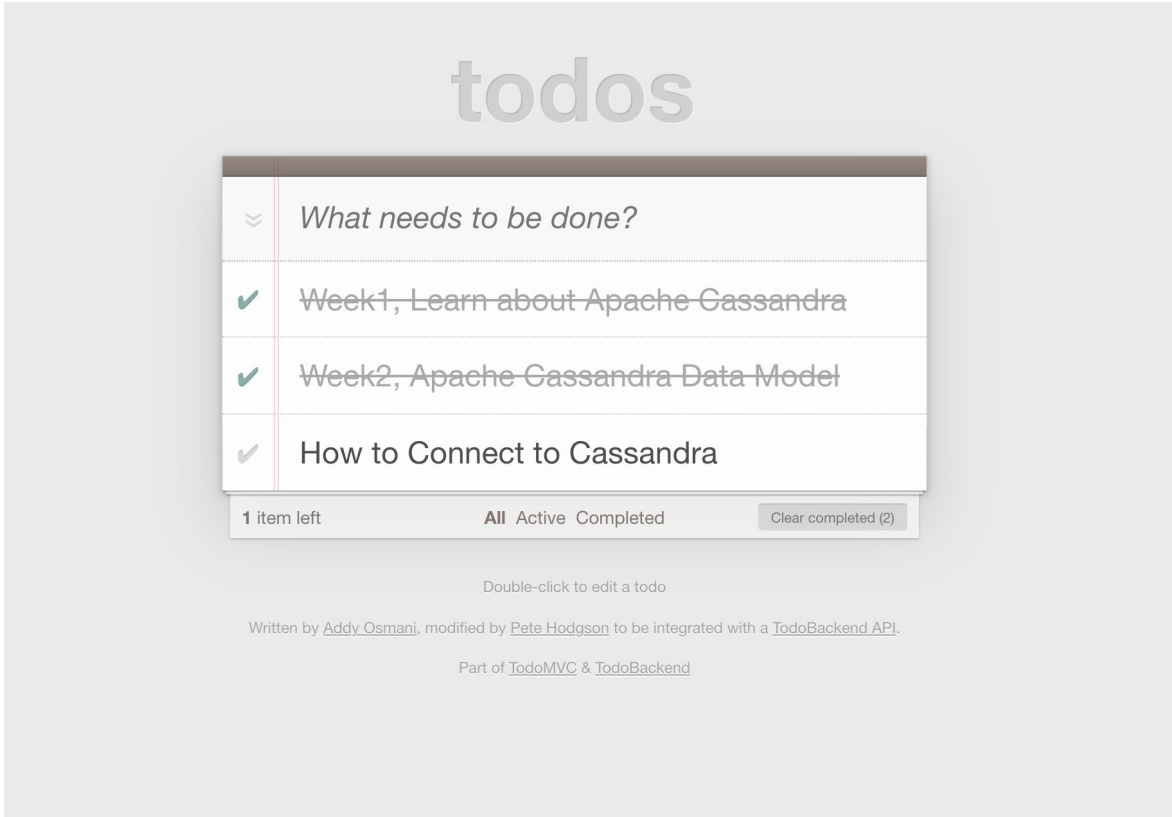
WEEK 1
January 5th - January 11th

WEEK 3
January 19th-January 25th

WEEK 2
January 12th - January 18th

WEEK 4
January 26th-February 1st

THIS SESSION CAN BE FOLLOWED WITHOUT ATTENDING PREVIOUS



TodoApplication

1 **Attend one of the 2 LIVE STREAMED workshop (Wednesday or Thursday)**

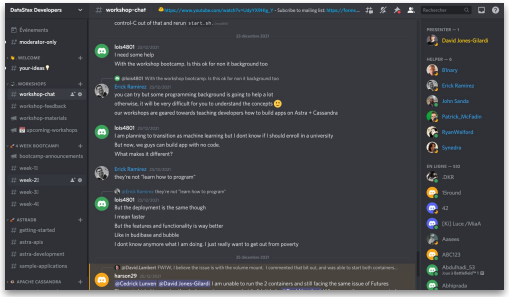
4-week bootcamp Housekeeping

Livestream: youtube.com/DataStaxDevs

YouTube

Twitch

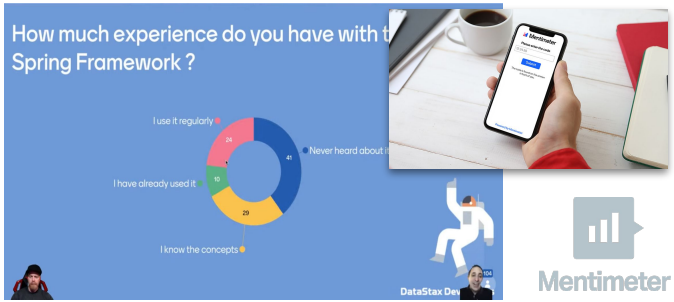
Questions: https://dtsx.io/discord



YouTube

Discord

Games and quizzes: menti.com



Mentimeter

1 Attend the live sessions

1. Attend one of the 2 LIVE STREAMED workshop (Wednesday or Thursday)
2. Complete the workshop labs

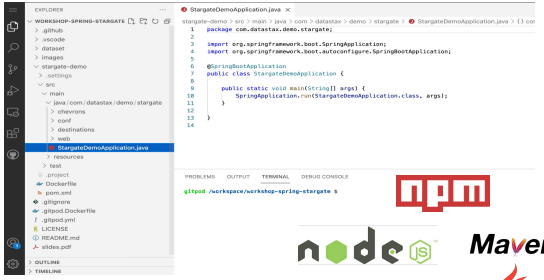
4-week bootcamp Housekeeping

AstraDB astra.datastax.com

Database + GraphQL + PlayGround

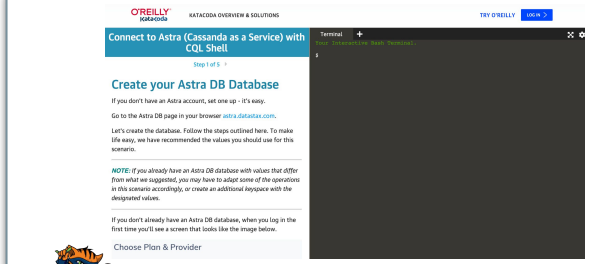
DataStax Astra DB

Gitpod IDE: https://gitpod.io

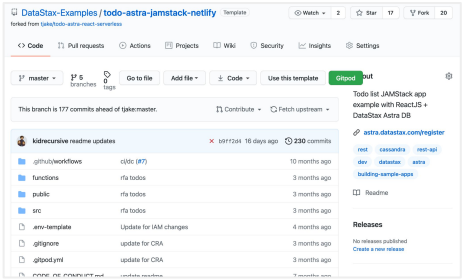


Gitpod

Katacoda katacoda.com/datastax



Katacoda



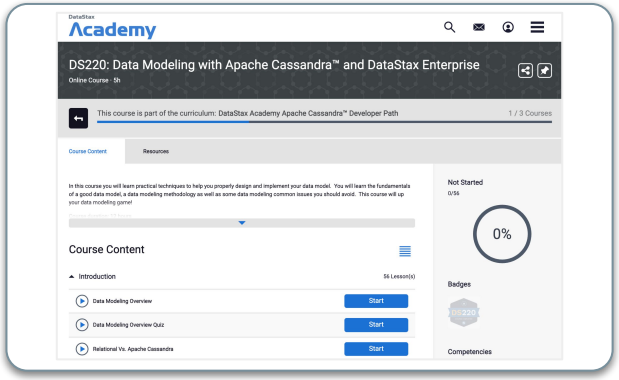
GitHub

2 Complete Workshops Labs

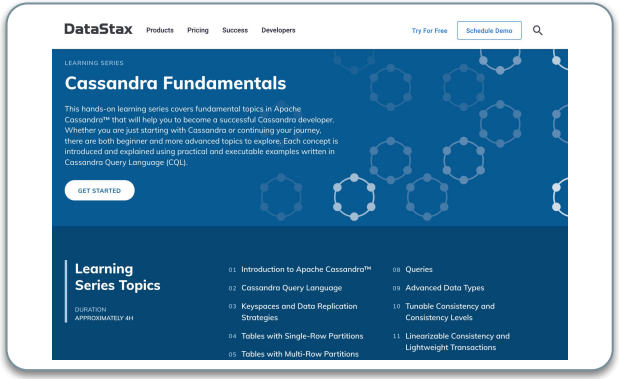
1. Attend one of the 2 LIVE STREAMED workshop (Wednesday or Thursday)
2. Complete the workshop labs
3. Complete the Learning materials

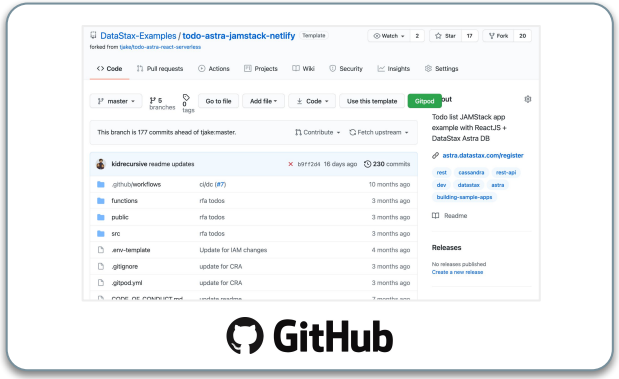
4-week bootcamp Housekeeping

Academy academy.datastax.com



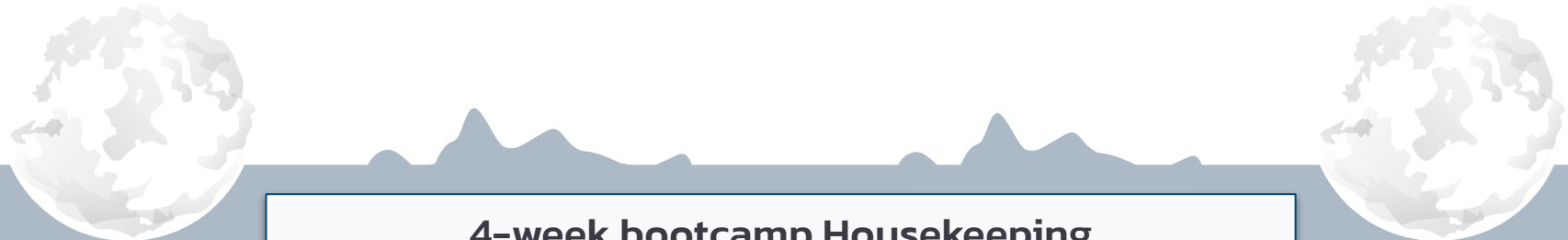
Datastax /dev datastax.com/dev





3 **Do your homeworks**

1. Attend one of the 2 LIVE STREAMED workshop (Wednesday or Thursday)
2. Complete the workshop labs
3. Complete the Learning materials
4. Submit the homework (google form)



