DataStax

Developers

Build a TikTok Clone

DataStax

@drchung

@drchung5

@ChungFuCoder

- Developer/Architect
- Author
- Apache Cassandra™ certified
- Java certified

David Chung, DataStax Developer Relations

@sarma-pydipally-0115a064

@sarma1807

@OracleByExample

- DB YouTuber w/ 5k subscribers
- Udemy Instructor
- Open Source Dev
  - Prometheus-Grafana-Cassandra
  - Python Sales App
  - Private_Email_Server

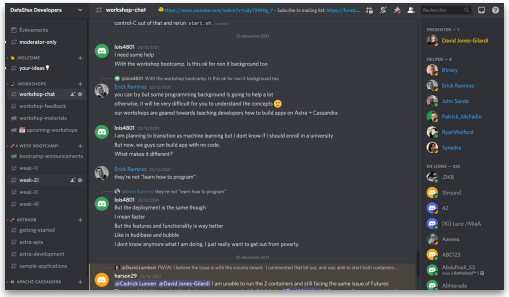
cassandra

Sarma Pydipally, Special Guest

Livestream: youtube.com/DataStaxDevs

YouTube

Questions: https://dtsx.io/discord



YouTube
(with nighbot)

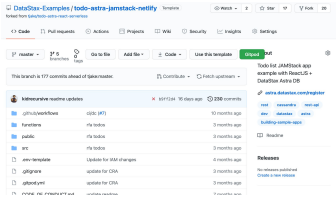
Discord
(#workshop-chat)

!discord

Live Sessions

Nothing to install !

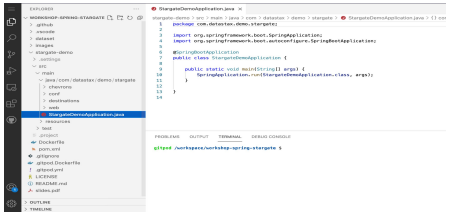
Source code + exercises + slides



GitHub

!github

IDE



Gitpod

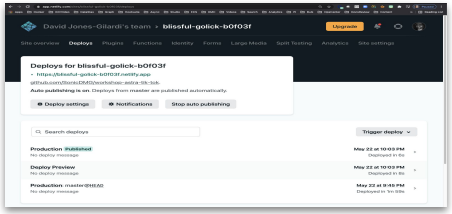
!gitpod

Database + Api + Streaming

DataStax
Astra DB

!astra

Deploy + Run + host



netlify

Hands-On Housekeeping

- How to build a frontend application using React Components
- How to build a backend with Javascript without frameworks like Axios not express.
- What is Apache Cassandra database and how it is different from SQL or Mongo.
- What is Gitpod and how you can use it for your projects.
- What is AstraDB and how you can use it for your projects.

What you'll learn today

01

Architecture
Design

02

DataStax Astra

STARGATE

Database
Document Oriented

03

Backend
Netlify Functions

04

Frontend
React

05

Api and Backend
Netlify Deployment

06

Resources

Agenda

Welcome to the TikTok clone workshop.

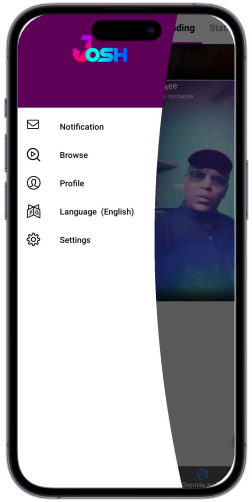
Your mission is to BUILD a TikTok clone to production over a global CDN using one of the most robust and scalable NoSQL databases on the planet.

You have 2 hours. Good luck.

Mission Statement

VERSE

Short video app runs on Astra DB, with 300 million users and 250 billion hits a day.



JOSH™

Josh is India's fastest growing application powered by Verse's platform powered by Cassandra/Astra

Actually, this application exists...

Mobile Applications

iOS

Desktop Applications

Mac OS

Application 101

Strengths

- Performance
- Extended Features

Weaknesses

- Dedicated language/platform
- Installation required

Opportunities

- Native integration (OS)
  - Look and Feel
  - Performance
- Smooth usage

Threats

- Security
- Versioning

Is it good enough ?

