

DataStax

# Developers

Api and Microservices  
with Apache Cassandra™

Bootcamp 2022, week4



# Director of Developer Relations

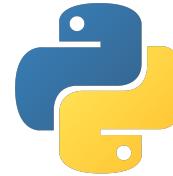
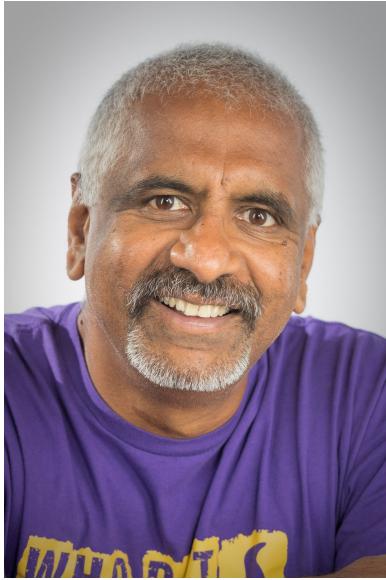


- Trainer
- Public Speaker
- Developers Support
- Developer Applications
- Developer Tooling
  
- Creator of ff4j ([ff4j.org](http://ff4j.org))
- Maintainer for 8 years+
  
- Happy developer for 14 years
- Spring Petclinic Reactive & Starters
- Implementing APIs for 8 years



Cédrick Lunven

# Developer Advocate



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



Raghavan "Rags" Srinivas



@rags



@ragsns



@ragss



Cedrick  
Lunven

Aleksandr  
Volochnev

Jack  
Fryer

Kirsten  
Hunter

Stefano  
Lottini

David  
Gilardi

Ryan  
Welford

Rags  
Srinivas

Sonia  
Siganporia

R

S



DataStax Developers Crew

# 01



**Bootcamp 2022**  
**Housekeeping**  
**Reminders**

# 02

**Microservices**  
**Why with Apache Cassandra ?**

# 03

**APIs**  
**Rest, GraphQL, gRPC**

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**Todo Application**  
**TodoMVC, TodoBackend**

# 05

**Code Build Package**  
**Building efficient Data Model**

# 06

**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



Bootcamp 2022

# todos

- ⌄ What needs to be done?
  - ✓ Week1, Learn about Apache Cassandra
  - ✓ Week2, Apache Cassandra Data Model
  - ✓ How to Connect to Cassandra

1 item left

All Active Completed

[Clear completed \(2\)](#)

Double-click to edit a todo

Written by [Addy Osmani](#), modified by [Pete Hodgson](#) to be integrated with a [TodoBackend API](#).

Part of [TodoMVC](#) & [TodoBackend](#)



**TodoApplication**



1

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



4-week bootcamp Housekeeping



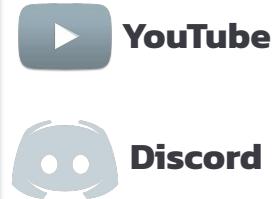
**Livestream:** youtube.com/DataStaxDevs

**Questions:** <https://dtsx.io/discord>

#### Agenda



A screenshot of a Discord channel titled "workshop-chat". The channel has several messages from users like "isole001", "Erick.Fernandes", and "isole002" discussing workshop topics such as "DataStax Astra", "Reactive Drivers", and "Spring Reactive Boot and WebFlux". The interface shows a list of users on the right and a message history on the left.



## Games and quizzes: [menti.com](https://menti.com)

A Menti poll titled "How much experience do you have with the Spring Framework ?" with the following results:

Experience Level	Percentage
Never heard about it	41%
I know the concepts	29%
I have already used it	10%
I use it regularly	20%

Below the chart, there is a small video player showing a person holding a smartphone displaying the Mentimeter app.

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



## Database + GraphQL + PlayGround



DataStax  
**Astra DB**



The screenshot shows the Gitpod IDE interface. On the left, the file tree displays 'StargateDemoApplication.java' and 'MainAstraDemoApplication.java'. The right side shows the code editor with Java code. Below the code editor are logos for npm, node.js, Maven, and Docker. The Gitpod logo is at the bottom center.

The screenshot shows a GitHub repository page for 'DataStax-Examples / todo-astra-jamstack-netlify'. It displays branches, commits, and releases. The GitHub logo is at the bottom center.

O'REILLY  
KATACODA KATACODA OVERVIEW & SOLUTIONS

Connect to Astra (Cassandra as a Service) with CQL Shell

Step 1 of 5

### Create your Astra DB Database

If you don't have an Astra account, set one up - it's easy!

Go to the Astra DB page in your browser [astra.datastax.com](https://astra.datastax.com).

Let's create the database. Follow the steps outlined here. To make it easy, we have recommended the values you should use for this scenario.

**NOTE:** If you already have an Astra DB database with values that differ from what we suggested, you may have to adjust some of the operations in this scenario accordingly, or create an additional response with the designated values.

If you don't already have an Astra DB database, when you log in for the first time you'll see a screen that looks like the image below.

Choose Plan & Provider



Katacoda



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

The screenshot shows the DataStax Academy course page for DS220. At the top, it says "Course Content" and "Introduction". Below that, there are three sections: "Data Modeling Overview", "Data Modeling Overview Quiz", and "Relational Vs. Apache Cassandra". Each section has a "Start" button. To the right, there's a progress bar showing "Not Started 0/56" and a circular progress indicator at 0%. Below the progress bar are sections for "Badges" and "Competencies".

The screenshot shows the DataStax /dev Learning Series Topics page for "Cassandra Fundamentals". It features a blue header with the title "Cassandra Fundamentals" and a "GET STARTED" button. Below the header, there's a section titled "Learning Series Topics" with a list of 11 topics: 01 Introduction to Apache Cassandra™, 02 Cassandra Query Language, 03 Keyspaces and Data Replication Strategies, 04 Tables with Single-Row Partitions, 05 Tables with Multi-Row Partitions, 06 Queries, 07 Advanced Data Types, 08 Tunable Consistency and Consistency Levels, 09 Linearizable Consistency and Lightweight Transactions, 10 Readme, and 11 Building Sample Apps.