4-week bootcamp Housekeeping

Intro to NoSQL Homework

Welcome and thank you! Here you can submit your homework for the datastax developers "Intro to NoSQL" workshop. In case of any questions please contact organisers at https://dtsx.io/aleks or just send an email to aleksandr.volochnev@datastax.com

- Workshop materials: https://github.com/datastaxdevs/workshop-introduction-to-nosql
- Discord chat: https://dtsx.io/discord

cedrick.lunven@datastax.com Switch account

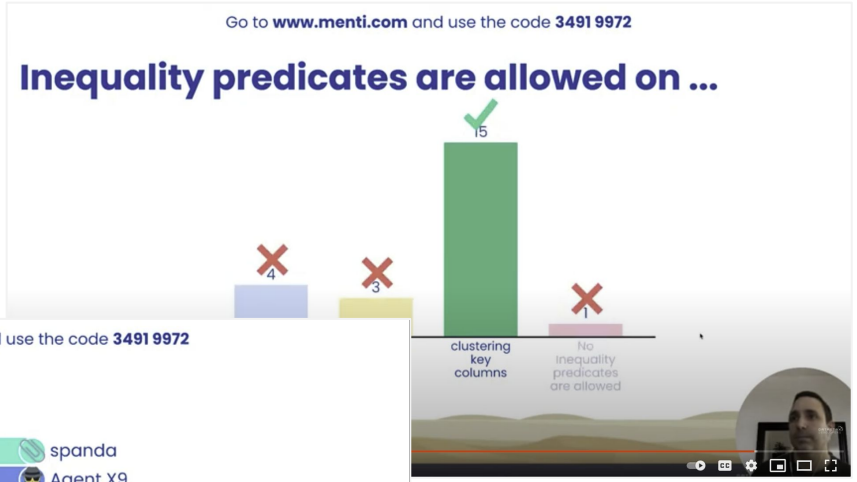
The name and photo associated with your Google account will be recorded when you upload files and submit this form. Only the email you enter is part of your response.

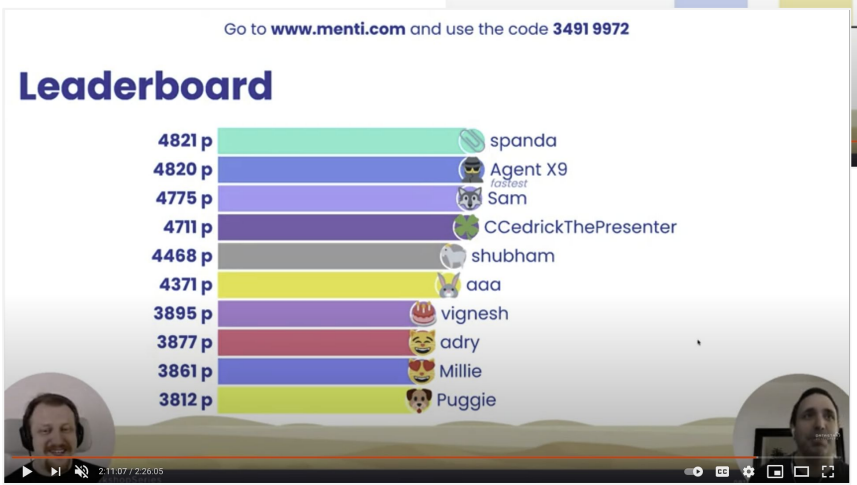
* Required

Email *

Your email

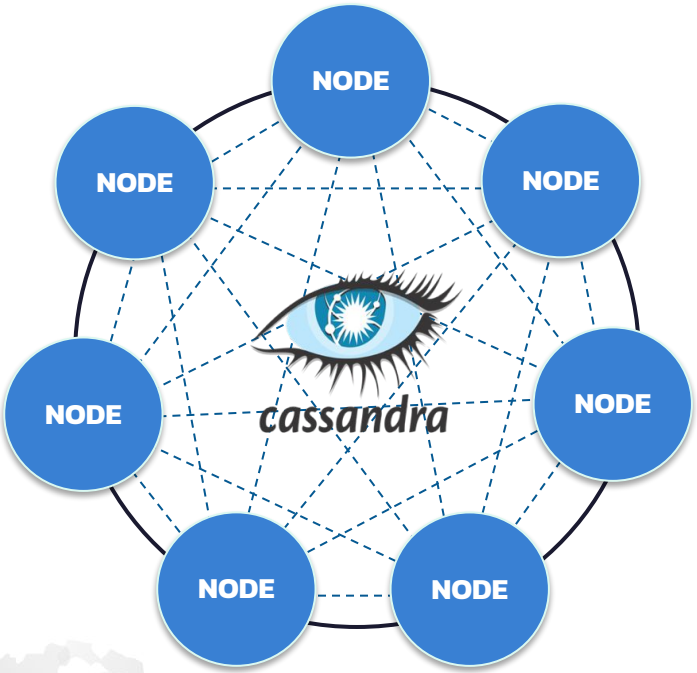
4 **Pass the Weekly Test**





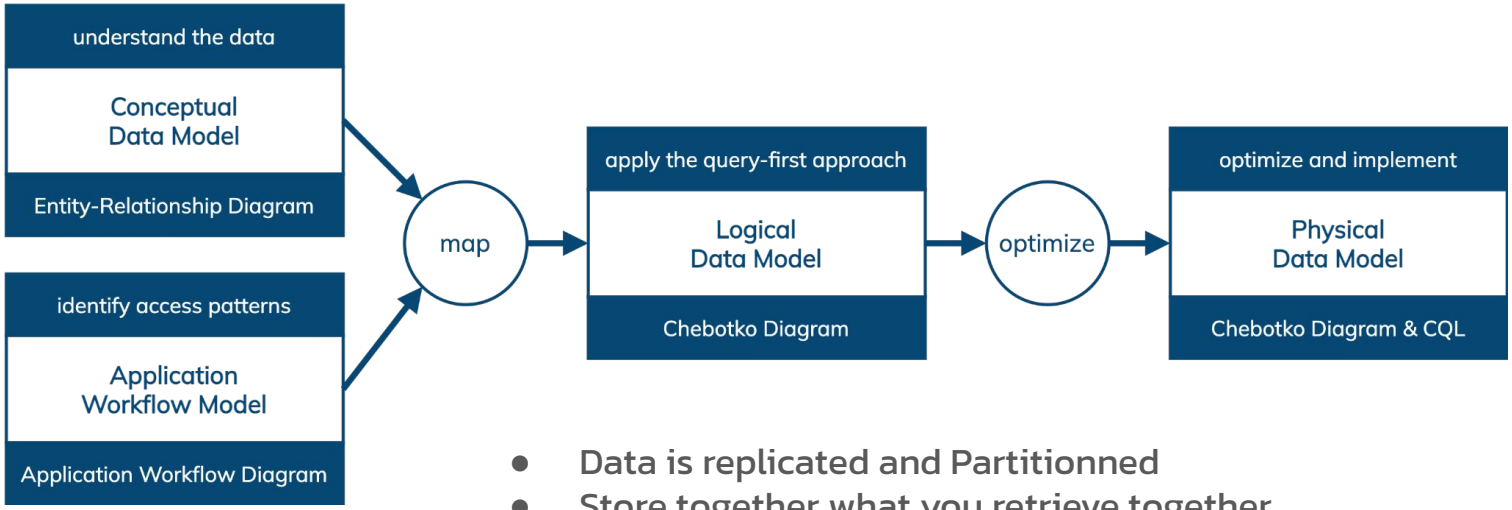
Play with us with Menti.com (new TAB)

Introduction to Apache Cassandra



- Big Data Ready
- Read / Write Performance
- Linear Scalability
- Highest Availability
- Self-Healing and Automation
- Geographical Distribution
- Platform Agnostic
- Vendor Independent