Web Application

Client

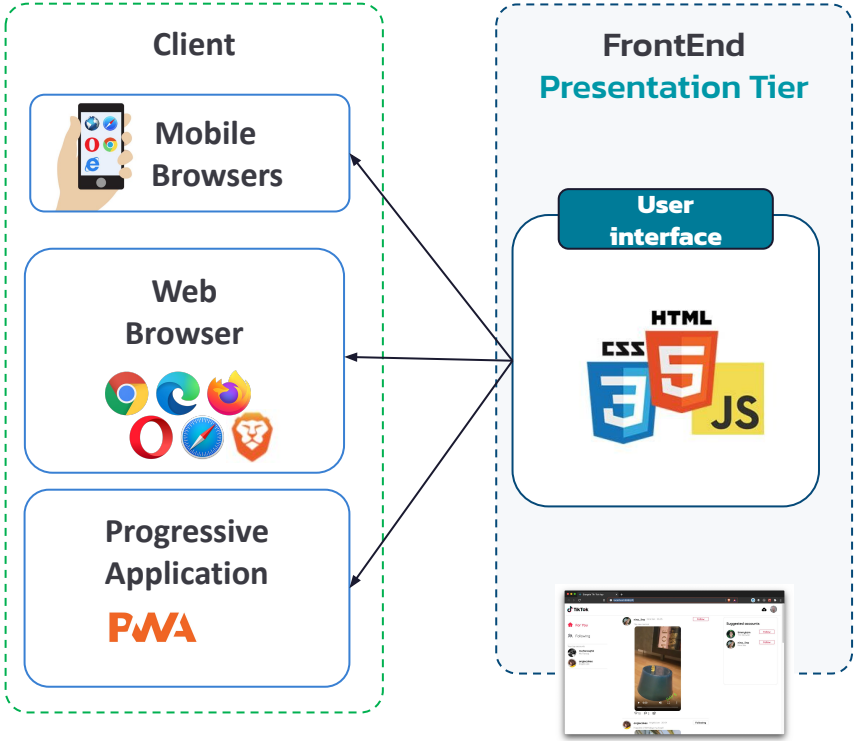
Mobile Browsers

Web Browser

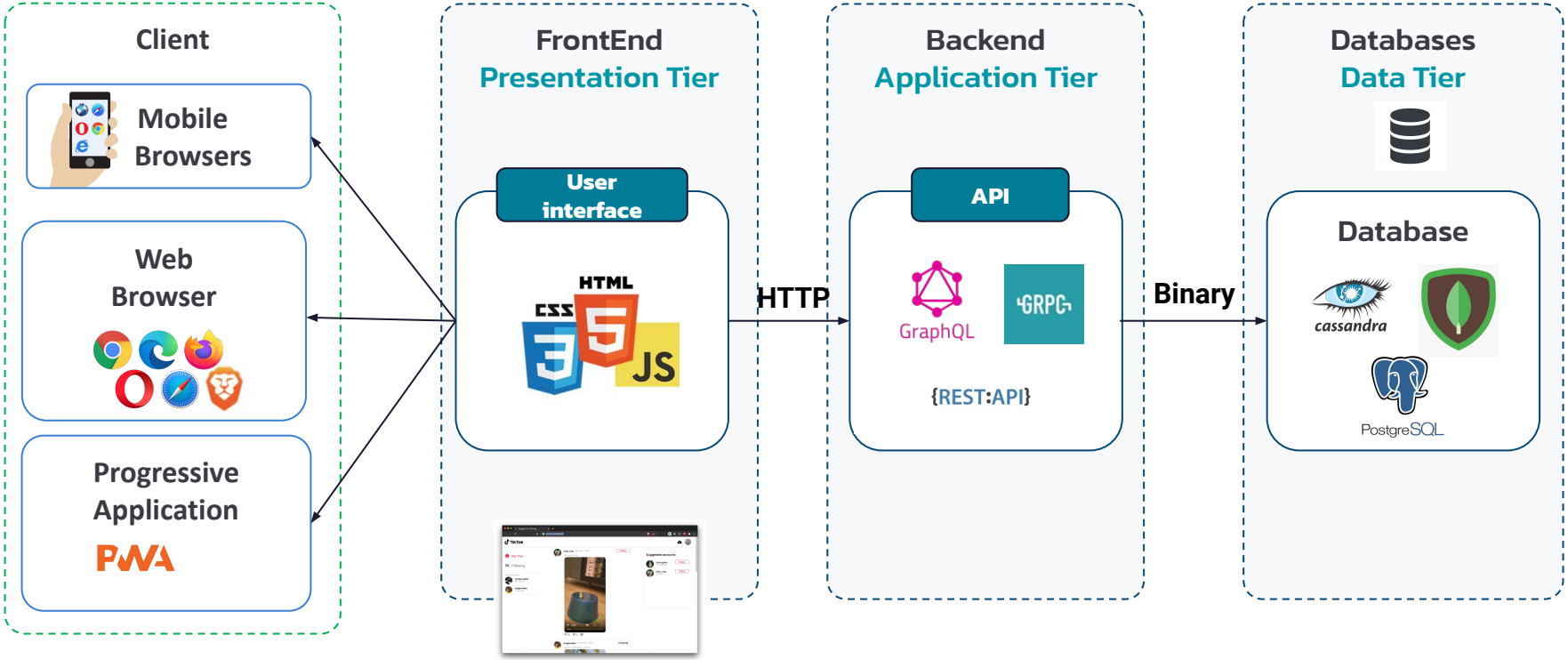
Progressive Application

PWA

Application Architecture



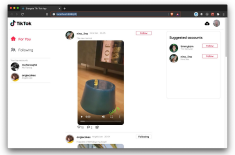
Application Architecture

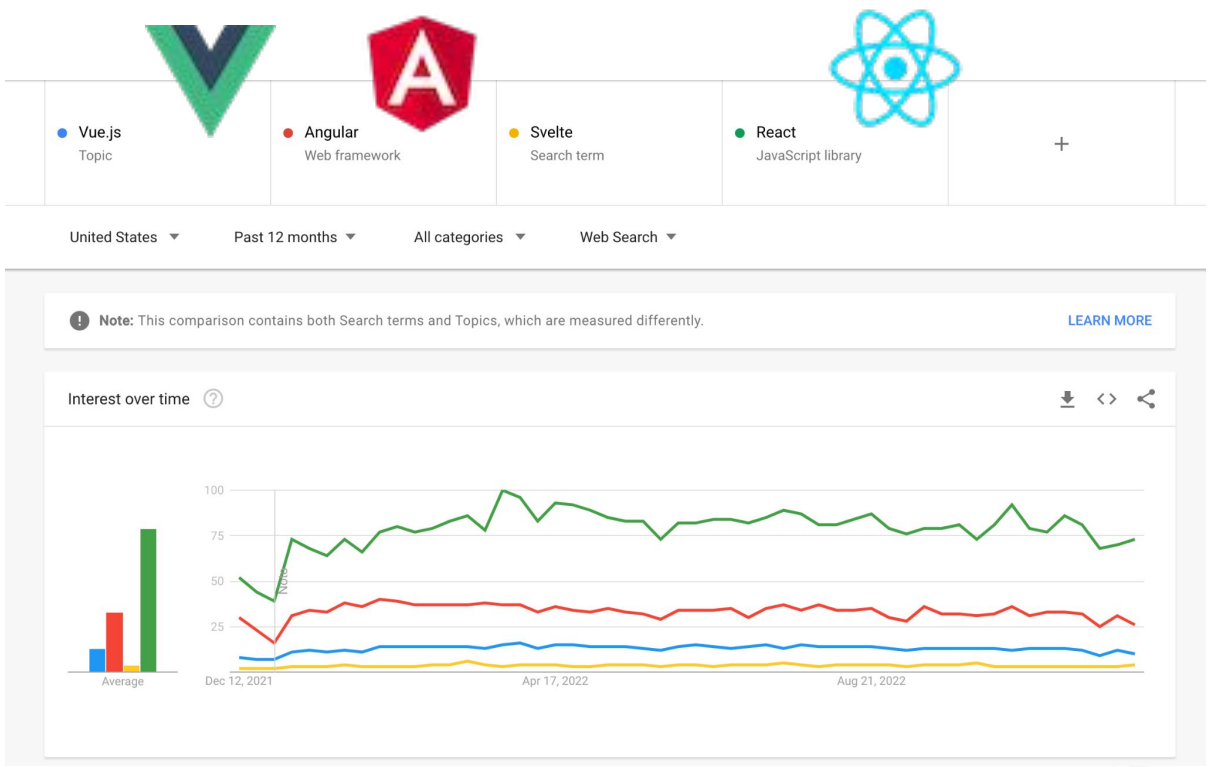


3-tier Application Architecture

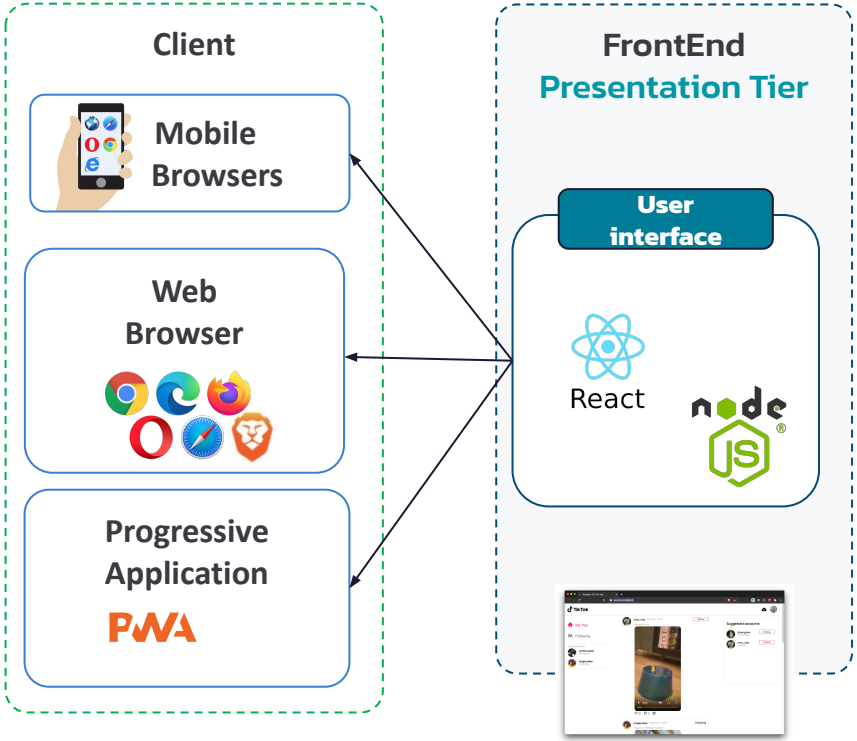
FrontEnd
Presentation Tier

User interface





React, Angular, Vue, Svelte, Swift, ...



Technical Architecture for Today

Backend
Application Tier

API

{REST:API}

Backend Java, Python, Javascript, Swift ?

Backend
Application Tier

API

GraphQL

GRPC

{REST:API}

spring

QUARKUS

MICRONAUT®

JS

Express JS

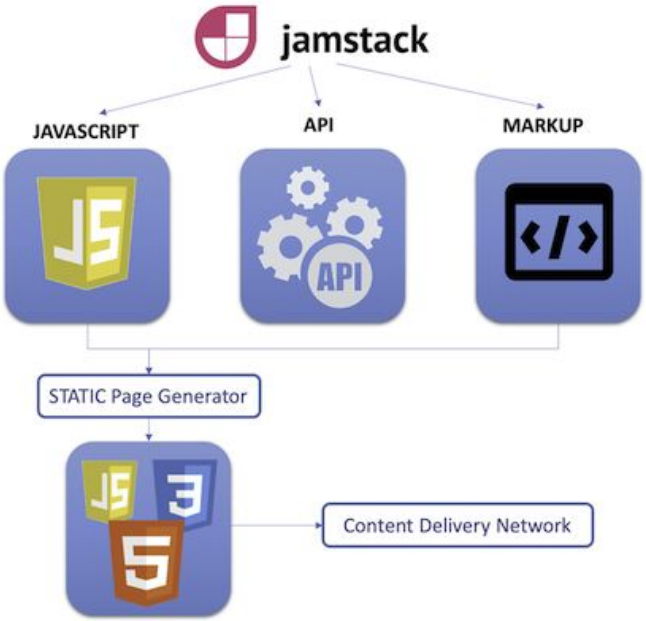
python™

FastAPI

Flask

dj

Backend Java, Python, Javascript, Swift ?



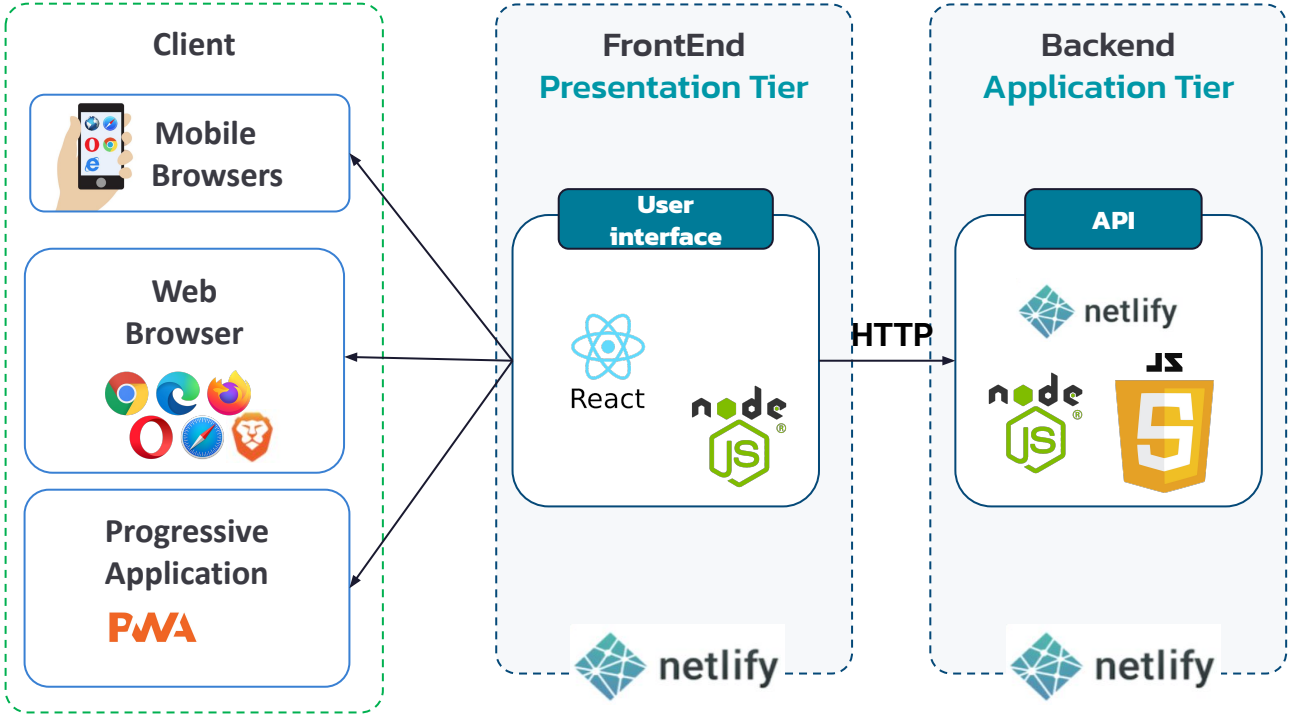
What is Jamstack?

Jamstack is an architectural approach that decouples the web experience layer from data and business logic, improving flexibility, scalability, performance, and maintainability.

Jamstack removes the need for business logic to dictate the web experience.

It enables a composable architecture for the web where custom logic and 3rd party services are consumed through APIs.

https://jamstack.org/



Technical Architecture for Today

Data ?