The screenshot shows a GitHub repository page for "DataStax-Examples / todo-astra-jamstack-netlify". The repository has 177 commits ahead of "tjake/master". It includes sections for "Code", "Pull requests", "Actions", "Projects", "Wiki", "Security", "Insights", and "Settings". The "Code" tab is selected, showing a list of files and their commit history. The repository has 230 commits and 2 stars. It includes links to "astra.datastax.com/register" and "Readme".

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](mailto:aleksandr.volochnev@datastax.com)

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

[cedrick.lunven@datastax.com](mailto: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



Go to [www.menti.com](http://www.menti.com) and use the code 3491 9972

## Leaderboard

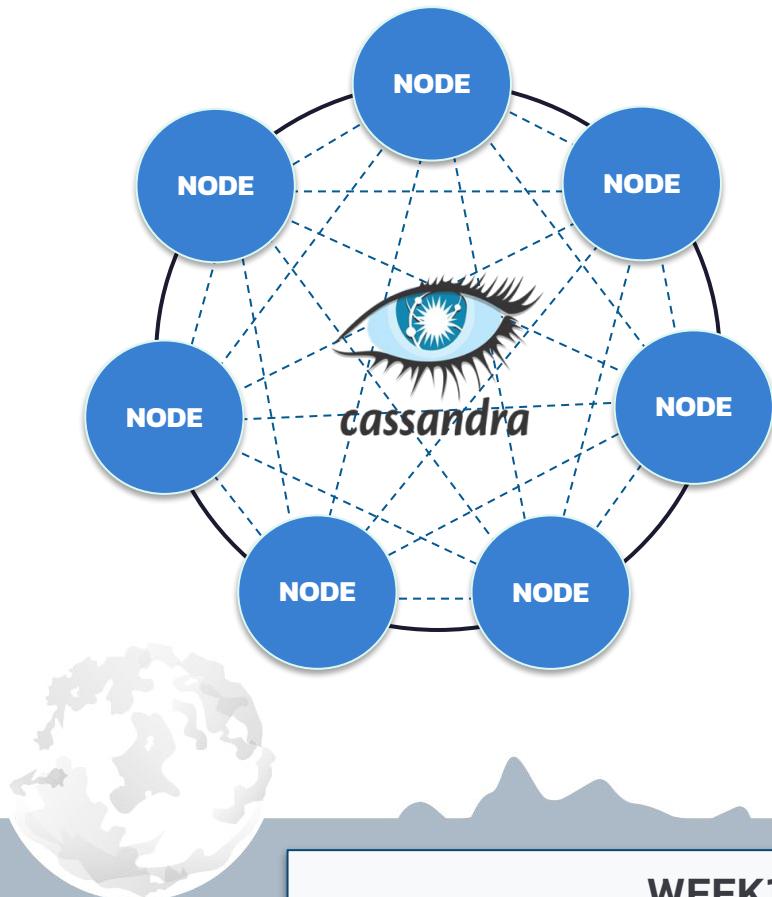
4821 p	spanda
4820 p	Agent X9
4775 p	fastest
4711 p	Sam
4468 p	CCedrickThePresenter
4371 p	shubham
3895 p	aaa
3877 p	vignesh
3861 p	adry
3812 p	Millie
	Puggie

2.11.07 / 2.26.05



Play with us with [Menti.com](http://Menti.com) (new TAB)