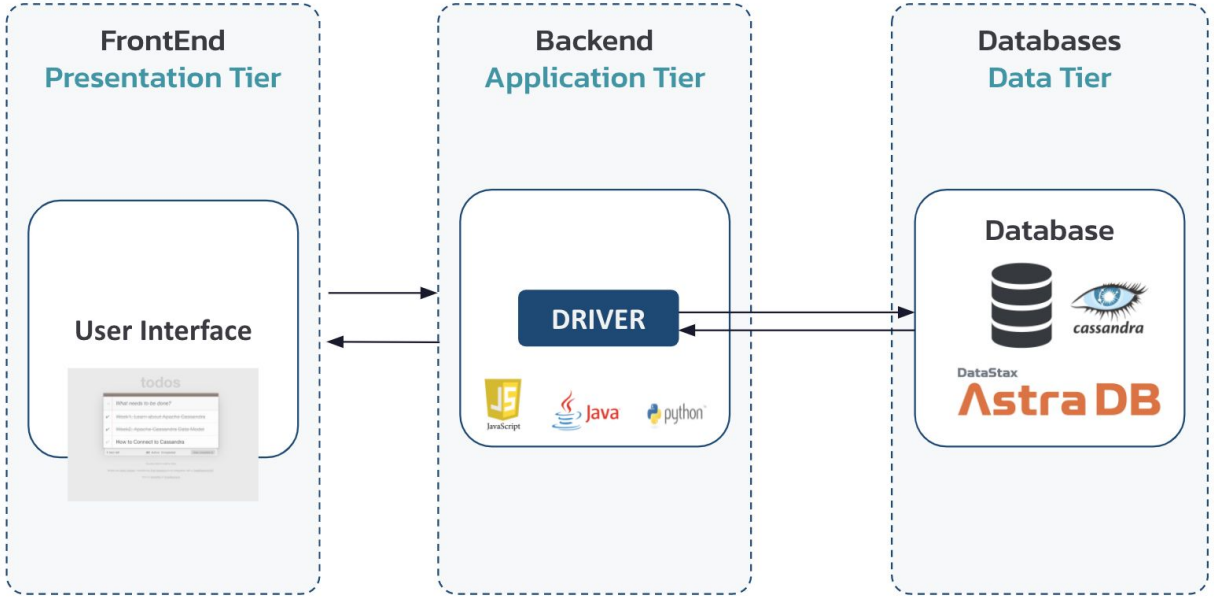
Data Modeling with Apache Cassandra



- Data is replicated and Partitionned
- Store together what you retrieve together
- Avoid big or hot partitions

Week2 In a Nutshell

Application Developement with Apache Cassandra



Week3 in a nutshell

And today's badge for your pleasure

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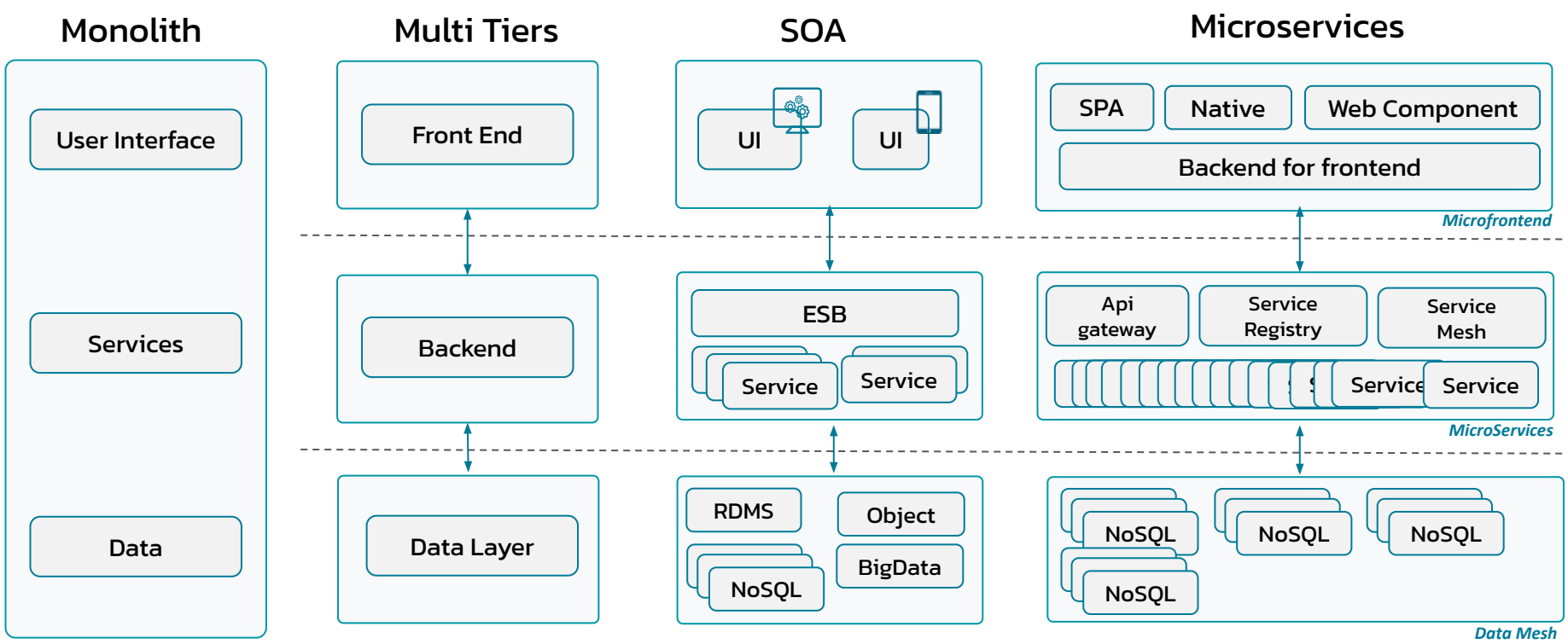
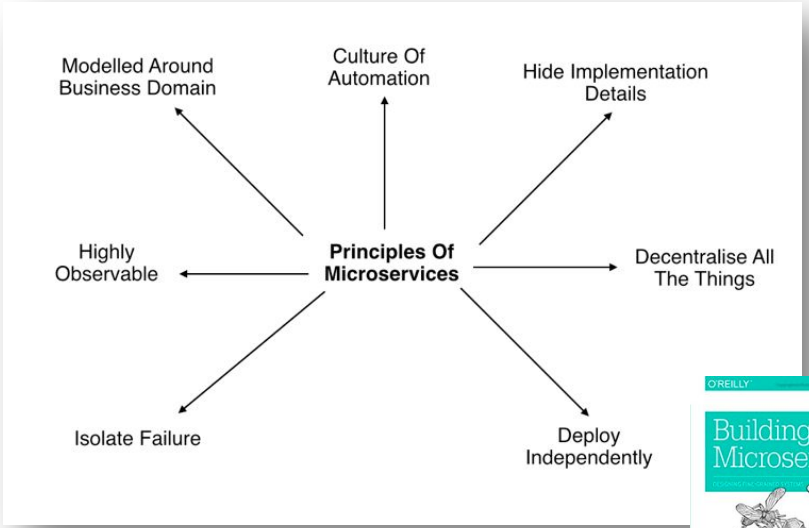


To the Microservices Architecture



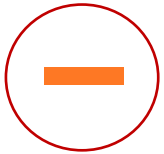
- ✔ Organized around Business Capabilities
- ✔ Products not Projects
- ✔ Smart endpoints and dumb pipes
- ✔ Decentralized Governance
- ✔ Decentralized Data Management
- ✔ Infrastructure Automation
- ✔ Design for failure
- ✔ Evolutionary Design

Martin Fowler

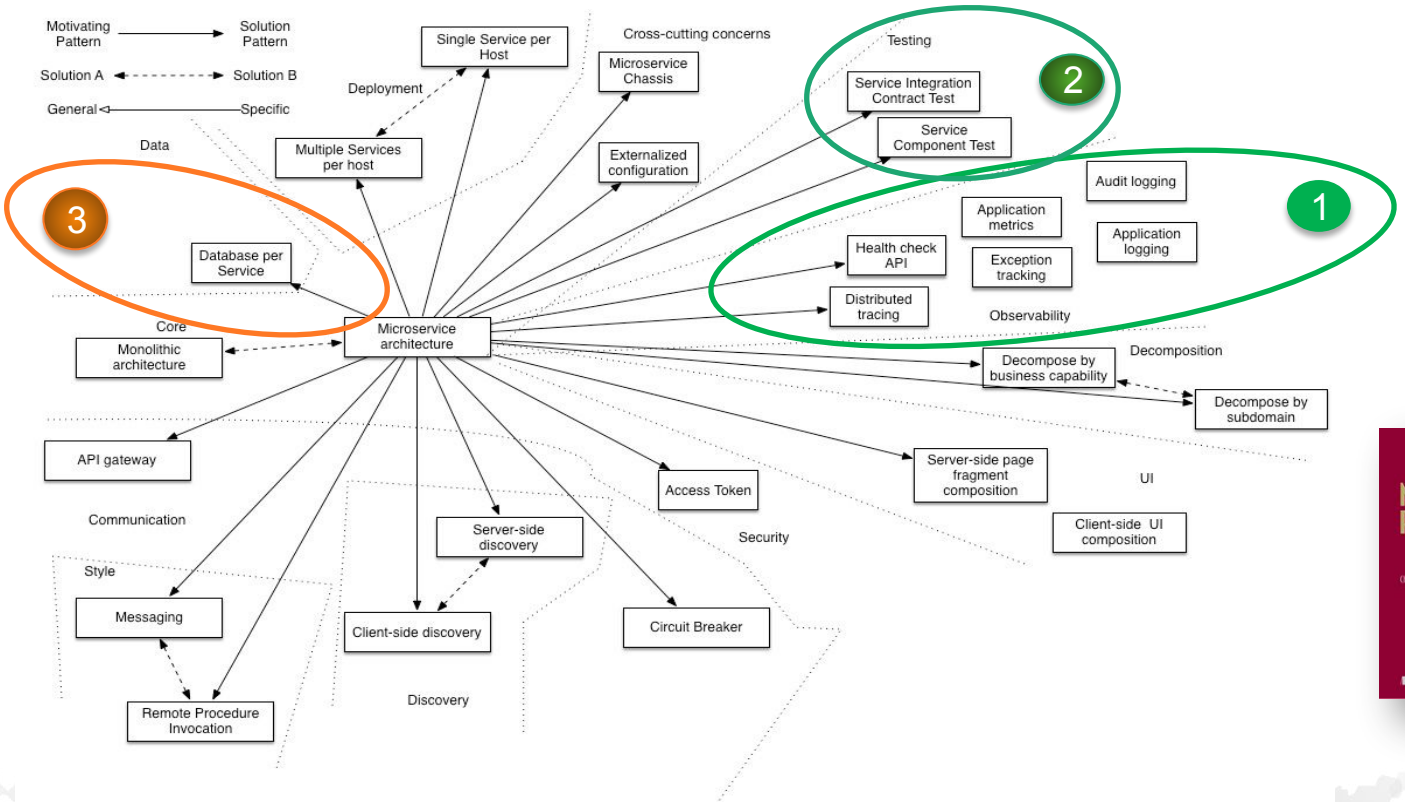
ADVANTAGES

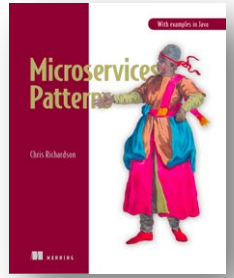
- Reduce Cost (Scaling, Design)
- Reduce Risk (resilience)
- Increase Release Speed
- Enable Visibility (security, monitoring)

DISADVANTAGES



- Complexity (Security, Transaction, Orchestration)
- Cultural Changes
- Bigger RUN footprint





Source: https://microservices.io/patterns/microservices.html

Where Cassandra make sense with Microservices

Microservices should not share anything
You install a Database for each service

Do you ?
Does anyone do that ?