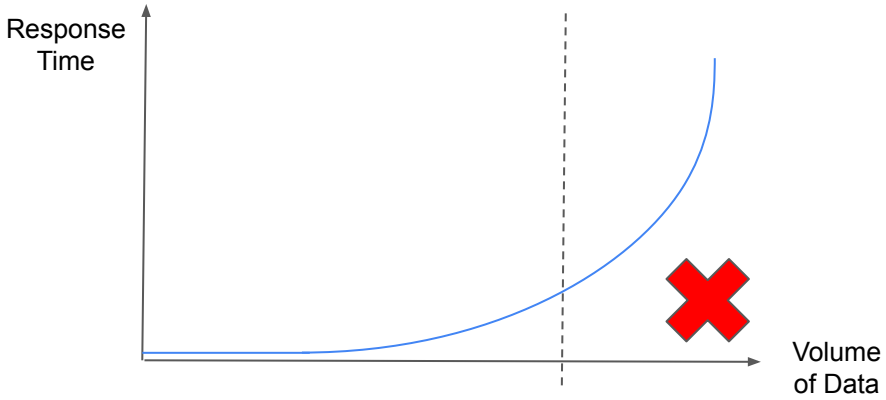
DataStax

OLTP: Online Transaction Processing

Fast Queries
"Customer-facing"
High number of transactions
Usually Hot / Live Data
High SLA Requirements
(Response Time / Availability)

OLAP: Online Analytical Processing

Complex Queries
Historical
High volume of data
Often "Cold Data"
Used by / for Analytics



~~Relational~~: Versatile but not scalable

Apache Cassandra

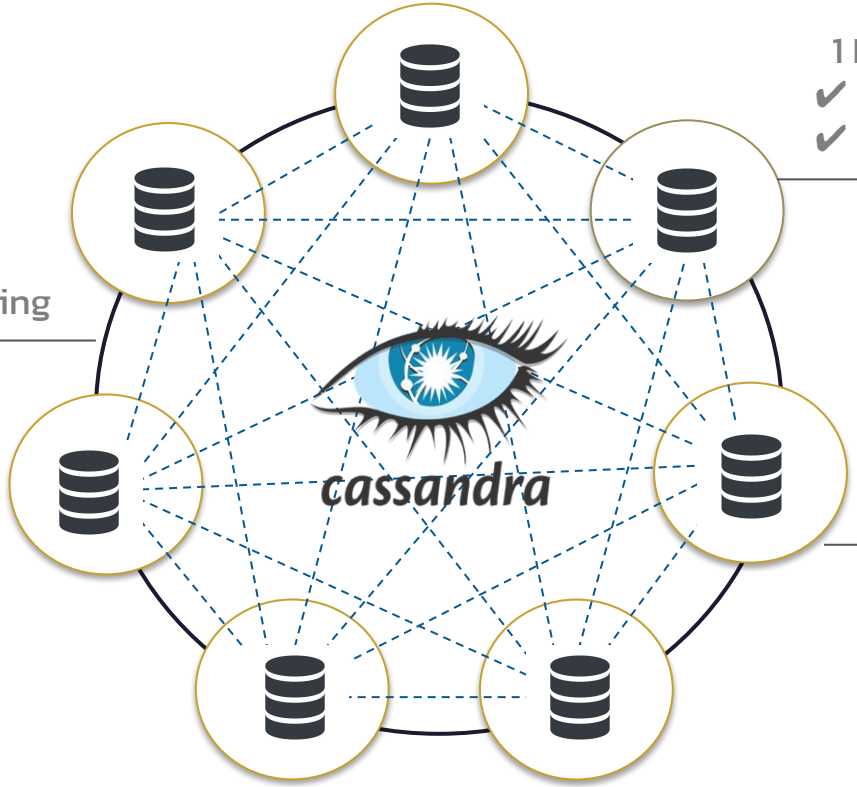
NoSQL Distributed Decentralised Database Management System

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

1 Installation = 1 NODE

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

DataCenter (DC) | Ring

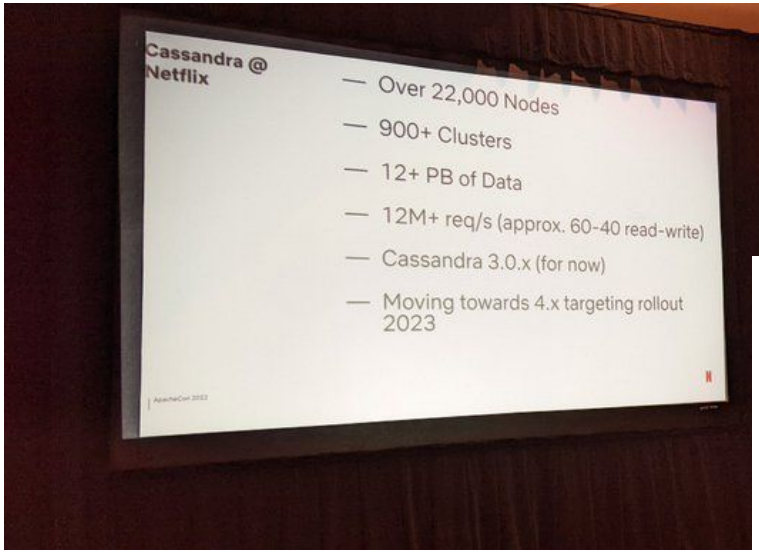


Communication:

- ✔ Gossiping
- ✔ Leaderless (peer-to-peer)

Distributed, NoSQL Database

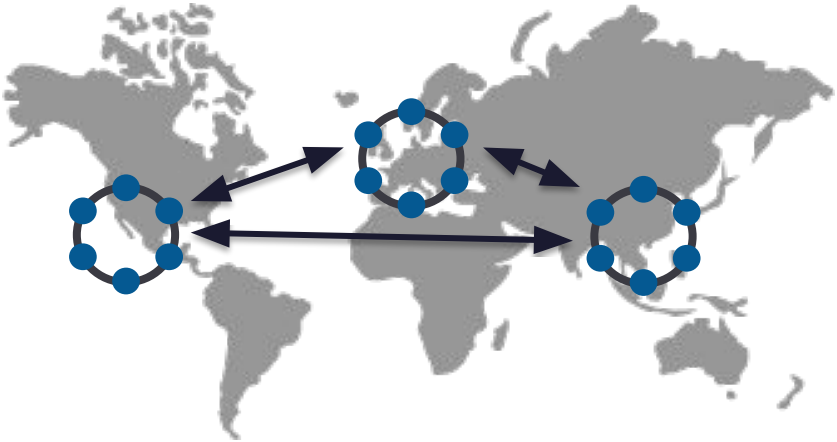
And many others...



Cassandra Biggest Users (and Developers)

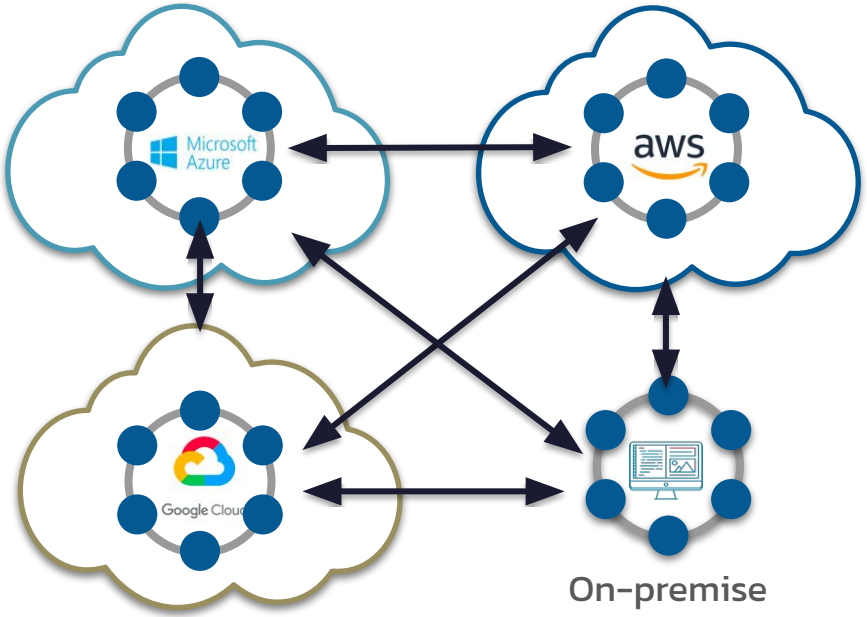
Cassandra's trademark is multi-datacenter deployments, granting you an exceptional capability for disaster tolerance while keeping your data close to your clients - worldwide.

<u>All DCs are active</u> (available for both writes and reads)!



Geographical Distribution

Apache Cassandra is **not bound to any platform** or service provider, helping you build hybrid-cloud and multi-cloud solutions with ease.



Platform Agnostic

Cassandra doesn't belong to any of commercial vendors but controlled by a non-profit Open Source **Apache Software Foundation**, already familiar to you by *Hadoop*, *Spark*, *Pulsar, Kafka*, *Zookeeper, Maven* and many other projects.

Vendor Independent

Apache Cassandra

Built as a Technical Necessity

of Fortune 100 companies have adopted

High Availability

Always On

Every second of downtime translates into lost revenue

Linear Scalability

Hyper-Scalability

Millions of operations per day, hour, or second

Low Latency

Faster Pace

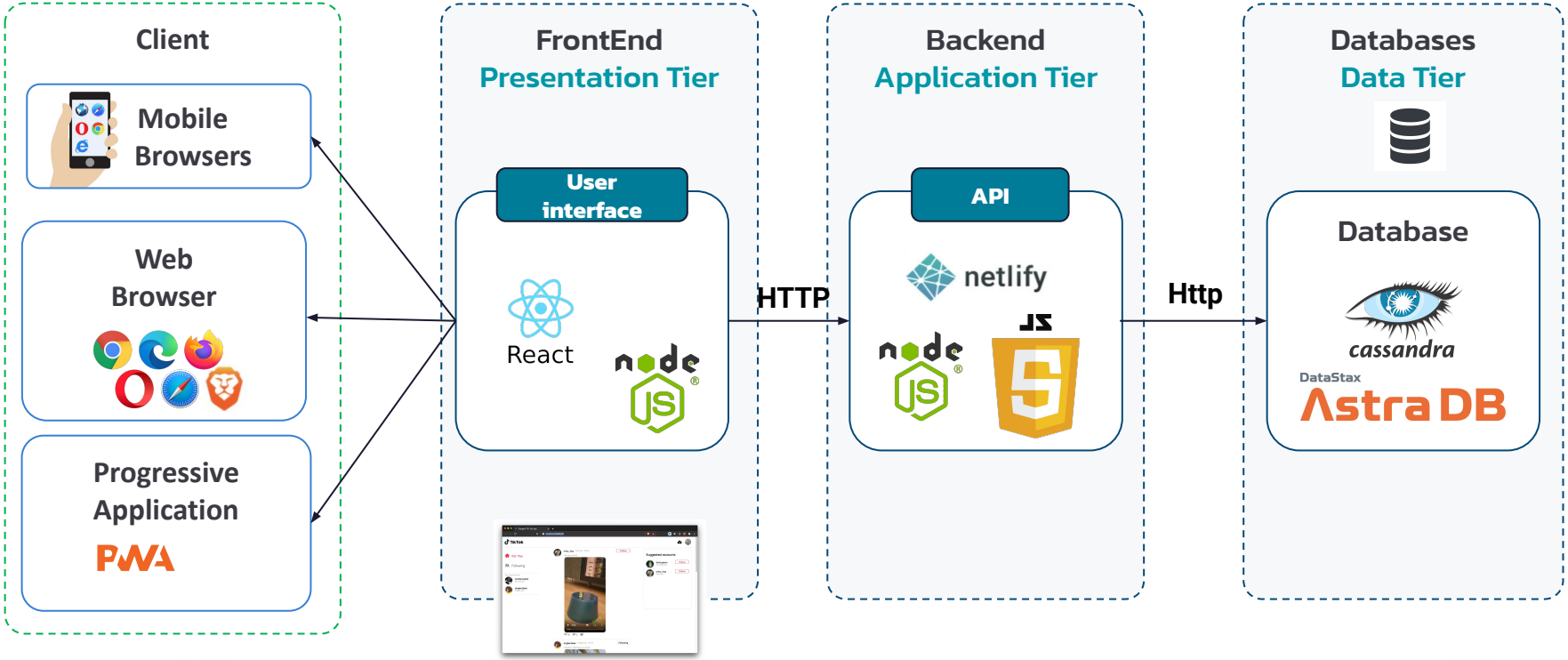
Every millisecond of latency has consequence

Global Distribution

Data Everywhere

On-premises, hybrid, multi-cloud, centralized, or edge

Why Cassandra ?