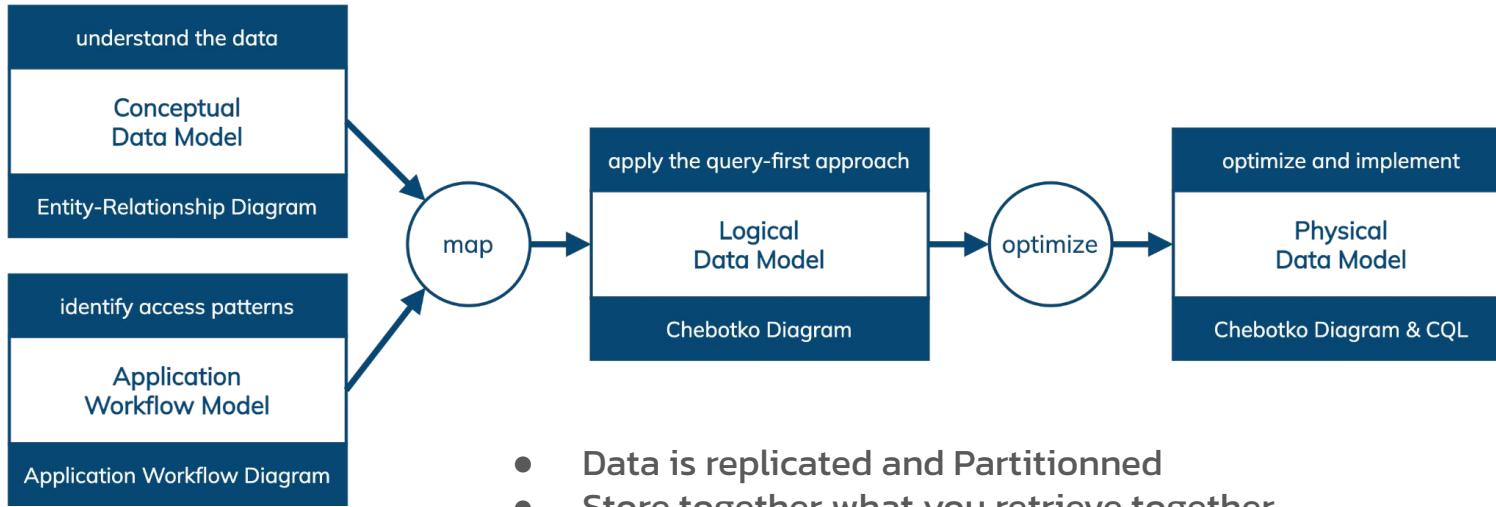
# Introduction to Apache Cassandra



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

WEEK1 in a Nutshell

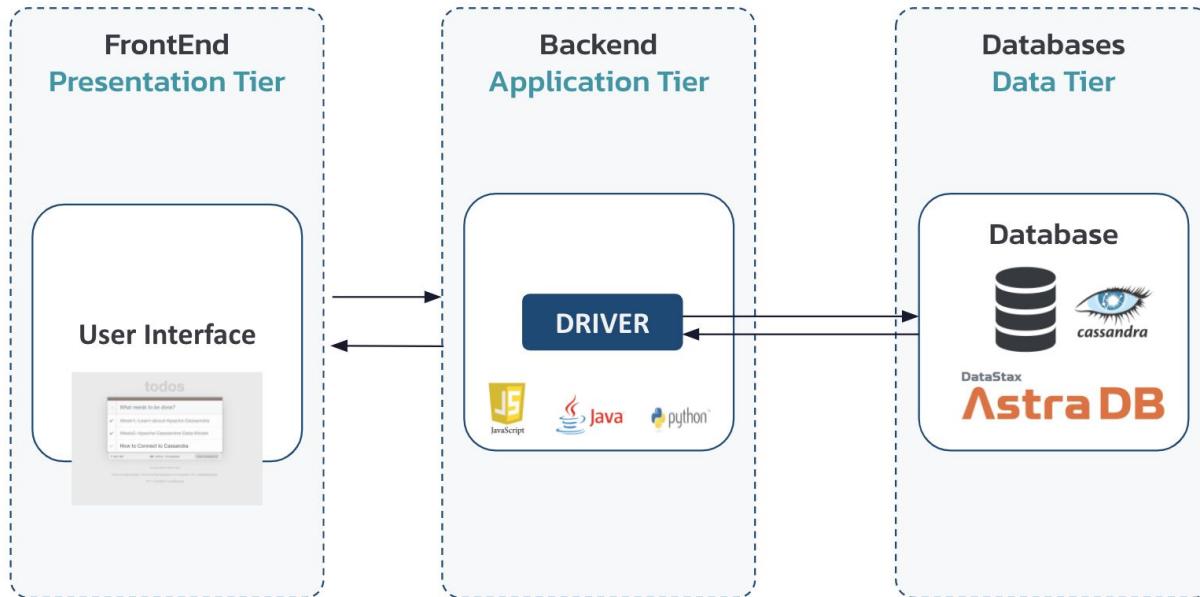
# Data Modeling with Apache Cassandra



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

Week2 In a Nutshell

# Application Development with Apache Cassandra



Week3 in a nutshell





And today's badge for your pleasure

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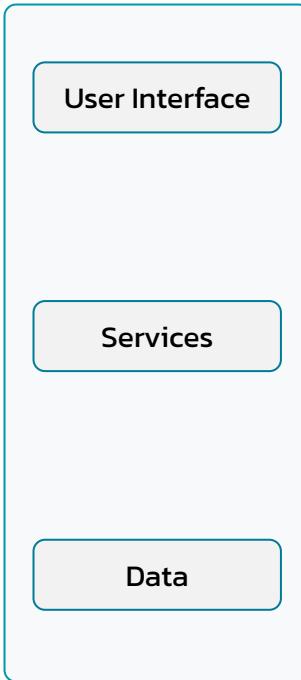
# 06