No. So WHY ?

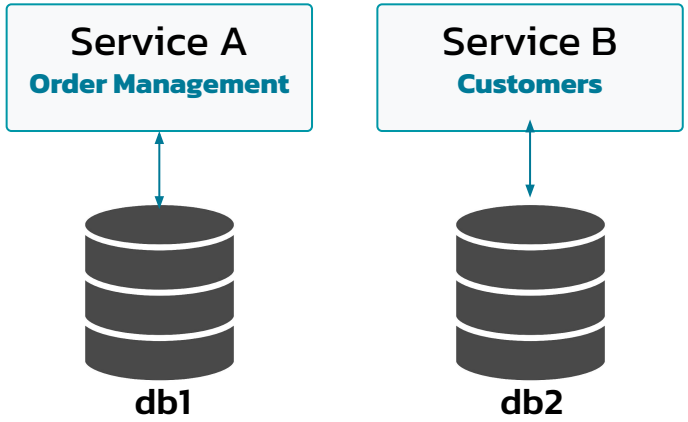
Atomicity

Consitency

Isolation

Durability

❌ No distributed transaction Cross Services



Basic

Availability

Soft State

Eventual Consistency

✅ AP System with Idempotence

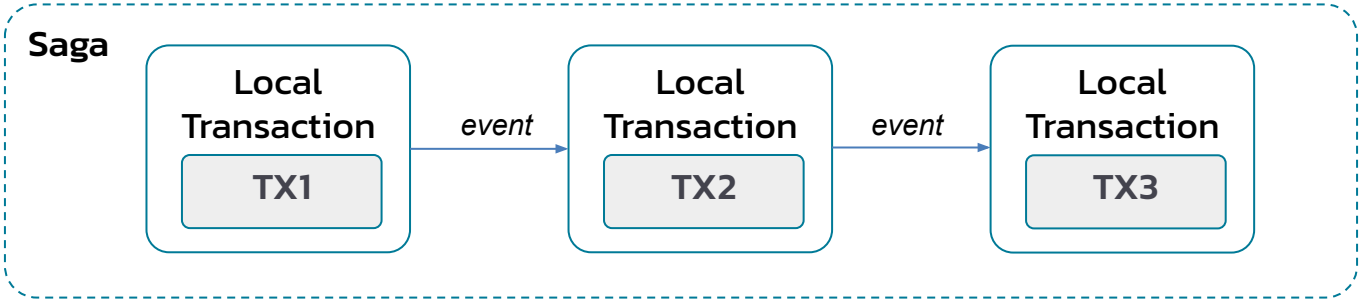
✅ Event Sourcing, CQRS

From “ACID’ to “BASE”

- Local Transactions and Compensations
- 2 Modes
  - Choregraphy (Event Oriented Architecture, eg: Pulsar...)
  - Orchestration (BPM, eg: Cadence)

Astra STREAMING

Temporal



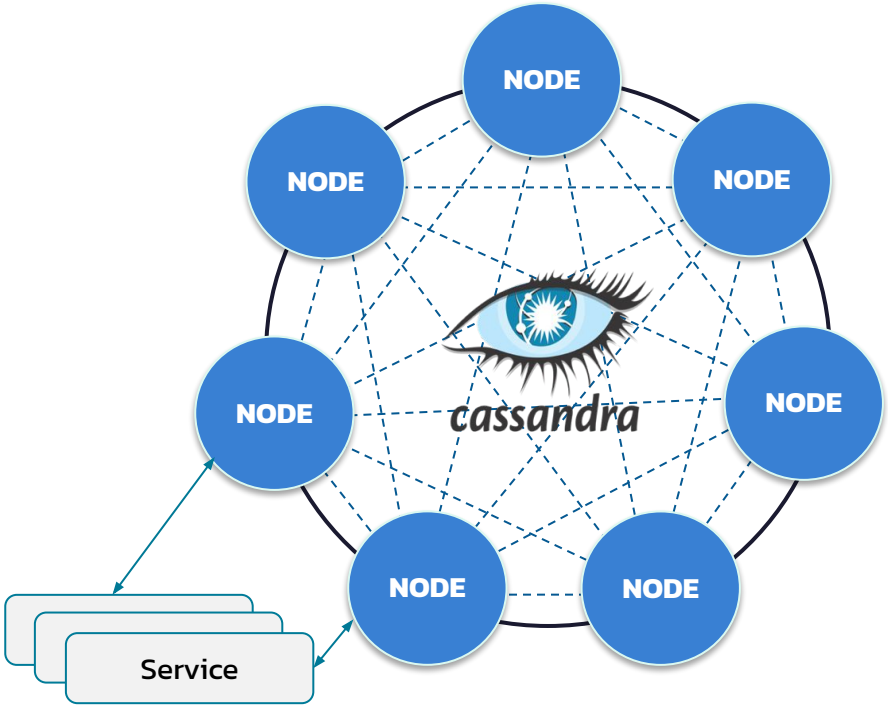
Microservice Saga

Loose Coupling: Data resiliency

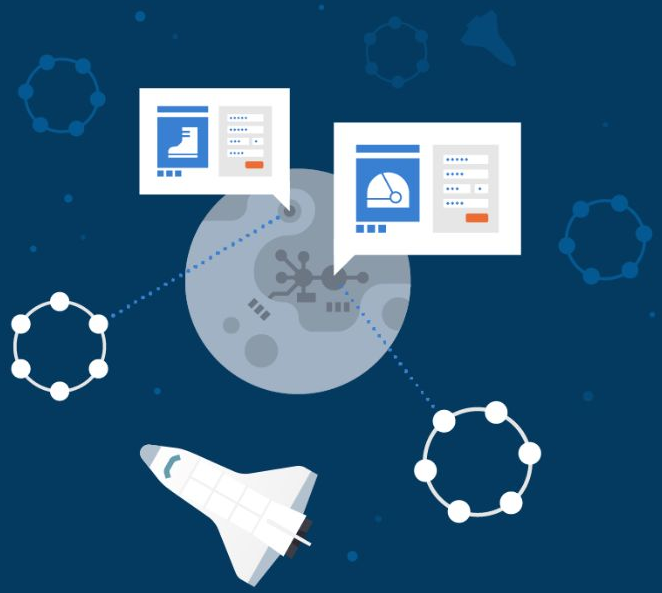
- Data Replicated on multiple Nodes
- Load Balancing at driver side
- Health Check at driver side
- Hinted HandOff

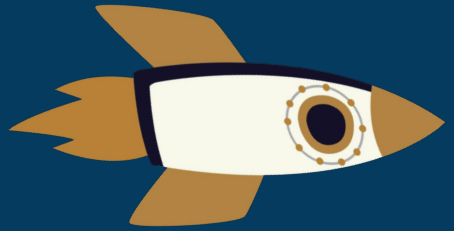
Share nothing: Data isolation

- Per Keyspace (with replications)
- Per Tables (1 query = 1 table)
- Per profile (RBAC)



Cassandra ❤ Microservices





Hands-on (!github)

#1 Database Setup

- ✅ Create Database is you have not
- ✅ Wake up the database if *StandBy*

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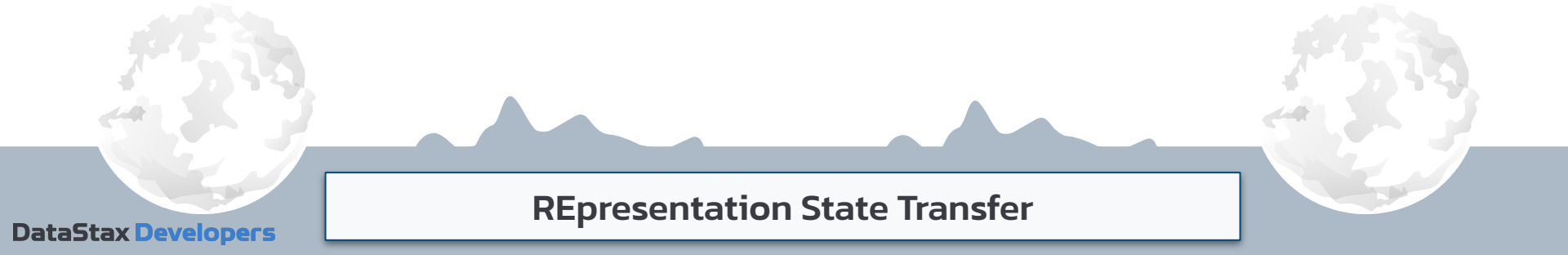
{ REST }