Technical Architecture for Today

Astra DB

- DBaaS, serverless, auto-scalable
- Multi-cloud, distributed, multi-node cluster
- NoSQL, multi-model
- Tabular, document, key-value
- Based on open-source *Apache* cassandra

State-of-the-art NoSQL Database

Lab 1

Getting Started with Database

https://github.com/datastaxdevs/workshop-social-media-tiktok

Create Astra DB

Create Instance + token

DataStax Repository

Hands-ON #1

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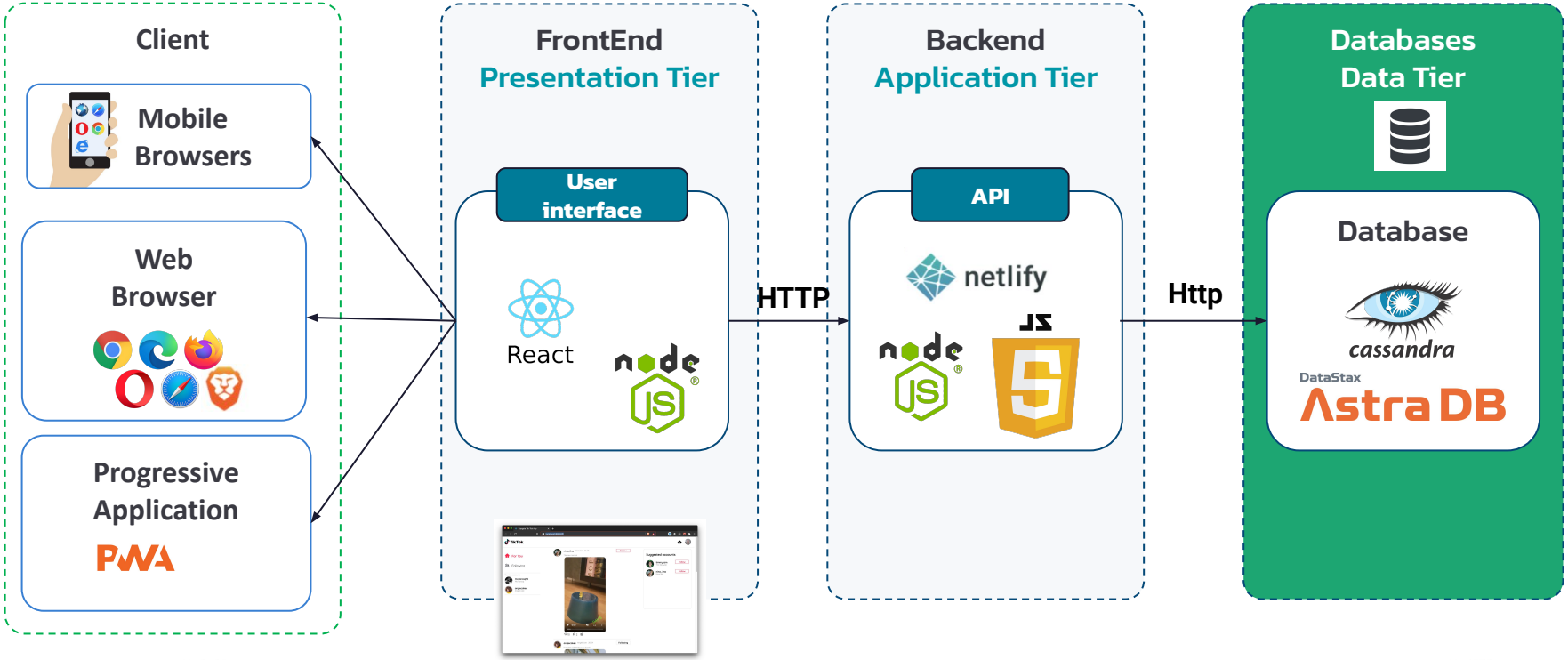
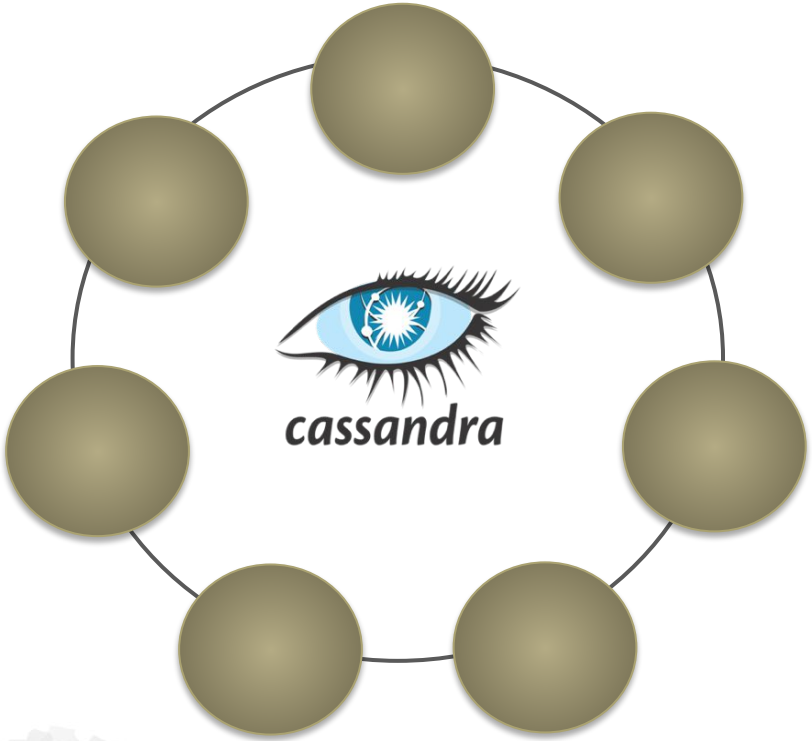


Technical Architecture for Today



sensors_by_network		
network	sensor	temperature
forest	f001	92
forest	f002	88
volcano	v001	210
sea	s001	45
sea	s002	50
home	h001	72
car	c001	69
car	c002	70
dog	d001	40
road	r001	105
road	r002	110
ice	i001	35

Partition Key

Primary Key

Cassandra Works with table

sensors_by_network		
network	sensor	temperature

forest	f001	92
forest	f002	88

sea	s001	45
sea	s002	50

car	c001	69
car	c002	70

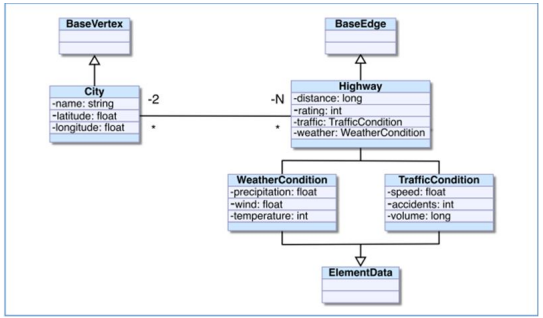
volcano	v001	210

home	h001	72

ice	i001	35
dog	d001	40

road	r001	105
road	r002	110

Distributed Tables



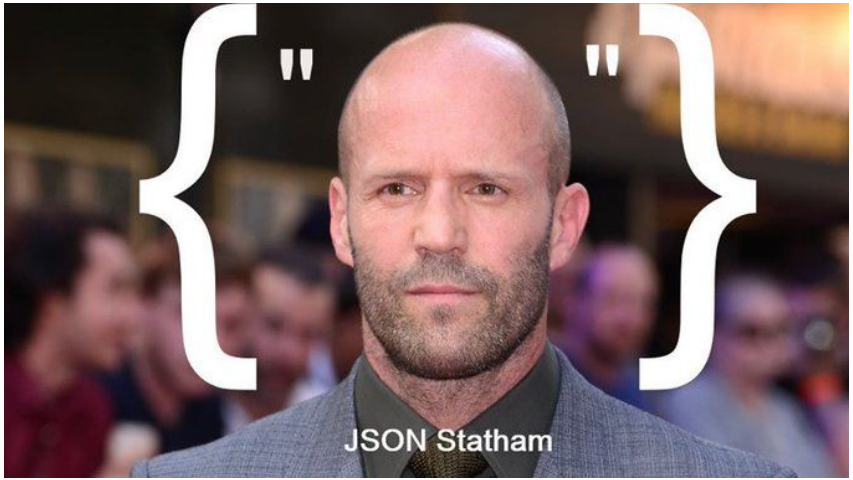
- Cassandra already handles both **JSON** and **nested objects**
  - INSERT JSON, SELECT JSON
  - Set<>, List<>,Map<>, and User Defined type (UDT) even nested