**What's next?**  
**Quiz, Homework, Next week**

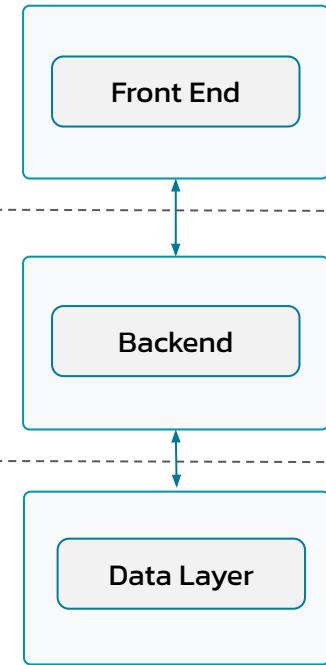


**Agenda**

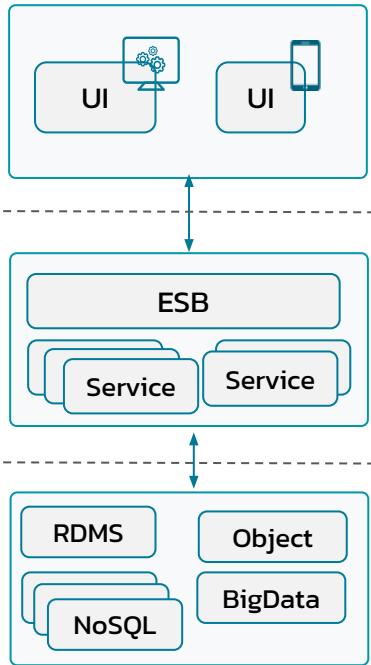
## Monolith



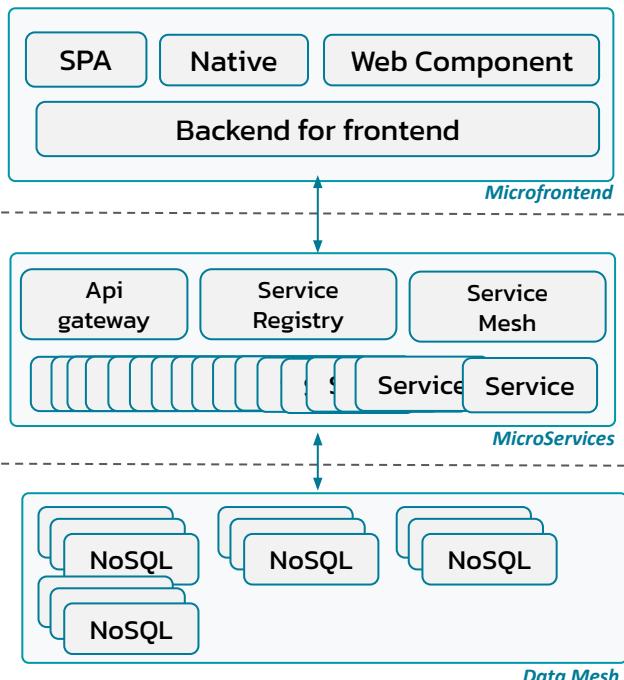
## Multi Tiers



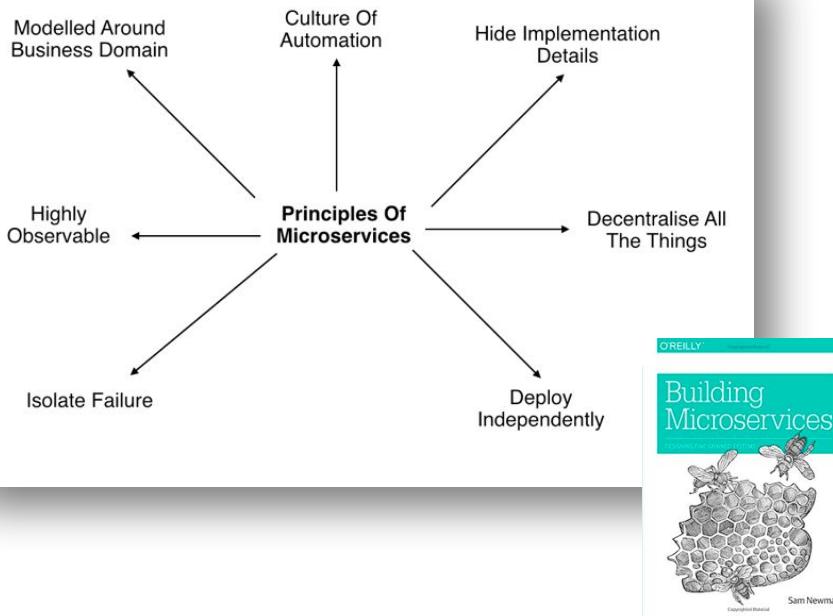
## SOA



## Microservices



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



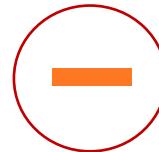
MicroServices

## ADVANTAGES



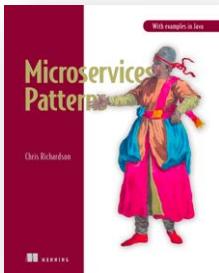
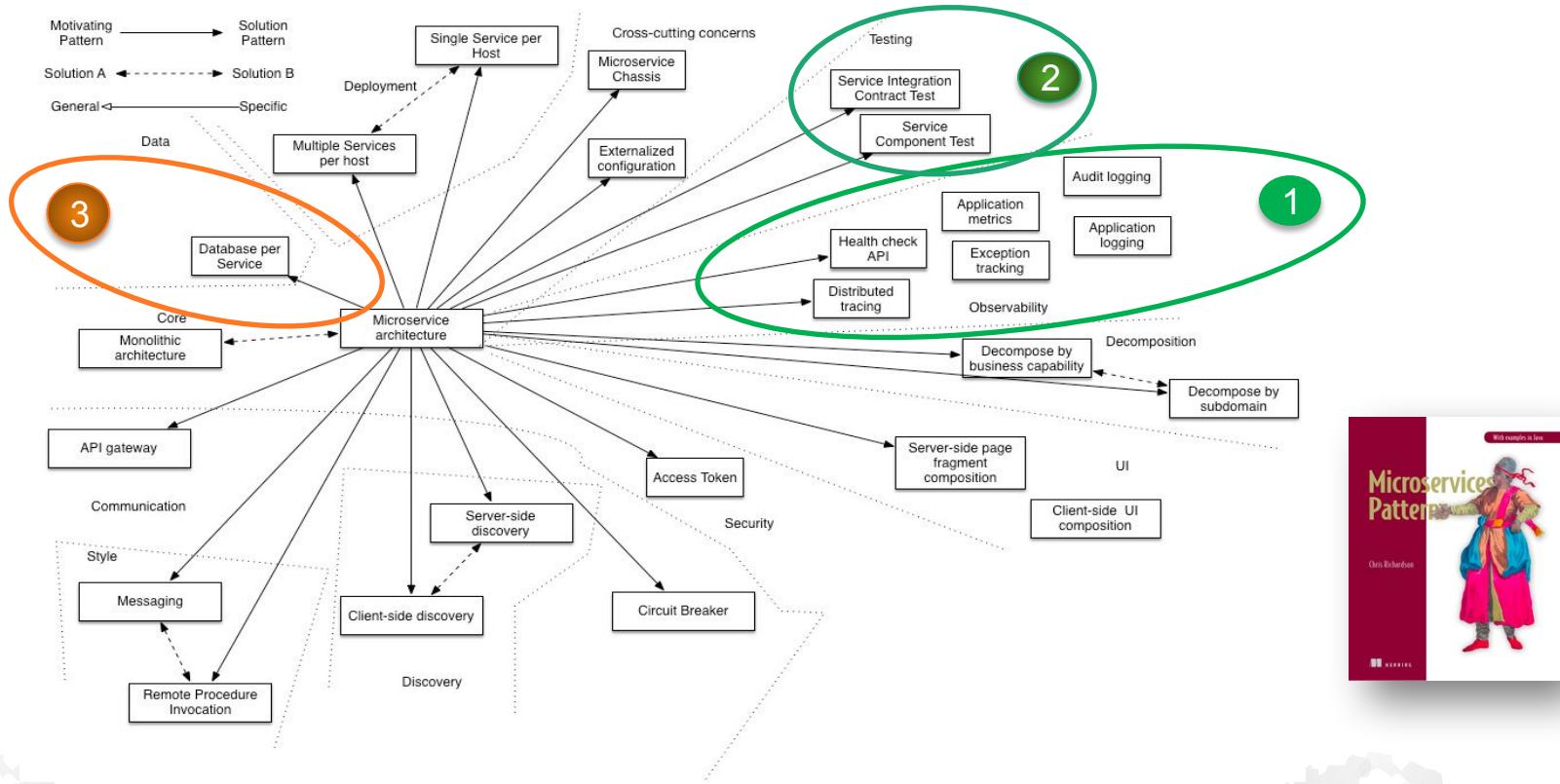
- Reduce Cost (Scaling, Design)
- Reduce Risk (resilience)
- Increase Release Speed
- Enable Visibility (security, monitoring)