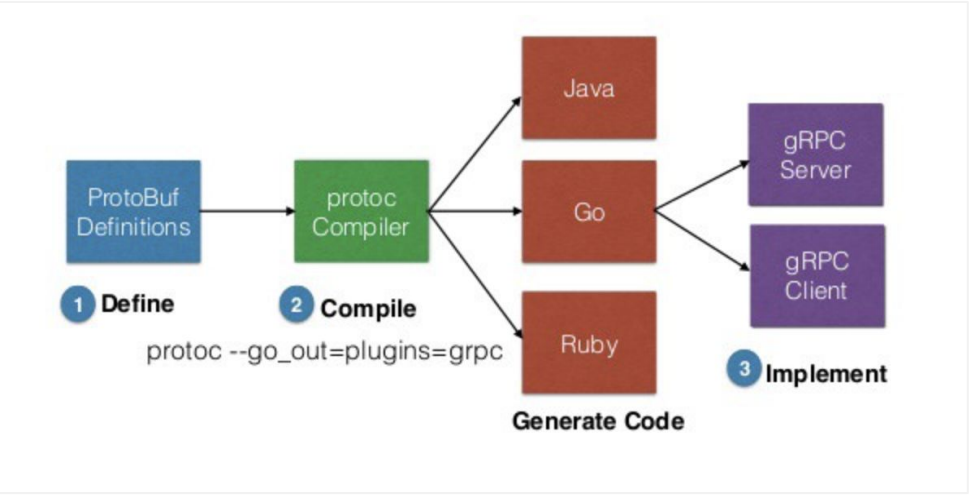
Todos Implement CRUD operations for Todo Tasks

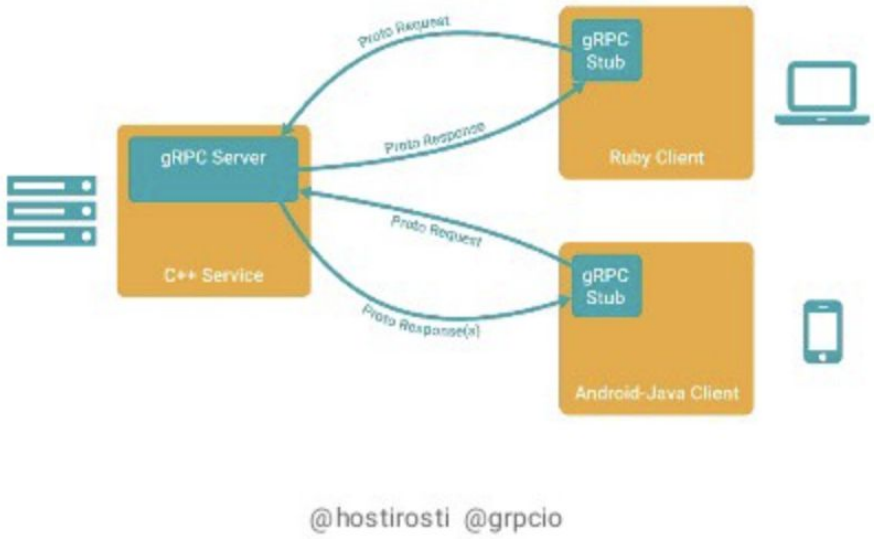
GET	`/api/v1/todos/`	Retrieve the complete list of Taskss
POST	`/api/v1/todos/`	Create a new task
DELETE	`/api/v1/todos/`	Delete all tasks in one go
GET	`/api/v1/todos/{taskId}`	Get details of a task if exists
DELETE	`/api/v1/todos/{taskId}`	Delete a task from its id of exists
PATCH	`/api/v1/todos/{taskId}`	Update an existing task



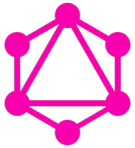
REpresentation State Transfer

gRPC





Google Remote Procedure Call



GraphQL

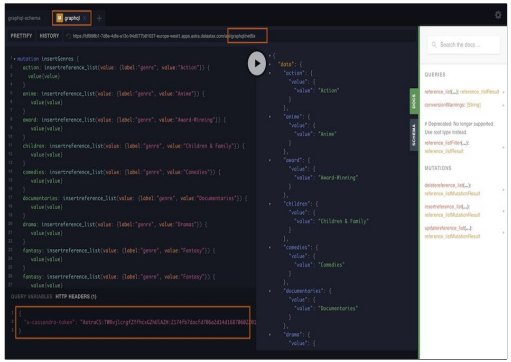
Describe your Data

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

Ask what you need

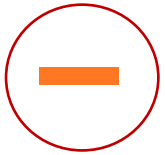
```
incomingWorkshops {
    title
    abstract
}
```

Discoverability (demo)



{ REST }

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



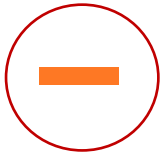
- Verbose payloads (*json*, *xml*)
- No discoverability
- Not suitable for command-like (functions) API

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

Rest vs gRPC vs GraphQL ?

gRPC

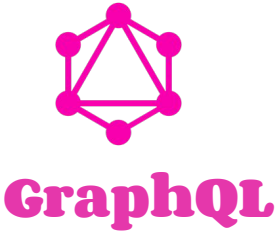
- High Performances (http/2 – binary serialisation)
- Multiple stubs : Sync, Async, Streaming
- Multi languages - Interoperability



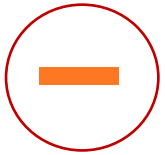
- Strongly coupled (schema with proto files)
- No discoverability
- Protobuf serialization format

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

Rest vs gRPC vs GraphQL ?



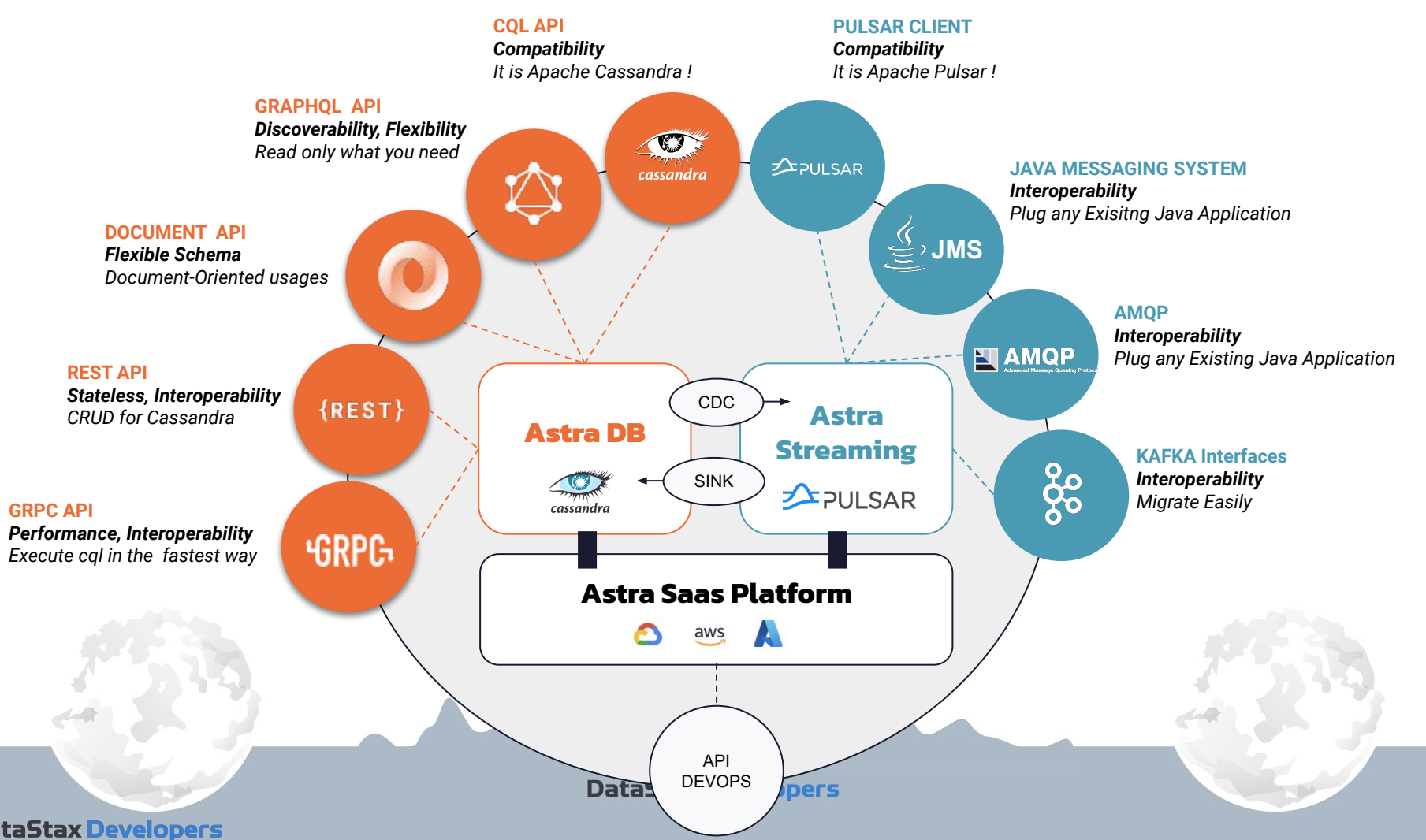
- Discoverability, documentation
- Custom payloads
- Match standards (Json | Http)



- 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)

Rest vs gRPC vs GraphQL ?