- 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"]
}';
```

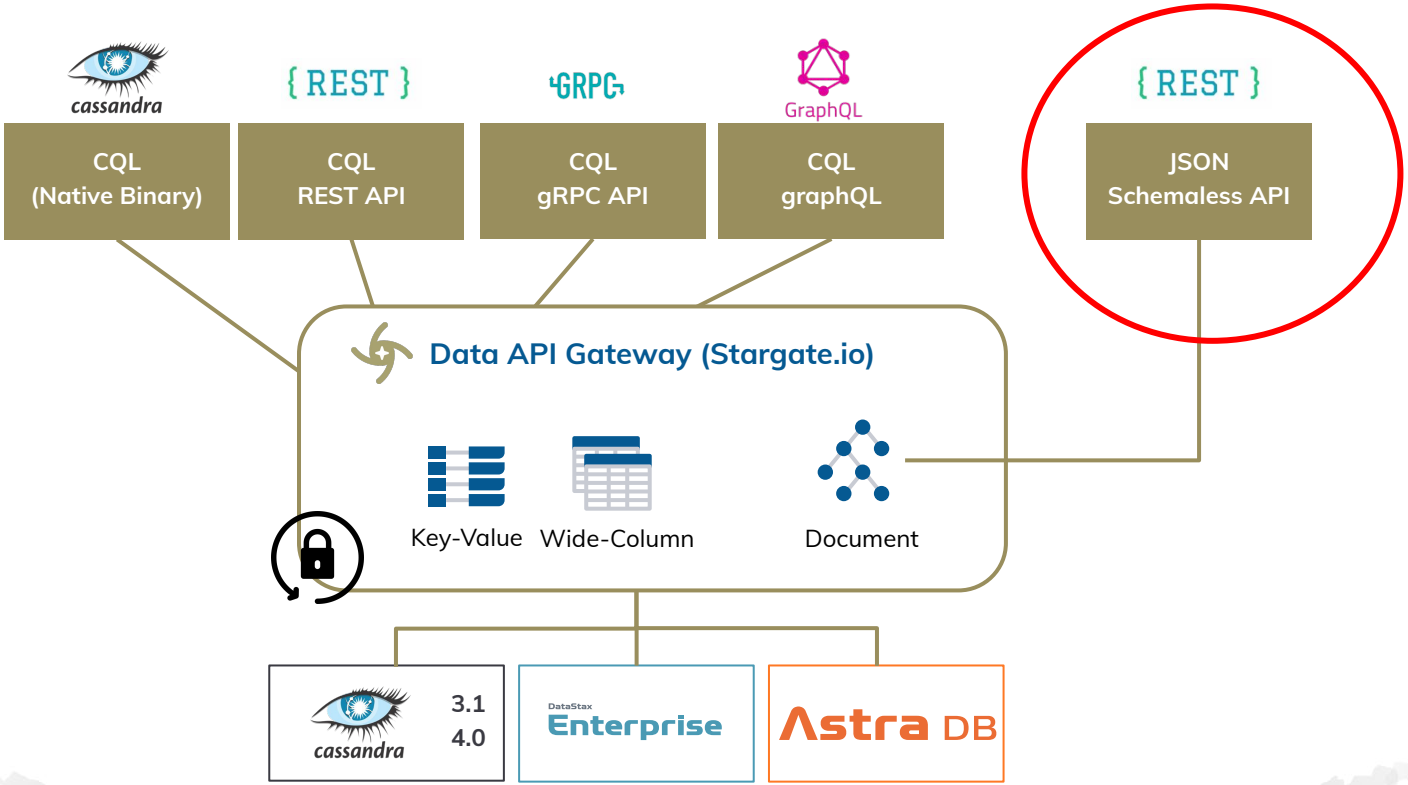
Cassandra and JSON



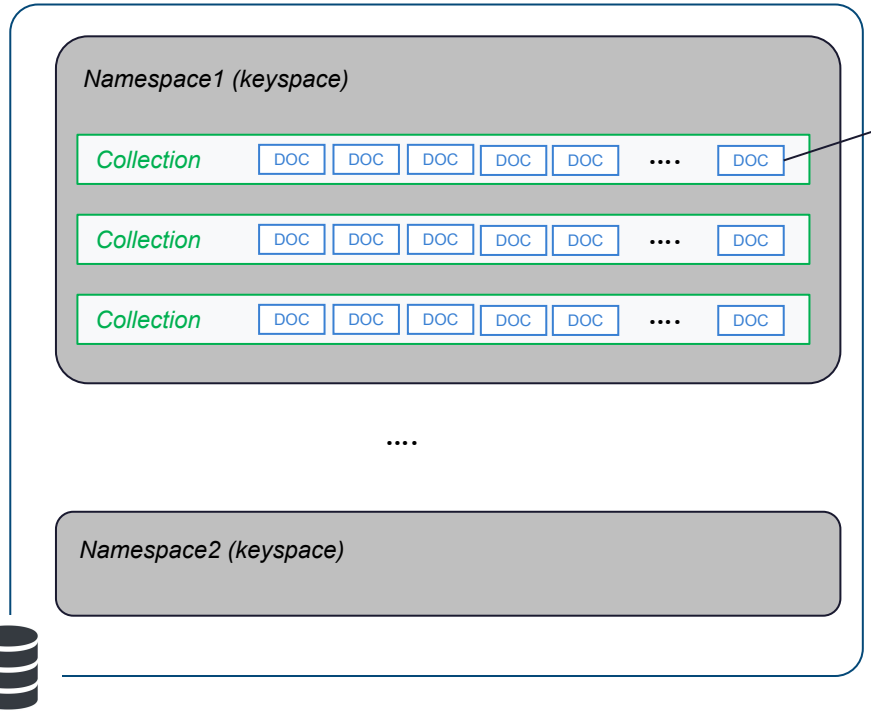
"What rules ?"

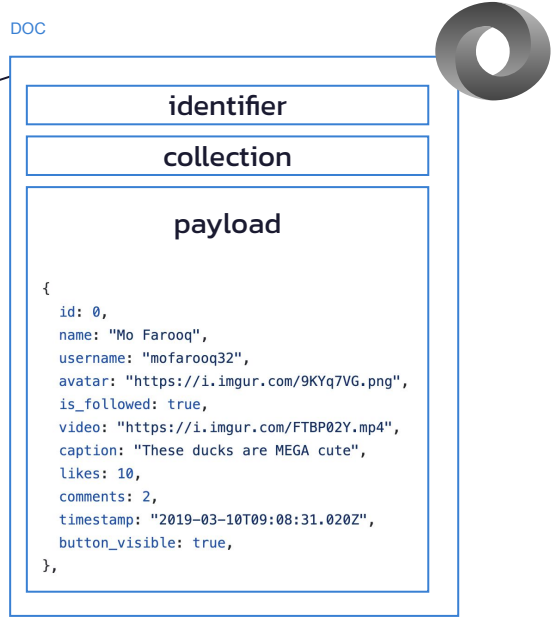
- You want to insert and retrieve any JSON documents efficiently
- Allow "schemaless" (Validation-less)
- Write to a single document is a single batch of statements
- Read from a single document is a single SELECT statement.
- Limit Tombstones with range deletes

Schemaless ?


cassandra
{ REST }
GRPC
GraphQL
{ REST }
CQL
(Native Binary)
CQL
REST API
CQL
gRPC API
CQL
graphQL
JSON
Schemaless API
Data API Gateway (Stargate.io)
Key-Value
Wide-Column
Document
cassandra
3.1
4.0
DataStax
Enterprise
Astra DB

Stargate





Document API

Lab 2

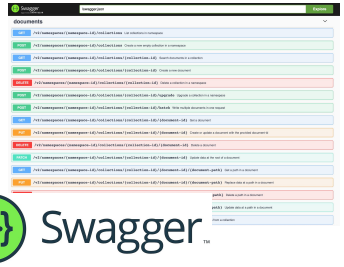
Document API

https://github.com/datastaxdevs/workshop-social-media-tiktok

Create Astra DB

Create Instance + token

DataStax Repository



Document API

DataStax
Astra DB

Hands-ON

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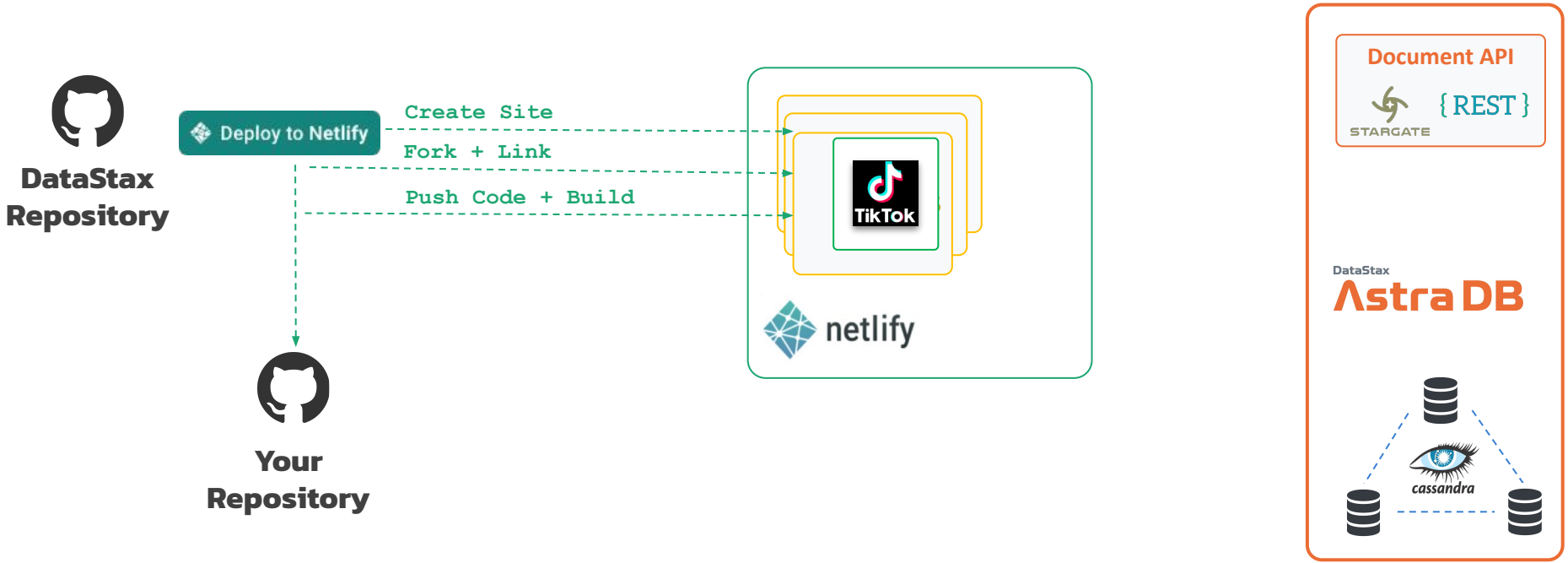
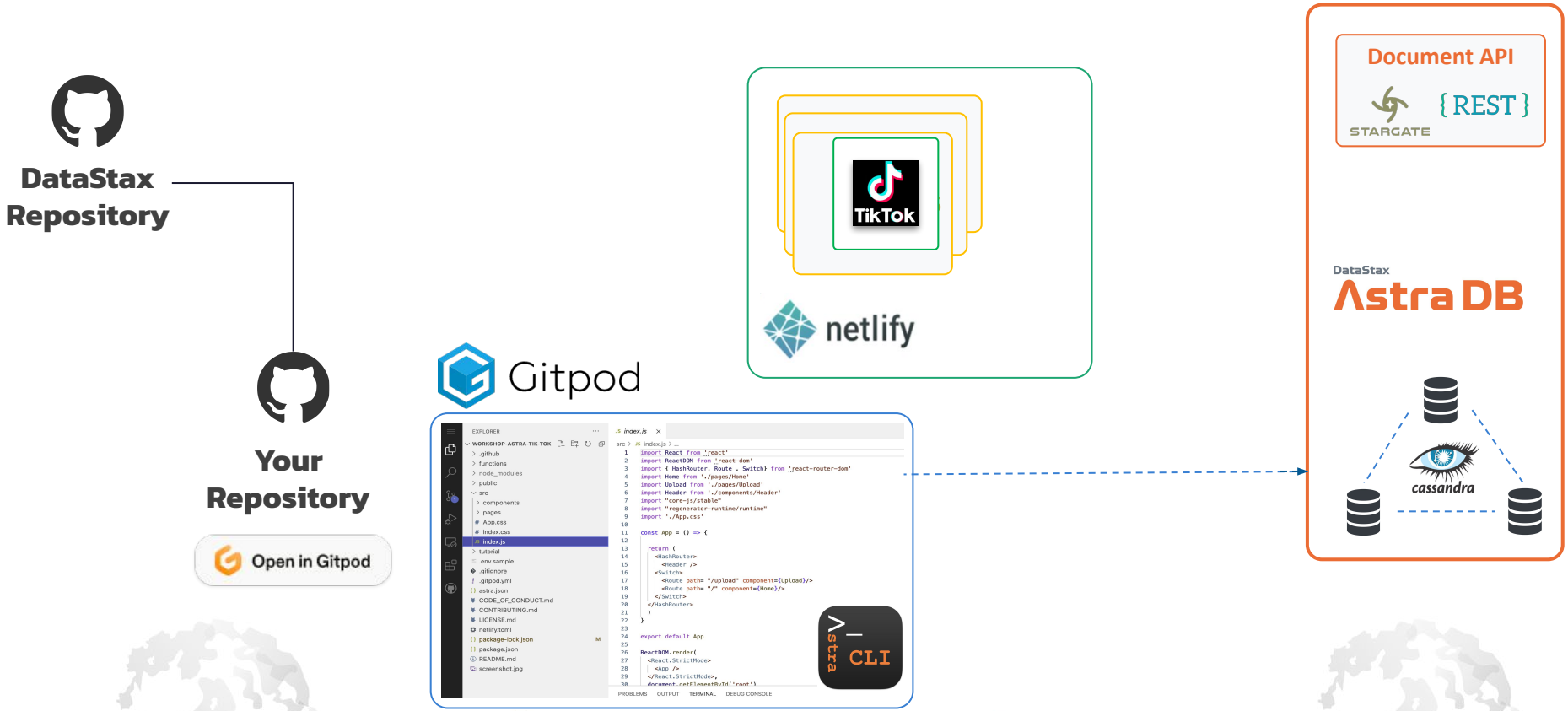
Lab 3

IDE Setup

https://github.com/datastaxdevs/workshop-social-media-tiktok


DataStax Repository
Deploy to Netlify
Create Site
Fork + Link
Push Code + Build
TikTok
netlify
Your Repository
Document API
STARGATE
{REST}
DataStax
Astra DB
cassandra

Hands-ON


DataStax Repository
Your Repository
Open in Gitpod
Gitpod
TikTok
netlify
Document API
STARGATE
{ REST }
DataStax
Astra DB
cassandra
astra
CLI

Hands-ON

Lab 4

Coding Against DB

https://github.com/datastaxdevs/workshop-social-media-tiktok

Create Astra DB

Create Instance + token

Document API

STARGATE

{ REST }

TikTok

netlify

Config

DataStax

Astra DB

cassandra

Gitpod

Open in Gitpod