## DISADVANTAGES



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





## 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

Consistency

Isolation

Durability

Basic

Availability

Soft State

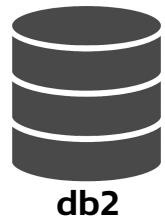
Eventual Consistency

 No distributed transaction Cross Services

Service A  
Order Management



Service B  
Customers



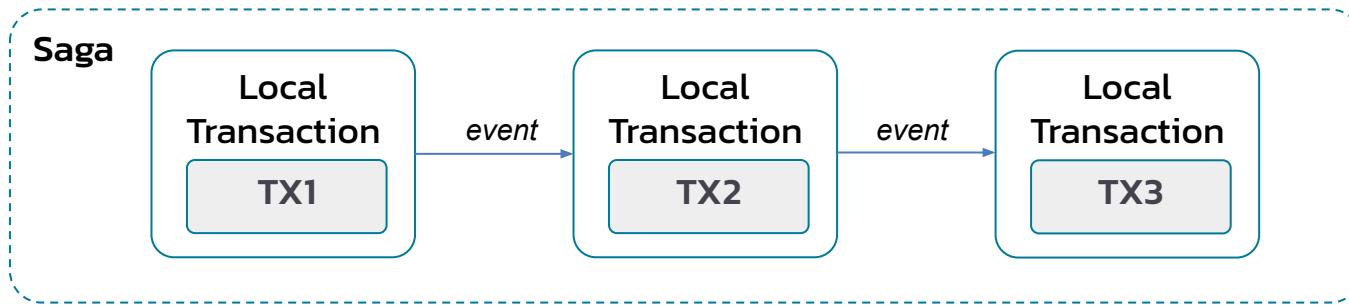
 AP System with Idempotence

 Event Sourcing, CQRS



From "ACID" to "BASE"

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



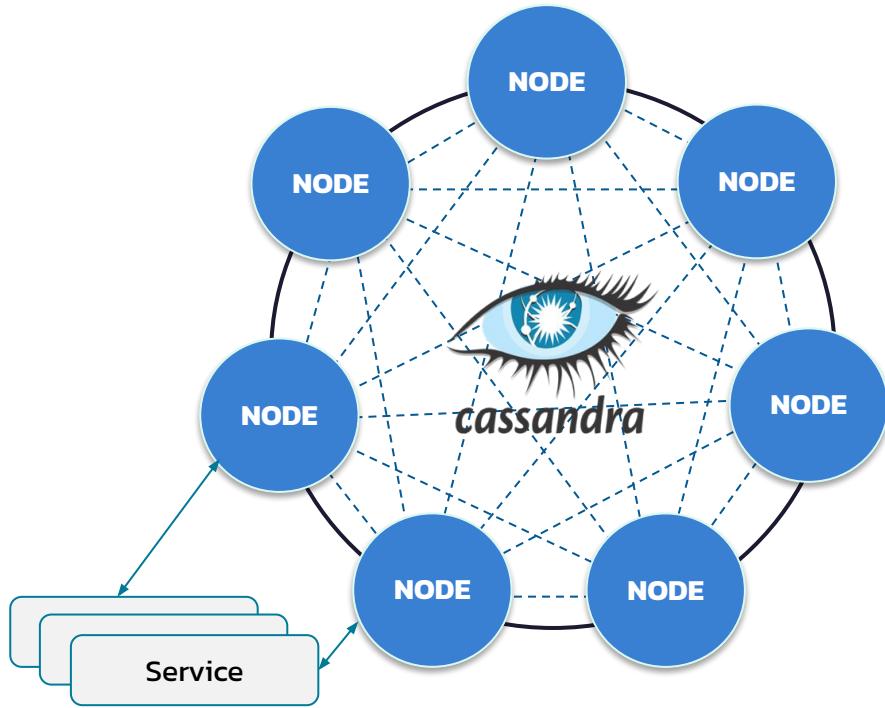
Microservice Saga

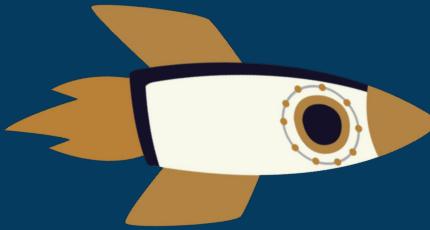
## Loose Coupling: Data resiliency

- 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)





# Hands-on (!github)

## #1 Database Setup

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



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**Agenda**

# { 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**

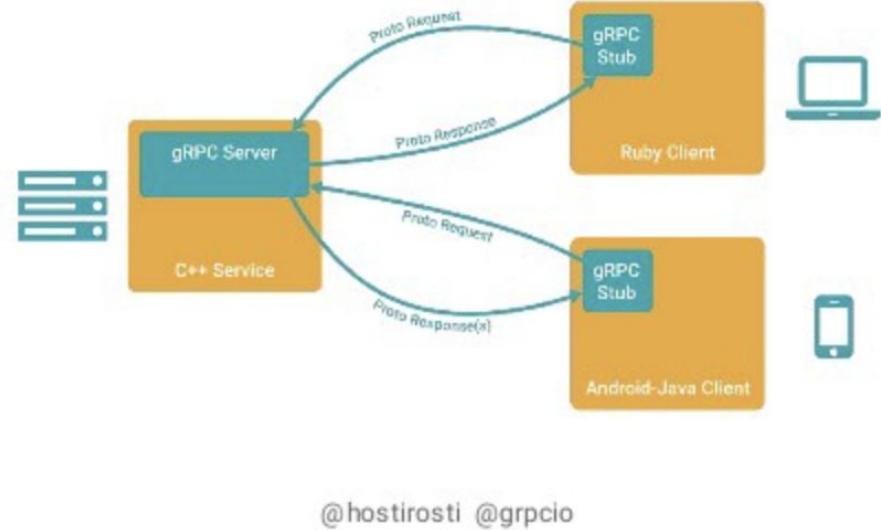
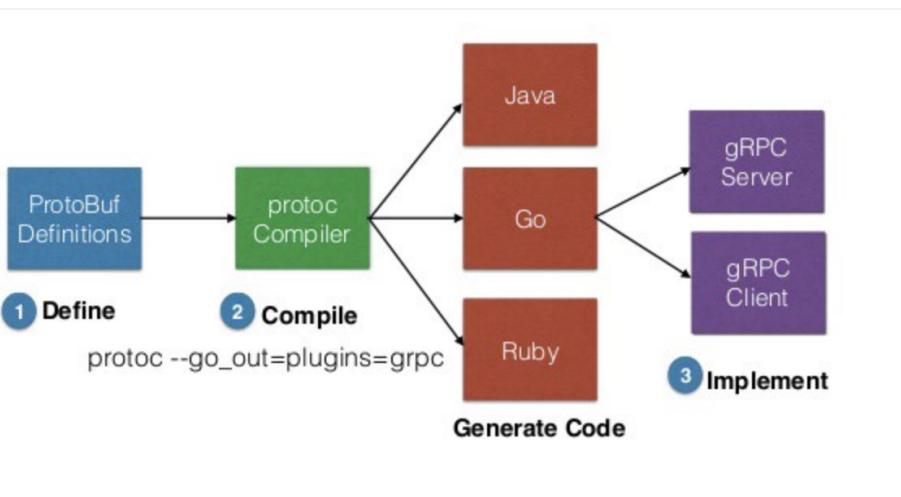
`/api/v1/todos/{taskId}` Get details of a task if exists