CQL API
Compatibility
It is Apache Cassandra !
PULSAR CLIENT
Compatibility
It is Apache Pulsar !
GRAPHQL API
Discoverability, Flexibility
Read only what you need
JAVA MESSAGING SYSTEM
Interoperability
Plug any Exisitng Java Application
DOCUMENT API
Flexible Schema
Document-Oriented usages
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 in the fastest way
cassandra
PULSAR
JMS
AMQP
{REST}
GRPC
Astra DB
cassandra
CDC
SINK
Astra Streaming
PULSAR
Astra Saas Platform
aws
API
DEVOPS

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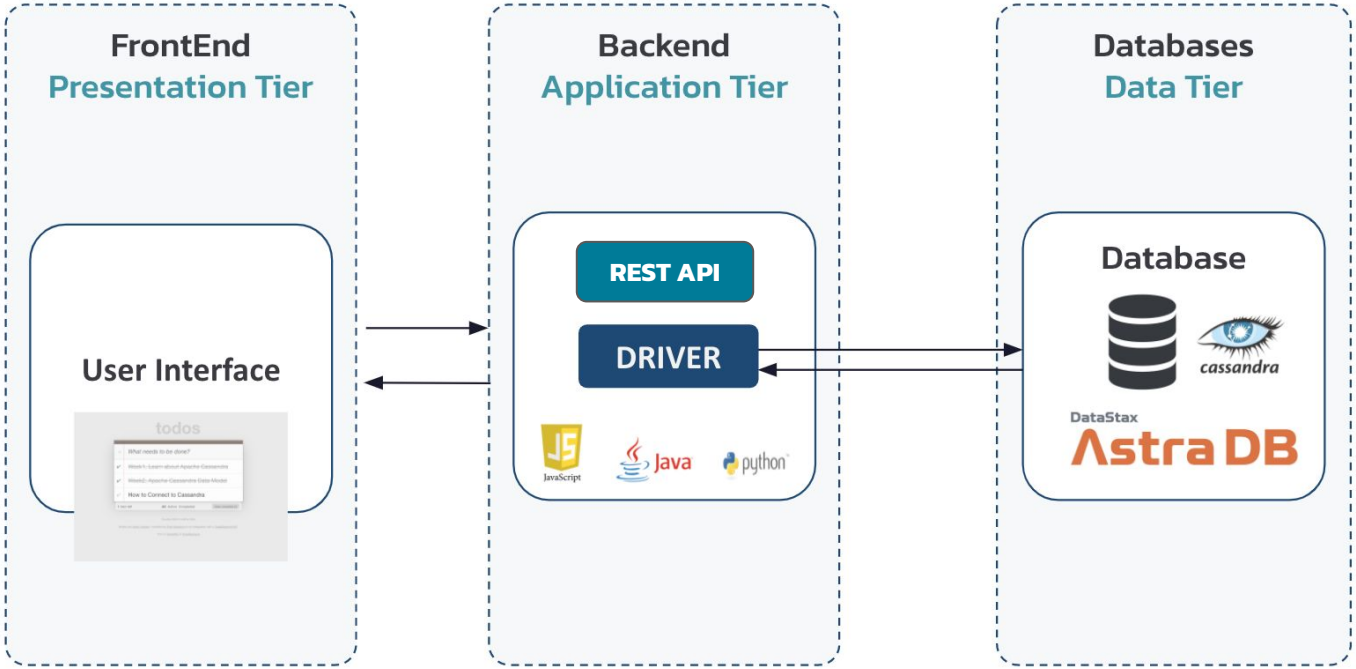
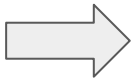


Architecture of our Microservice

TodoMVC

Helping you **select** an MV* framework

Download | View on GitHub | Blog



http://todomvc.com/examples/angularjs/

TodoMVC.com

Todo-Backend

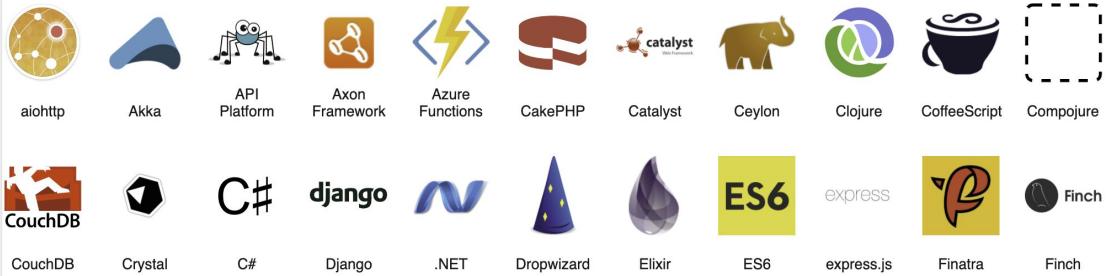
a shared example to showcase backend tech stacks

The Todo-Backend project defines a simple web API spec - for managing a todo list. Contributors implement that spec using various tech stacks. Those implementations are cataloged below. A spec runner verifies that each contribution implements the exact same API, by running an automated test suite which defines the API.

The Todo-Backend project was inspired by the TodoMVC project, and some code (specifically the todo client app) was borrowed directly from TodoMVC.

Created and curated by Pete Hodgson.

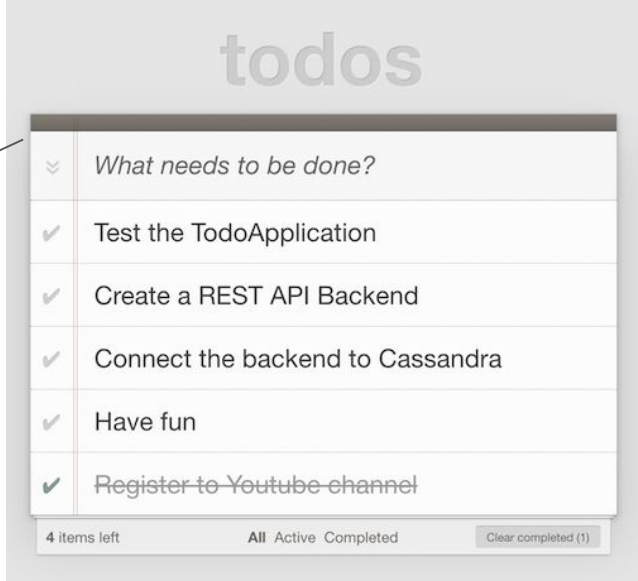
featuring HTTP APIs built with:



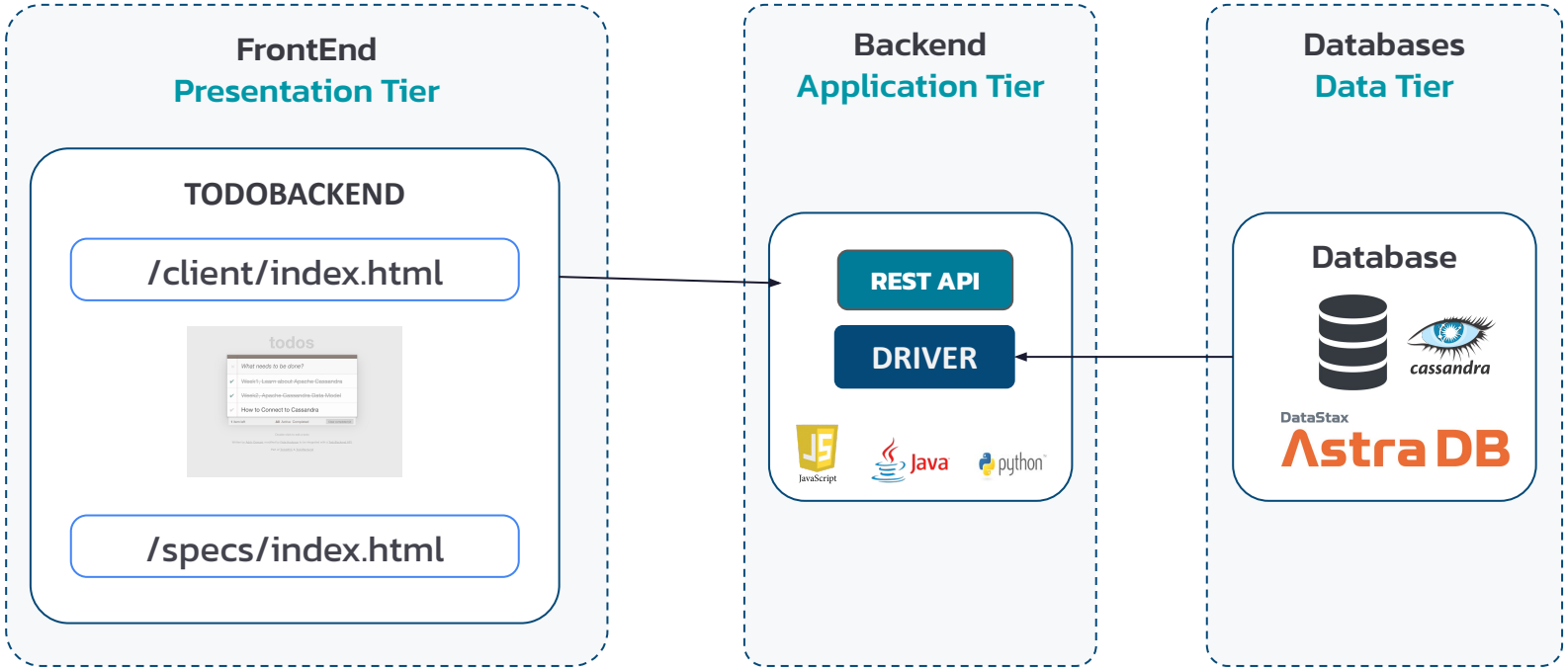
Todo Backend.com

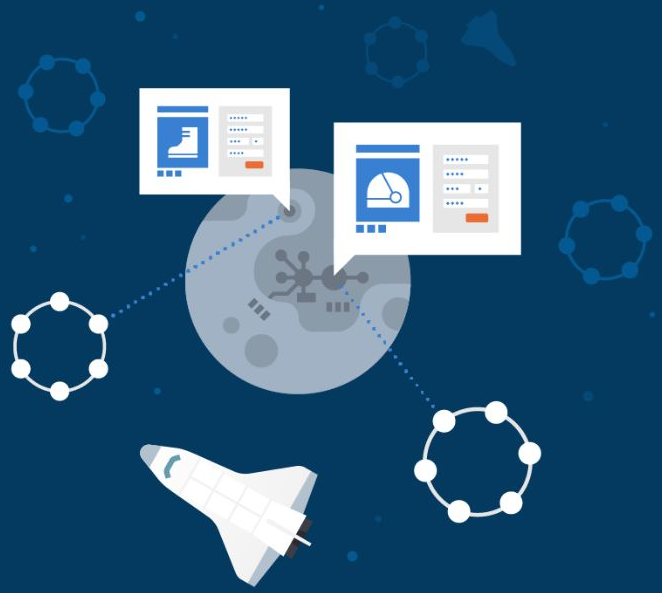
Todos Implement CRUD operations for Todo Tasks

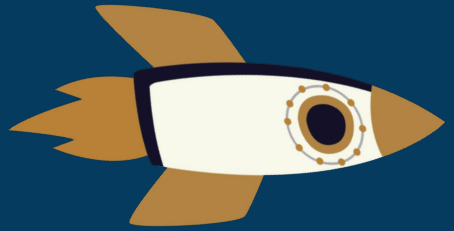
GET	`/api/v1/todos/`	Retrieve the complete list of Taskss
POST	`/api/v1/todos/`	Create a new task
DELETE	`/api/v1/todos/`	Delete all tasks in one go
GET	`/api/v1/todos/{taskId}`	Get details of a task if exists
DELETE	`/api/v1/todos/{taskId}`	Delete a task from its id of exists
PATCH	`/api/v1/todos/{taskId}`	Update an existing task



Rest Api Specifications


FrontEnd
Presentation Tier
TODOBACKEND
/client/index.html
/specs/index.html
Backend
Application Tier
REST API
DRIVER
JavaScript
Java
python
Databases
Data Tier
Database
cassandra
DataStax
Astra DB





Hands-on (!github)

#2 Todo App

✅ Run existing todo Application

✅ Getting ready for Code !