```
EXPLORER
WORKSHOP-ASTRA-TIK-TOK
> .github
> functions
> node_modules
> public
src
> components
> pages
App.css
index.js
tutorial
.env.sample
.gitignore
.gitpod.yml
astra.json
CODE_OF_CONDUCT.md
CONTRIBUTING.md
LICENSE.md
netlify.toml
package-lock.json
package.json
README.md
screenshot.jpg
```

```
import React from 'react'
import ReactDOM from 'react-dom'
import { HashRouter, Route , Switch} from 'react-router-dom'
import Home from './pages/Home'
import Upload from './pages/Upload'
import Header from './components/Header'
import "core-js/stable"
import "regenerator-runtime/runtime"
import './App.css'

const App = () => {

  return (
    <HashRouter>
      <Header />
    <Switch>
      <Route path= "/upload" component={Upload}/>
      <Route path= "/" component={Home}/>
    </Switch>
  </HashRouter>
  )
}

export default App

ReactDOM.render(
    <React.StrictMode>
      <App />
    </React.StrictMode>,
```

netlify

Hands-ON

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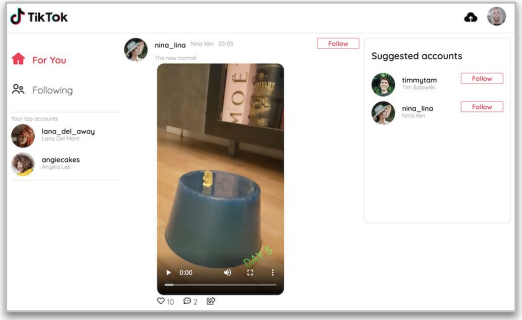
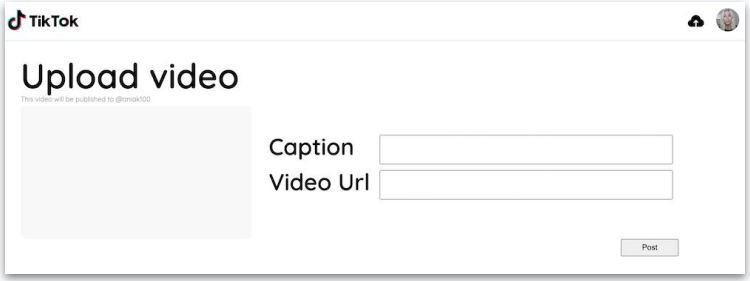
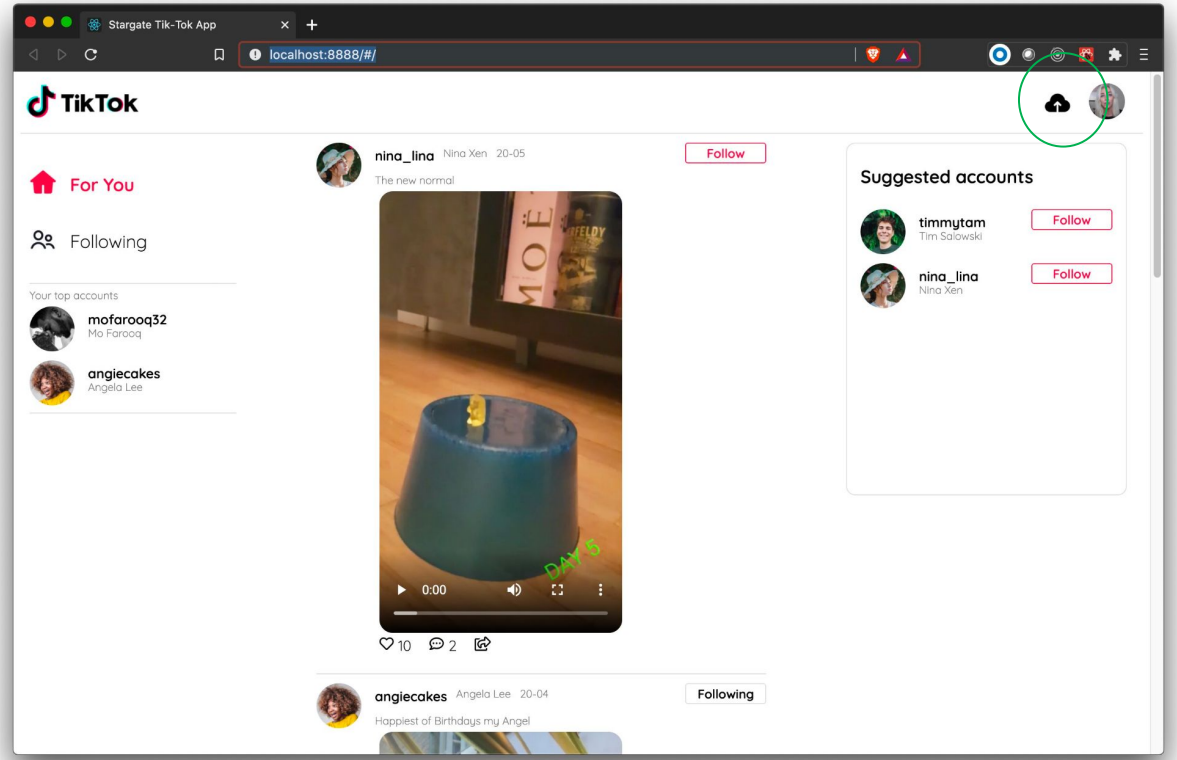


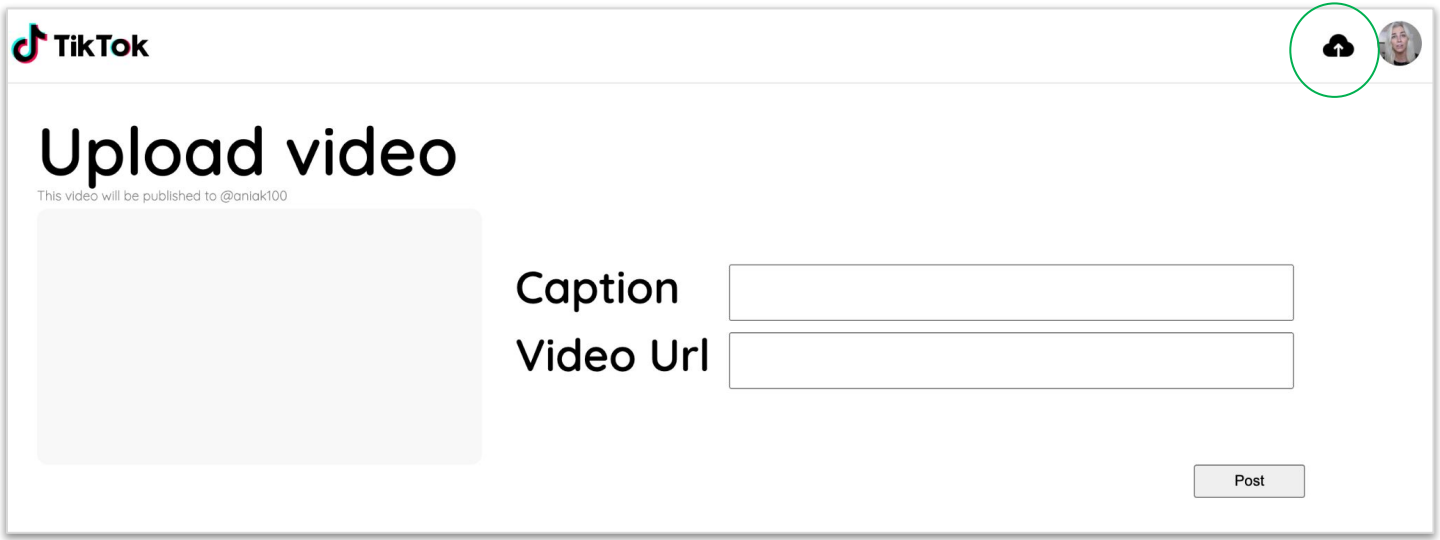
/upload



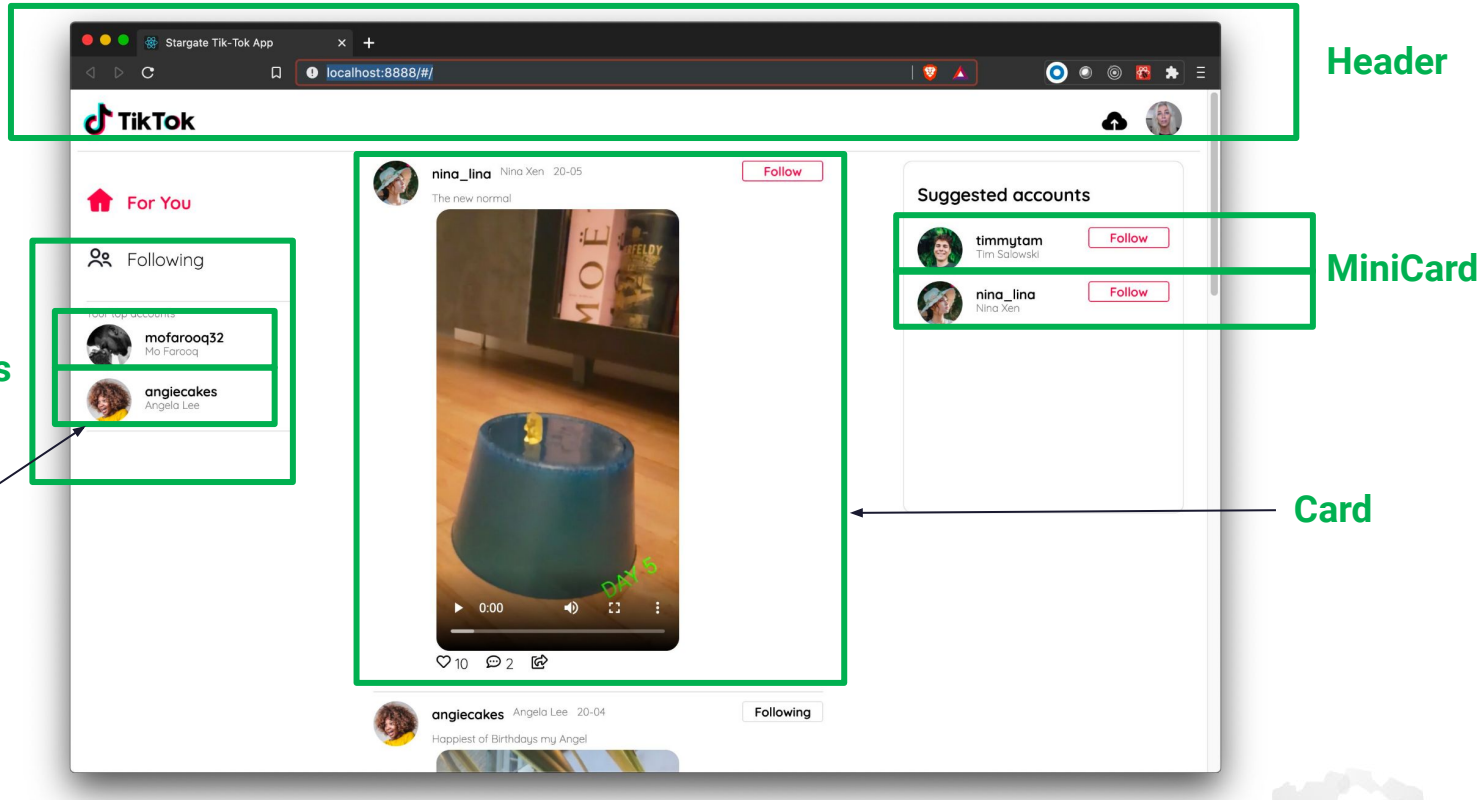
React and Reac Dom with 2 pages


Stargate Tik-Tok App
localhost:8888/#/
TikTok
For You
Following
Your top accounts
mofarooq32