**DELETE**

`/api/v1/todos/{taskId}` Delete a task from its id if exists

**PATCH**

`/api/v1/todos/{taskId}` Update an existing task



Google Remote Procedure Call



## Describe your Data

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

## Ask what you need

```
incomingWorkshops {  
    title  
    abstract  
}
```

## Discoverability (demo)

The screenshot shows a GraphQL playground interface with a query editor and a results panel. The query is:

```
query {  
    incomingWorkshops {  
        title  
        abstract  
    }  
}
```

The results panel displays a nested JSON structure representing the workshop data. It includes fields like 'title', 'abstract', and lists of 'Speaker' objects. A red box highlights a specific part of the JSON output.



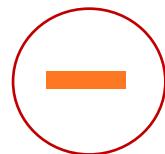
GraphQL



# { 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



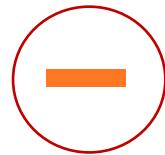
- CRUD superstar
- Relevant for mutations (OLTP)
- Public and web APIs
- Limited Business Scope



Rest vs gRPC vs GraphQL ?



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



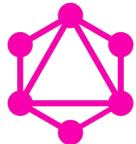
- Strongly coupled (schema with proto files)
- No discoverability
- Protobuf serialization format



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



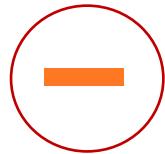
Rest vs gRPC vs GraphQL ?



# 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)

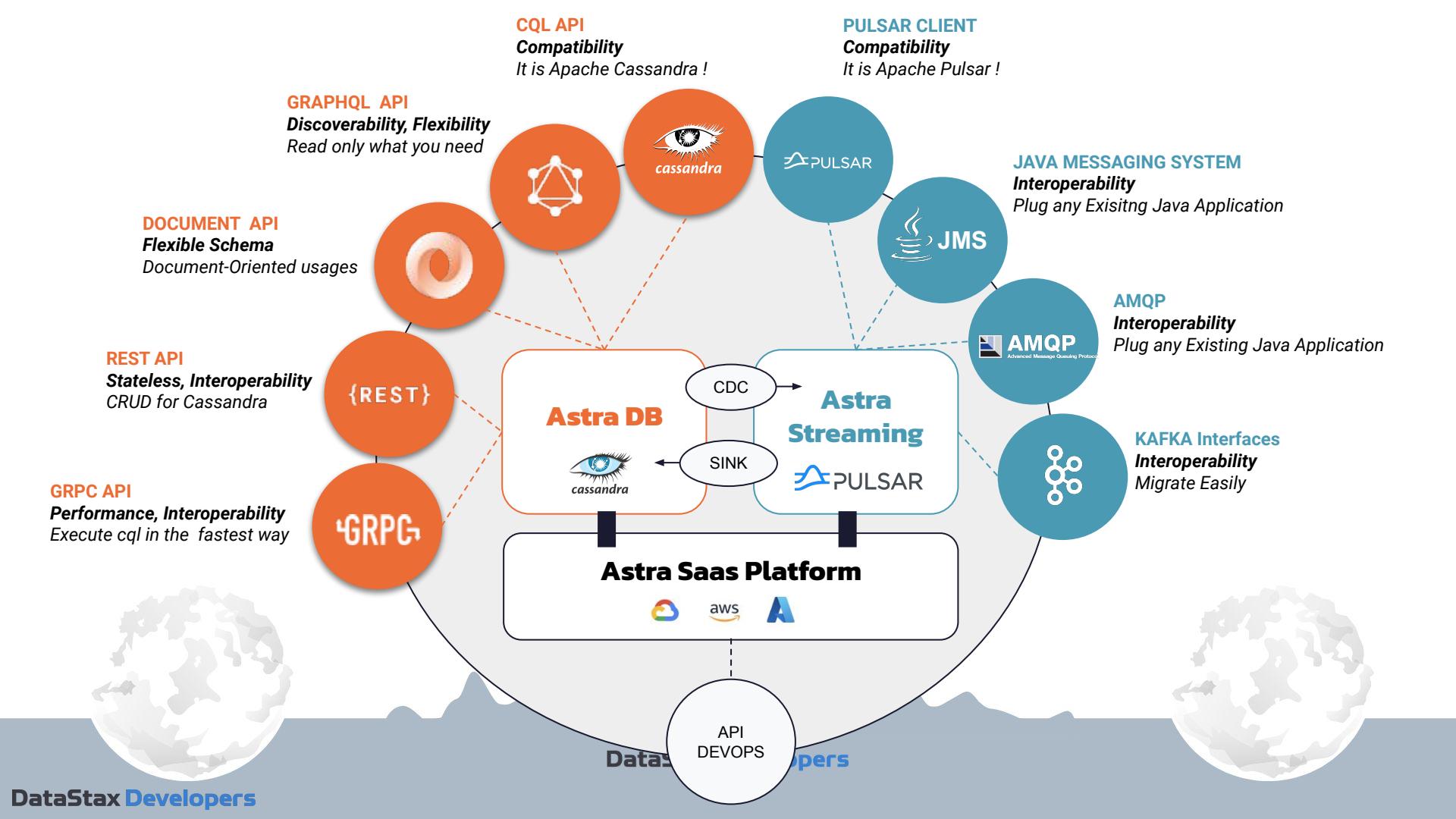


- Backend for frontend (JS)
- Service aggregation | composition (joins)
- When volume matters (mobile phones)



Rest vs gRPC vs GraphQL ?