01

Bootcamp 2022
Housekeeping
Reminders

02

Microservices
Why with Apache Cassandra ?

03

APIs
Rest, GraphQL, gRPC

04

Todo Application
TodoMVC, TodoBackend

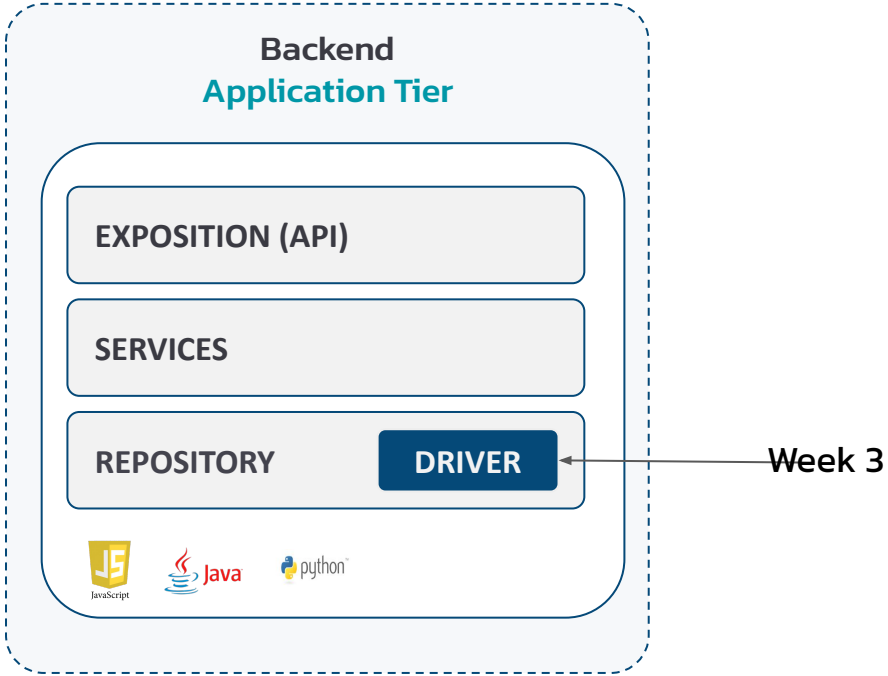
05

Code Build Package
Building efficient Data Model

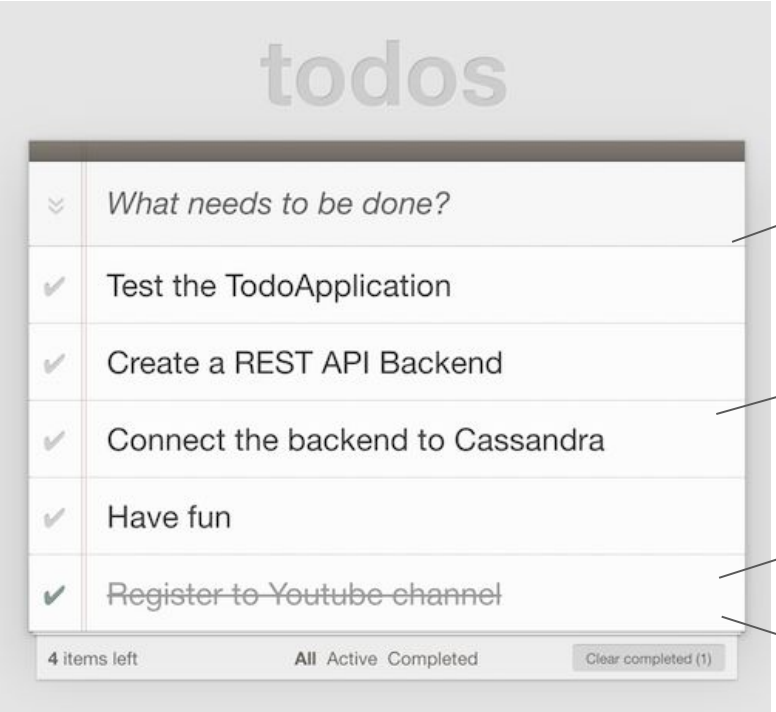
06

What's next?
Quiz, Homework, Next week

Agenda



Anatomy of our microservice



List all tasks

Create a new Task

Mark a task as completed/uncomplete

Delete a task

Specification of Service layer

todoitems		
user_id	**TEXT**	**K**
item_id	TIMEUUID	C↑
completed	BOOLEAN	
title	TEXT	
offset	INT	

```
CREATE TABLE todos.todoitems (
    user_id    text,
    item_id    timeuuid,
    completed  boolean,
    title      text,
    offset     int,
    PRIMARY KEY ((user_id),item_id)
);
```

- Our Paritition key is user_id
  - We chose to have one todo list per user (avoiding any select * from table)
- Service
  - findTodos() for user
  - createTodo() for user
  - deleteTodo() from its id (userid + itemid)
  - updateTodo() from its id (both to mark it as complete and update title)
- REST API
  - The userid will appear in the URL
  - Provide major version (best practice)

/api/v1/{user_id}/todos

Backend

Spring Boot

- Spring MVC
- Spring Data
- JAVA Drivers

Backend

- Express
- Javascript
- JAVASCRIPT Drivers

Backend

- Flask
- Python
- PYTHON Drivers

Technical Stacks Implementation

Backend

Spring Boot

TodoController

TodoRepository

JAVA Drivers

Backend

api.js

todos.js

JAVASCRIPT Drivers

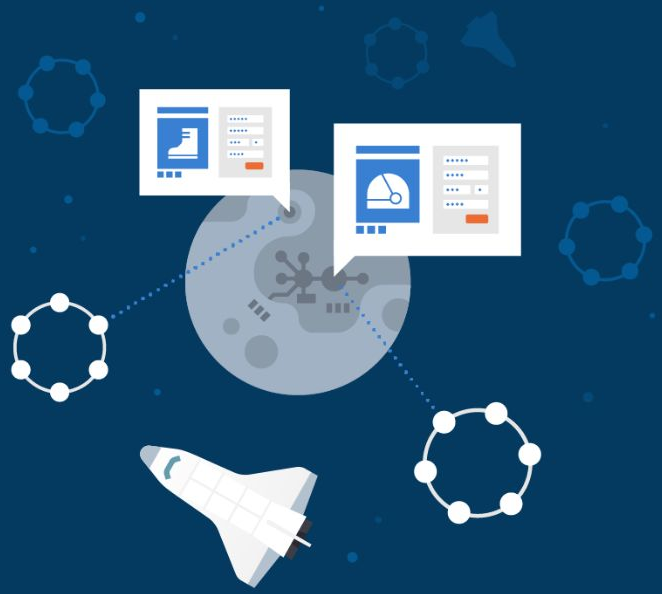
Backend

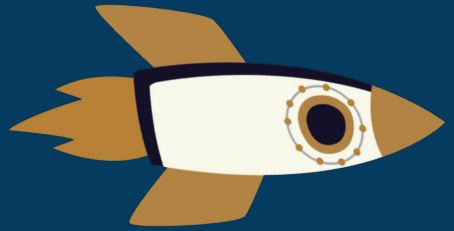
api.py

todos.py

PYTHON Drivers

Technical Stacks Implementation





Hands-on (!github)

#3 Code

- ✅ Connect and Create Schema
- ✅ Populate DB
- ✅ Run and understand the app

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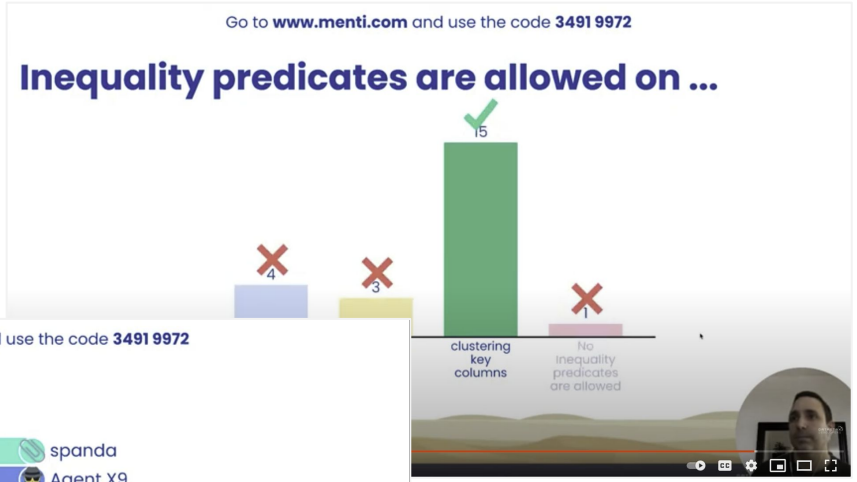
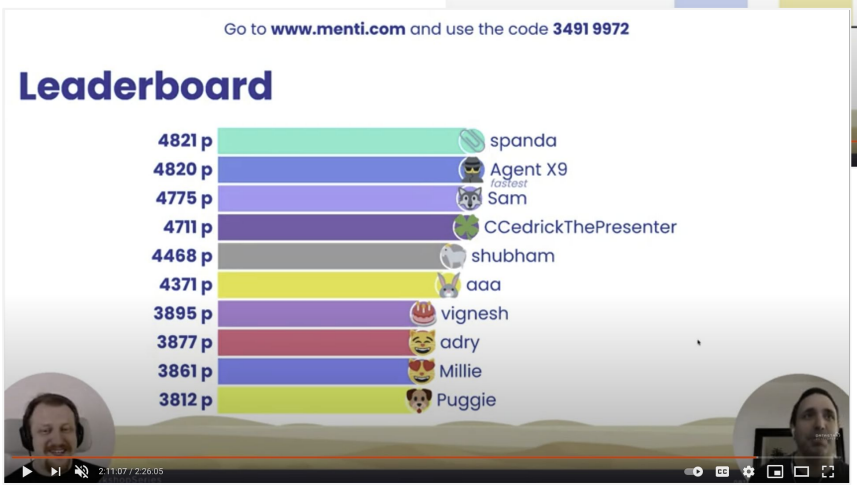