Mo Farooq
angiecakes
Angela Lee
nina_lina Nina Xen 20-05
Follow
The new normal
0:00
10
2
angiecakes Angela Lee 20-04
Following
Happiest of Birthdays my Angel
Suggested accounts
timmytam
Tim Salowski
Follow
nina_lina
Nina Xen
Follow

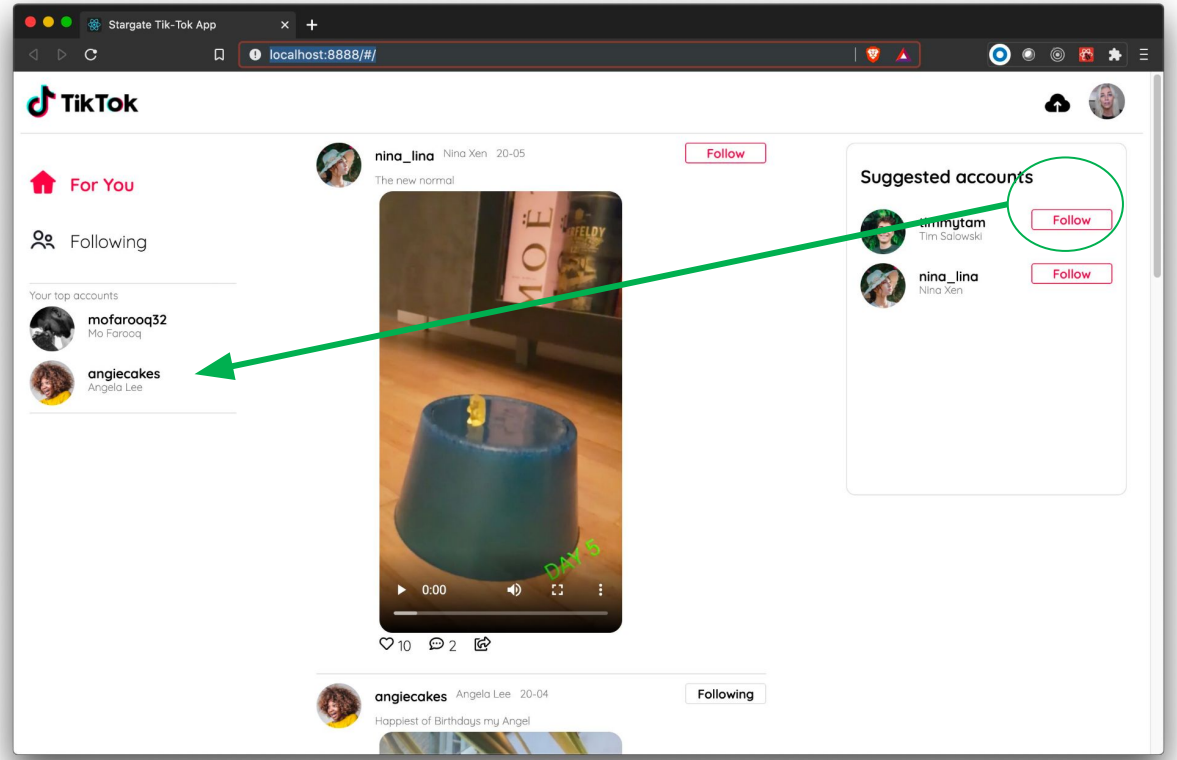
HOME



2 Pages Home and Upload


Header
Stargate Tik-Tok App
localhost:8888/#/
TikTok
For You
Following
mofarooq32
Mo Farooq
angiecakes
Angela Lee
FollowersColumns
MicroCard
nina_lina Nina Xen 20-05
Follow
The new normal
0:00
10
2
angiecakes Angela Lee 20-04
Following
Happiest of Birthdays my Angel
Suggested accounts
timmytam
Tim Salowski
Follow
nina_lina
Nina Xen
Follow
MiniCard
Card

HOME


Stargate Tik-Tok App
localhost:8888/#/
TikTok
For You
Following
Your top accounts
mofarooq32
Mo Farooq
angiecakes
Angela Lee
nina_lina Nina Xen 20-05
Follow
The new normal
0:00
10
2
angiecakes Angela Lee 20-04
Following
Happiest of Birthdays my Angel
Suggested accounts
Tim Salowski
Follow
nina_lina
Nina Xen
Follow

HOME

```
import React, { useState, useEffect } from 'react'
import FollowersColumn from '../components/FollowersColumn'
import Card            from '../components/Card'
import MiniCard        from '../components/MiniCard'
import axios           from 'axios'

…

const [users, setUsers] = useState(null)
const [userToToggle, setUserToToggle] = useState(null)