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Architecture of our Microservice



Helping you **select** an MV\* framework

Download

[View on GitHub](#)

[Blog](#)



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

A screenshot of the TodoMVC application interface. At the top, the word "todos" is displayed in a large, light gray font. Below it is a list of tasks, each preceded by an empty circular checkbox. The tasks are:

- Explain the use case
- Create the Data model
- Define the queries to perform
- Create the DDL
- Connect to Cassandra
- Create the CRUD repository
- Run the API

At the bottom of the list, there is a small navigation bar with three buttons: "All" (selected), "Active", and "Completed". To the left of the list, the text "What needs to be done?" is shown with a dropdown arrow icon.

[TodoMVC.com](http://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:



aiohttp



Akka



API Platform



Axon Framework



Azure Functions



CakePHP



Catalyst



Ceylon



Clojure



CoffeeScript



Compojure



CouchDB



Crystal



C#



django



.NET



Dropwizard



Elixir



ES6



express



express.js



Finatra



Finch

## 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 if exists

**PATCH** /api/v1/todos/{taskId} Update an existing task



# todos

What needs to be done?

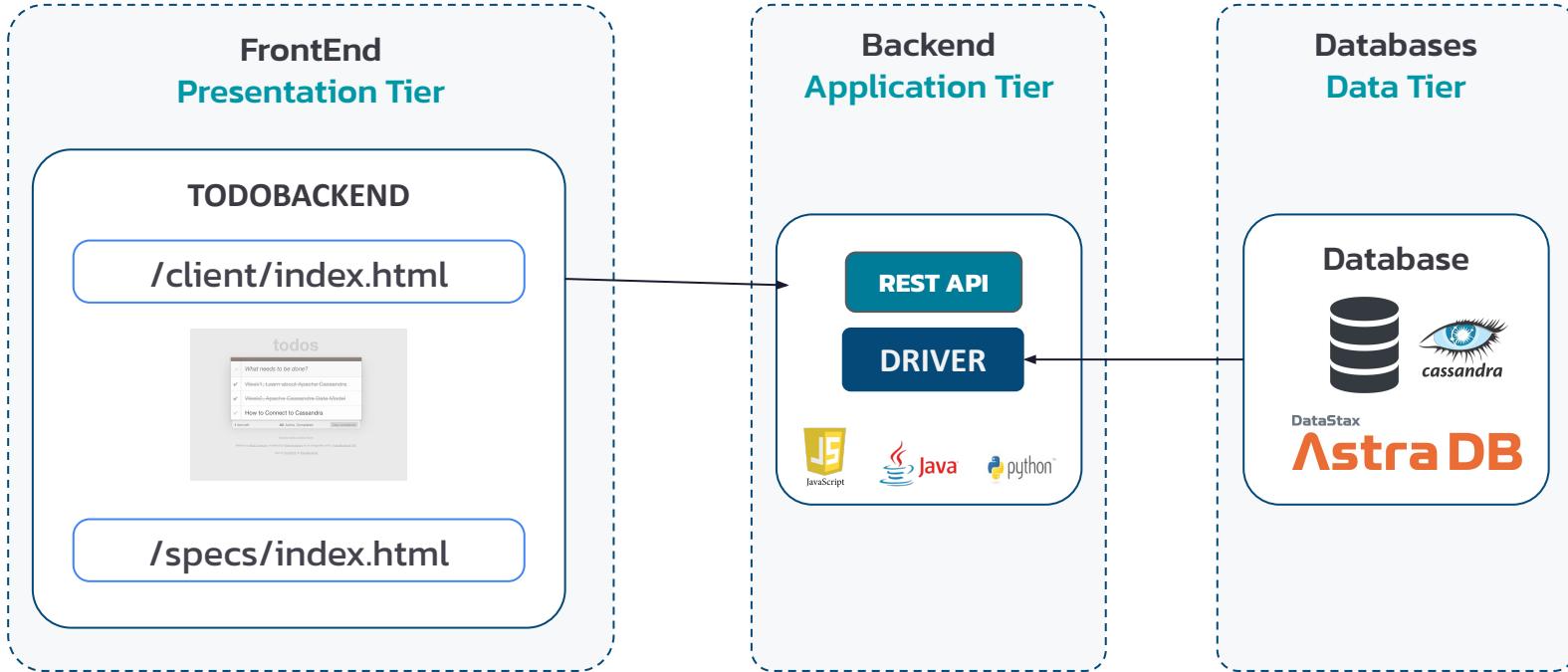
- ✓ Test the TodoApplication
- ✓ Create a REST API Backend
- ✓ Connect the backend to Cassandra
- ✓ Have fun
- ✓ Register to Youtube channel

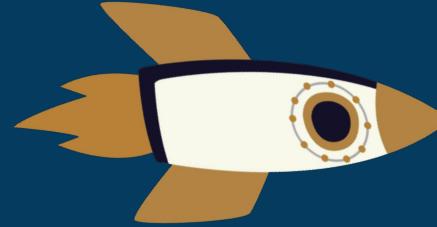
4 items left    All Active Completed    Clear completed (1)



Rest Api Specifications







# Hands-on (!github)

## #2 Todo App

- ✓ Run existing todo Application
- ✓ Getting ready for Code !