Play with us with Menti.com (new TAB)

SWAG WINNERS 🎉

Congratulations to 1st, 2nd and 3rd place on the Menti quiz!

To claim your prize, please send an email to:

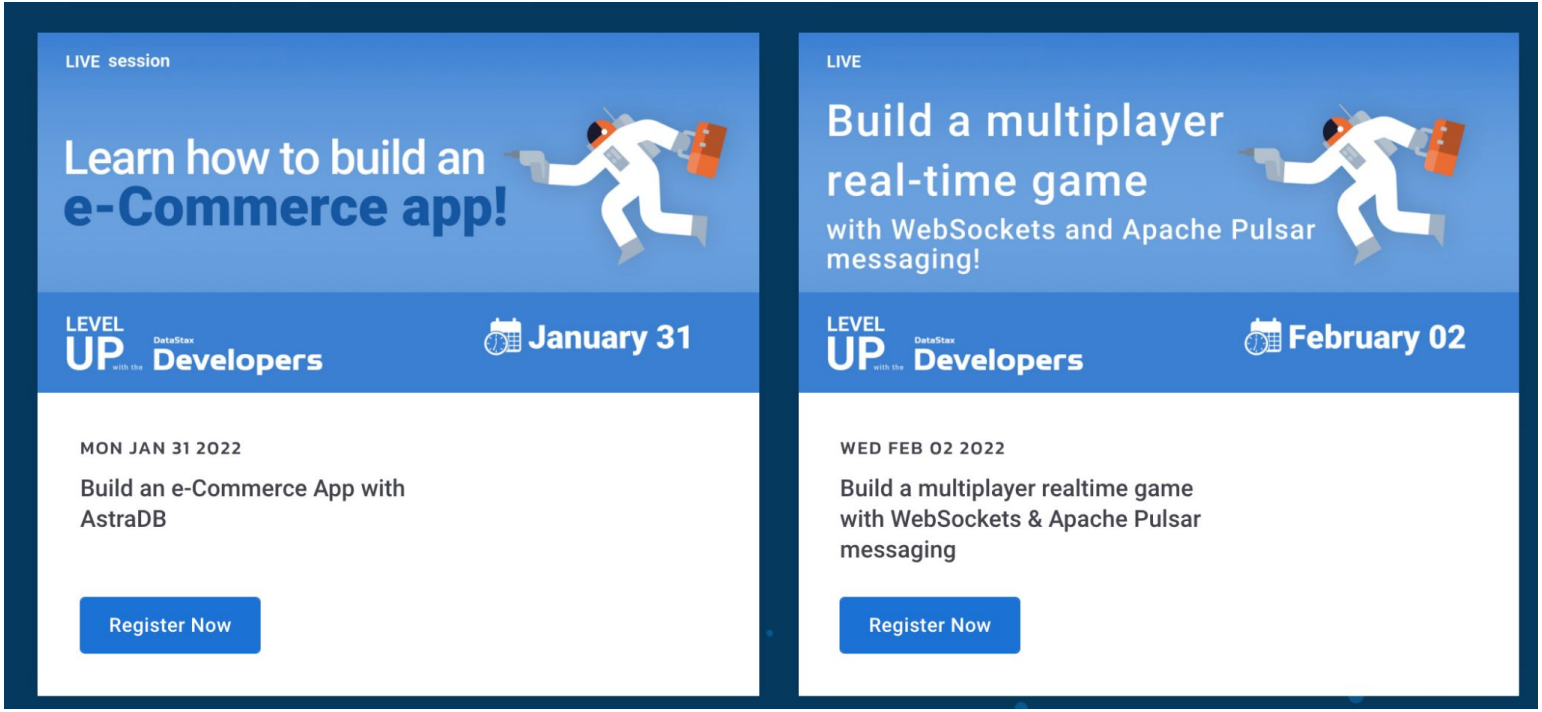
gary.harvey@datastax.com

** Include a screenshot of your Menti screen

Homework (!homework)

Fill the form with questions

Coding exercise: *Update the api and service layers code to offer a new endpoint to get only completed tasks for a user.*


LIVE session
Learn how to build an e-Commerce app!
LEVEL UP with the DataStax Developers
January 31
MON JAN 31 2022
Build an e-Commerce App with AstraDB
Register Now
LIVE
Build a multiplayer real-time game
with WebSockets and Apache Pulsar messaging!
LEVEL UP with the DataStax Developers
February 02
WED FEB 02 2022
Build a multiplayer realtime game with WebSockets & Apache Pulsar messaging
Register Now

Next Week

ASTRA DB'S BUILD-A-THON

MAKING SIDE-HUSTLES A REALITY

21 February - 28 May 2022

JOIN OUR ASTRA DB BUILD-A-THON HACK!

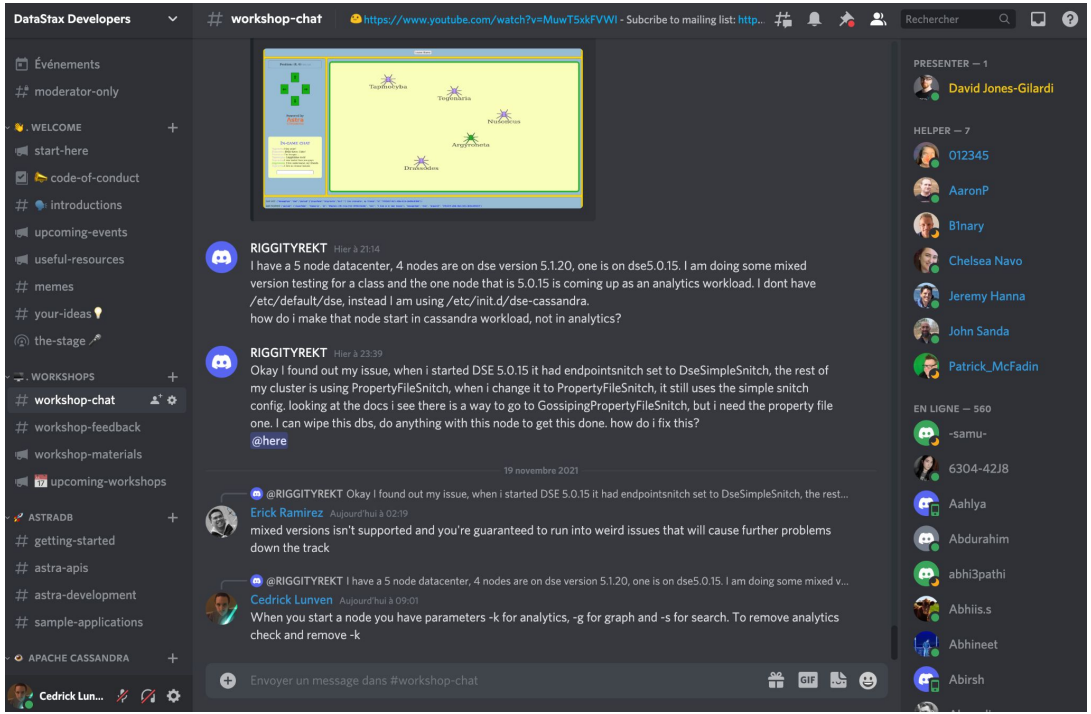
📍 3 months, 3 rounds of challenges. 📍
Join 1 month, 2 months or all 3

Each month, we'll reveal a fresh new set of challenges you can partake in.

All you have to do is have Astra DB as your backend.

USD$41,000 worth of prizes

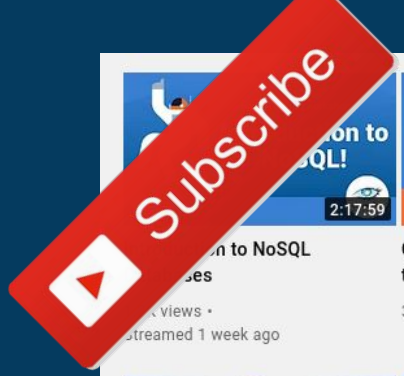
➡️ **REGISTER – buildathonhack.com**

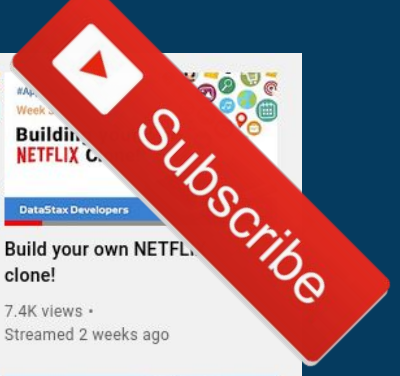


!discord

dtsx.io/discord

Datastax Developers Discord (18k+)





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Thank You!