…

const results = await axios.get('/.netlify/functions/posts')
setUsers(results.data)
```

HOME

01

Architecture
Design

02

DataStax Astra

STARGATE

Database
Document Oriented

03

Backend
Netlify Functions

04

Frontend
React

05

Api and Backend
Netlify Deployment

06

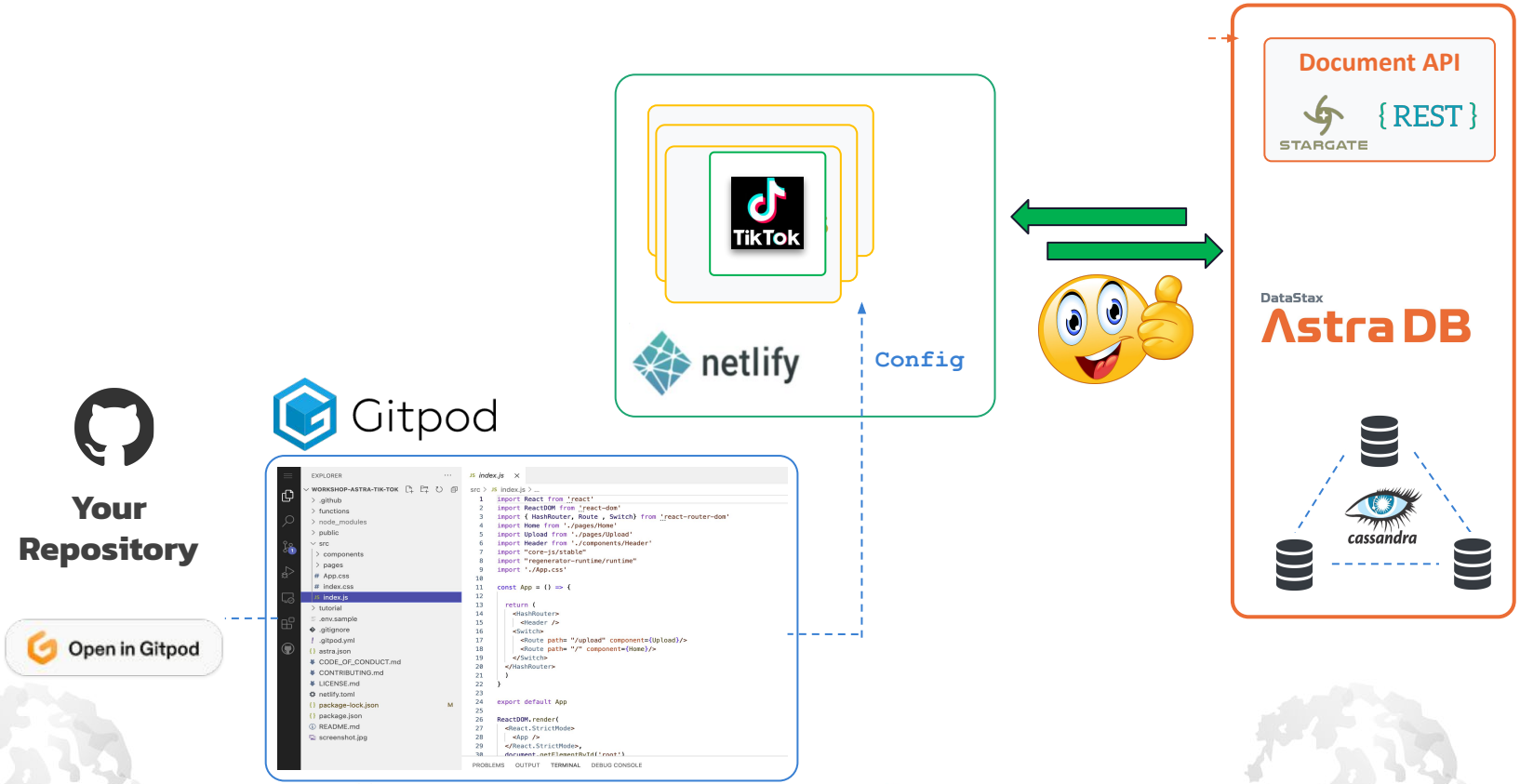
Resources

Agenda

Lab 5

Netlify Deploy

https://github.com/datastaxdevs/workshop-social-media-tiktok


Document API
STARGATE
{ REST }
TikTok
netlify
Config
DataStax
Astra DB
cassandra
Gitpod
Your Repository
Open in Gitpod

Hands-ON

01

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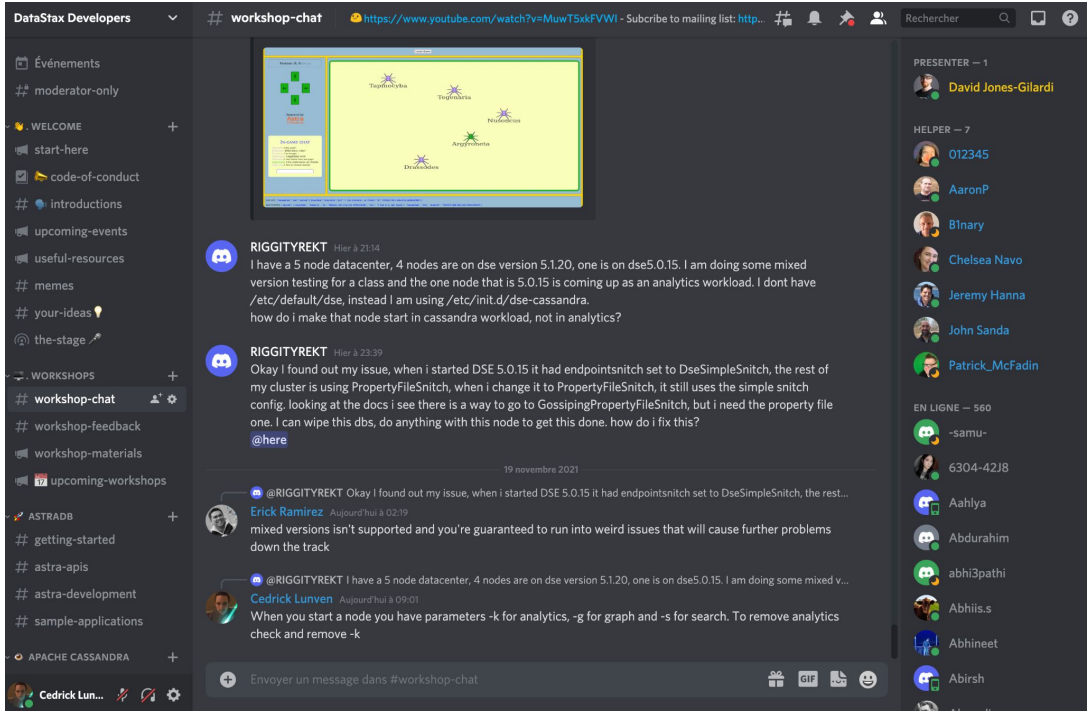
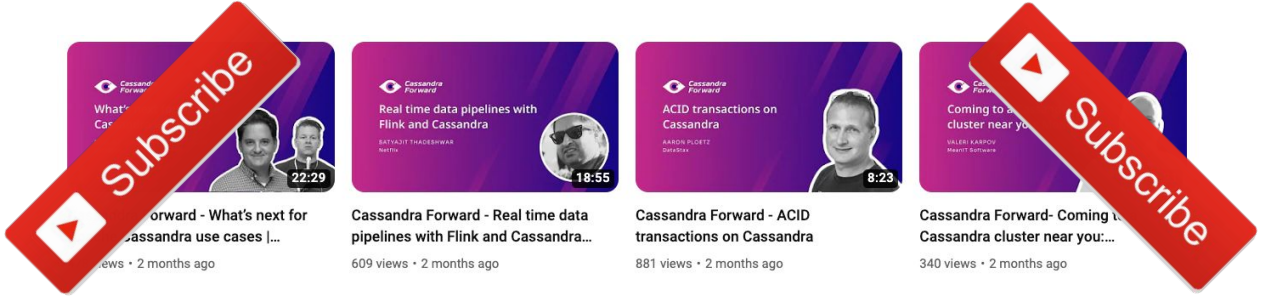


!discord

dtsx.io/discord

Datastax Developers Discord (18k+)



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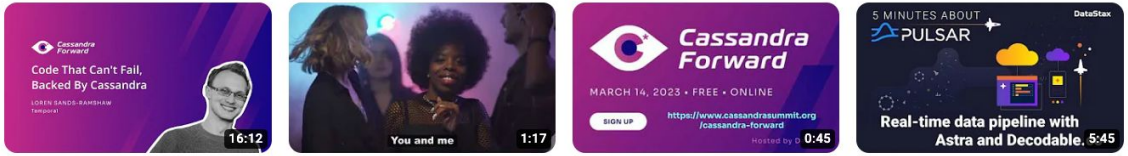

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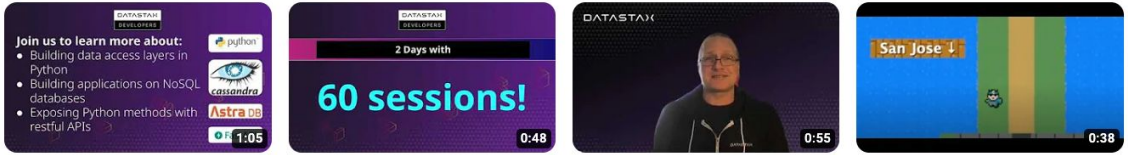

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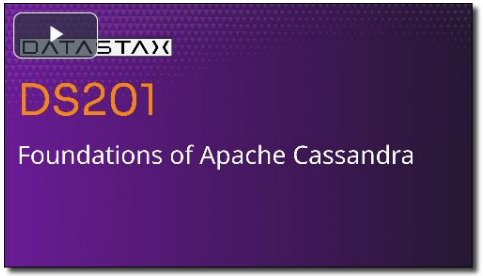

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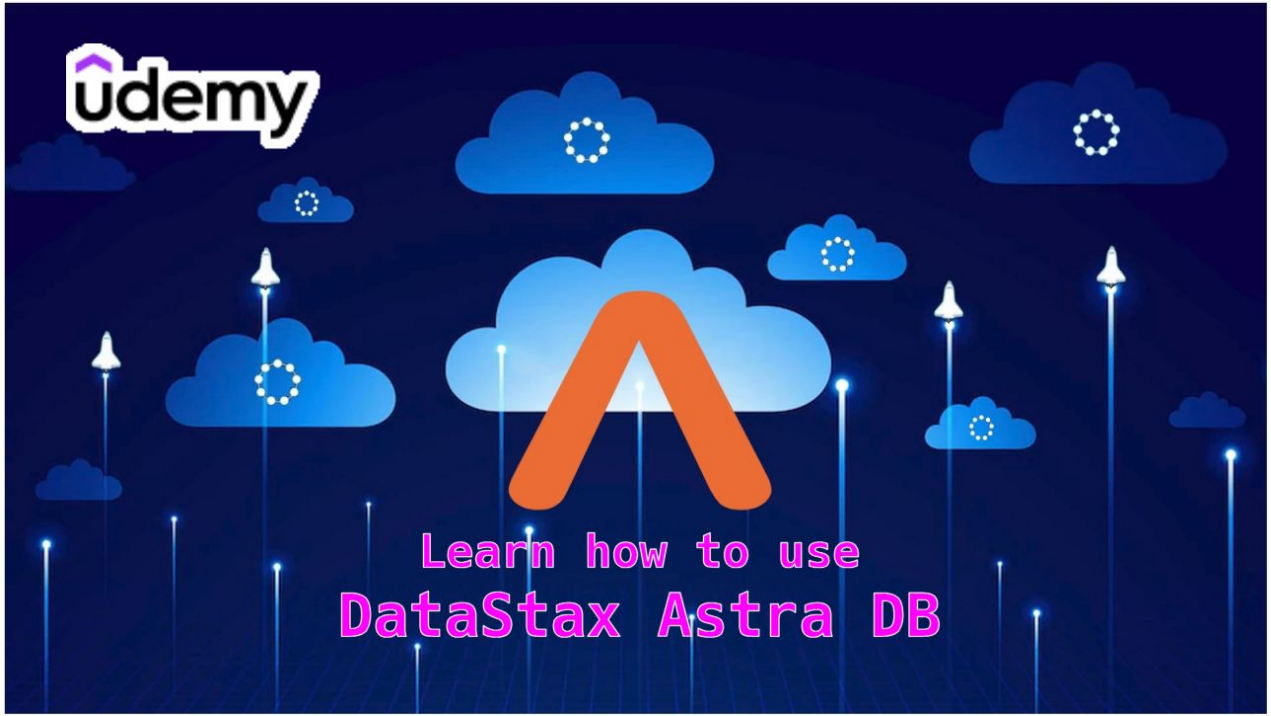
https://datastax.academy



https://tinyurl.com/Astra4Zero

Thank You!

DataStax