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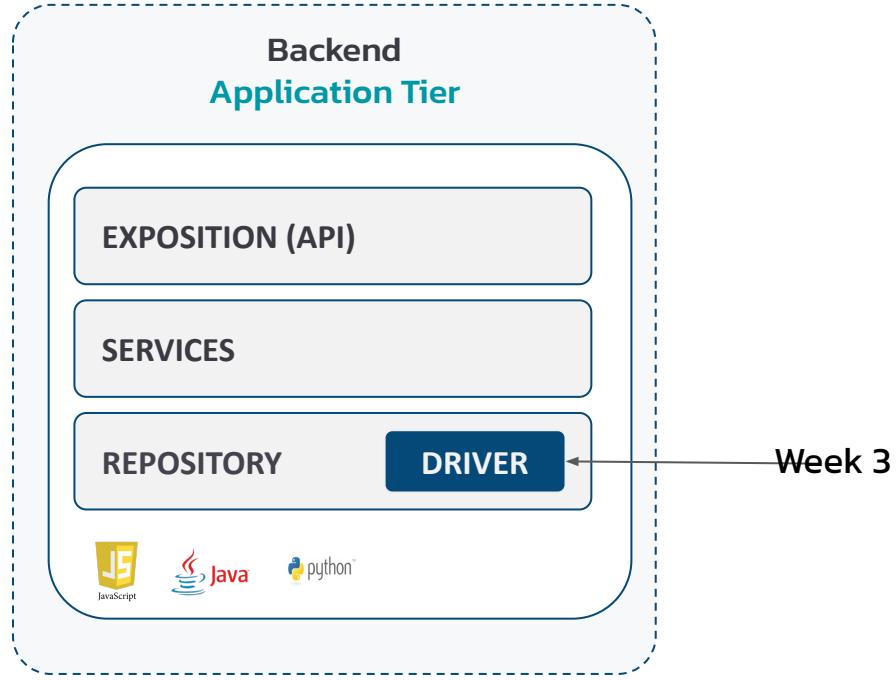
**Code Build Package**  
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Anatomy of our microservice

# todos

- What needs to be done?
- ✓ Test the TodoApplication
- ✓ Create a REST API Backend
- ✓ Connect the backend to Cassandra
- ✓ Have fun
- ✓ Register to Youtube channel

4 items left    All Active Completed    Clear completed (1)

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)
);
```



Data Model

- Our Partition 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



**node.js™**

Express

Javascript

JAVASCRIPT Drivers

Backend



Flask

Python

PYTHON Drivers



**Technical Stacks Implementation**



Backend



**Spring Boot**

TodoController

TodoRepository

JAVA Drivers

Backend



**node.js**

api.js

todos.js

JAVASCRIPT Drivers

Backend

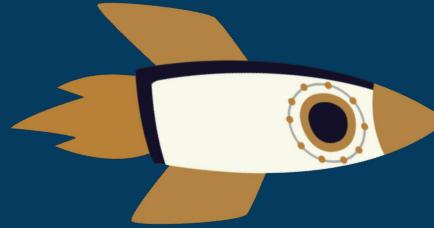


api.py

todos.py

PYTHON Drivers

Technical Stacks Implementation



# Hands-on (!github)

## #3 Code

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



# 01



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# 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**



Go to [www.menti.com](http://www.menti.com) and use the code 3491 9972

## Leaderboard

4821 p	spanda
4820 p	Agent X9
4775 p	fastest
4775 p	Sam
4711 p	CCedrickThePresenter
4468 p	shubham
4371 p	aaa
3895 p	vignesh
3877 p	adry
3861 p	Millie
3812 p	Puggie

2.11.07 / 2.26.05



Play with us with [Menti.com](http://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](mailto:gary.harvey@datastax.com)

**\*\* Include a screenshot of your Menti screen**



Swag Winners!

# 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!



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Next Week

# ASTRA DB'S BUILD-A-THON

MAKING SIDE-HUSTLES A REALITY

21 February - 28 May 2022



# ASTRA DB'S BUILD-A-THON

MAKING SIDE-HUSTLES A REALITY

21 February - 28 May 2022



## JOIN OUR ASTRA DB BUILD-A-THON HACK!

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DataStax Developers

# workshop-chat

<https://www.youtube.com/watch?v=MuwT5xxFVVI> - Subscribe to mailing list: [http...](http://)

Rechercher

PRESENTER — 1  
David Jones-Gilardi

HELPER — 7  
012345  
AaronP  
B1nary  
Chelsea Navo  
Jeremy Hanna  
John Sanda  
Patrick\_McFadin

EN LIGNE — 560  
-samu-  
6304-42JB  
Aahlya  
Abdurahim  
abhi3pathi  
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Abhineet  
Abirsh

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memes  
your-ideas  
@the-stage

WORKSHOPS  
# workshop-chat  
# workshop-feedback  
workshop-materials  
upcoming-workshops

ASTRA DB  
getting-started  
astra-apis  
astra-development  
sample-applications

APACHE CASSANDRA  
Cedrick Lun...

RIGGITYREKT Hier à 21:14  
I have a 5 node datacenter, 4 nodes are on dse version 5.1.20, one is on dse5.0.15. I am doing some mixed version testing for a class and the one node that is 5.0.15 is coming up as an analytics workload. I dont have /etc/default/dse, instead I am using /etc/init.d/dse-cassandra.  
how do I make that node start in cassandra workload, not in analytics?

RIGGITYREKT Hier à 23:39  
Okay I found out my issue, when i started DSE 5.0.15 it had endpointsnitch set to DseSimpleSnitch, the rest of my cluster is using PropertyFileSnitch, when i change it to PropertyFileSnitch, it still uses the simple snitch config. looking at the docs i see there is a way to go to GossipingPropertyFileSnitch, but i need the property file one. I can wipe this dbs, do anything with this node to get this done. how do i fix this?  
@here

Erick Ramirez Aujourd'hui à 02:19  
mixed versions isn't supported and you're guaranteed to run into weird issues that will cause further problems down the track

Cedrick Lunen Aujourd'hui à 09:01  
When you start a node you have parameters -k for analytics, -g for graph and -s for search. To remove analytics check and remove -k

Envoyer un message dans #workshop-chat

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[dtsx.io/discord](https://dtsx.io/discord)



DataStax Developers Discord (18k+)



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# Thank You!

