

# Build APIs with SpringBoot

REST, GRPC, GRAPHQL

Which one should you  
pick?



# About me: Cedrick Lunven



Director of Developer Advocacy



Creator and Maintainer of FF4j

Java and Spring Dinosaur



# Agenda

50min

1

Anatomy of a Spring Boot Micro service

2

Data Model & Persistence with Apache Cassandra

3

DEMO and Code Browse

{ REST }

GRPC

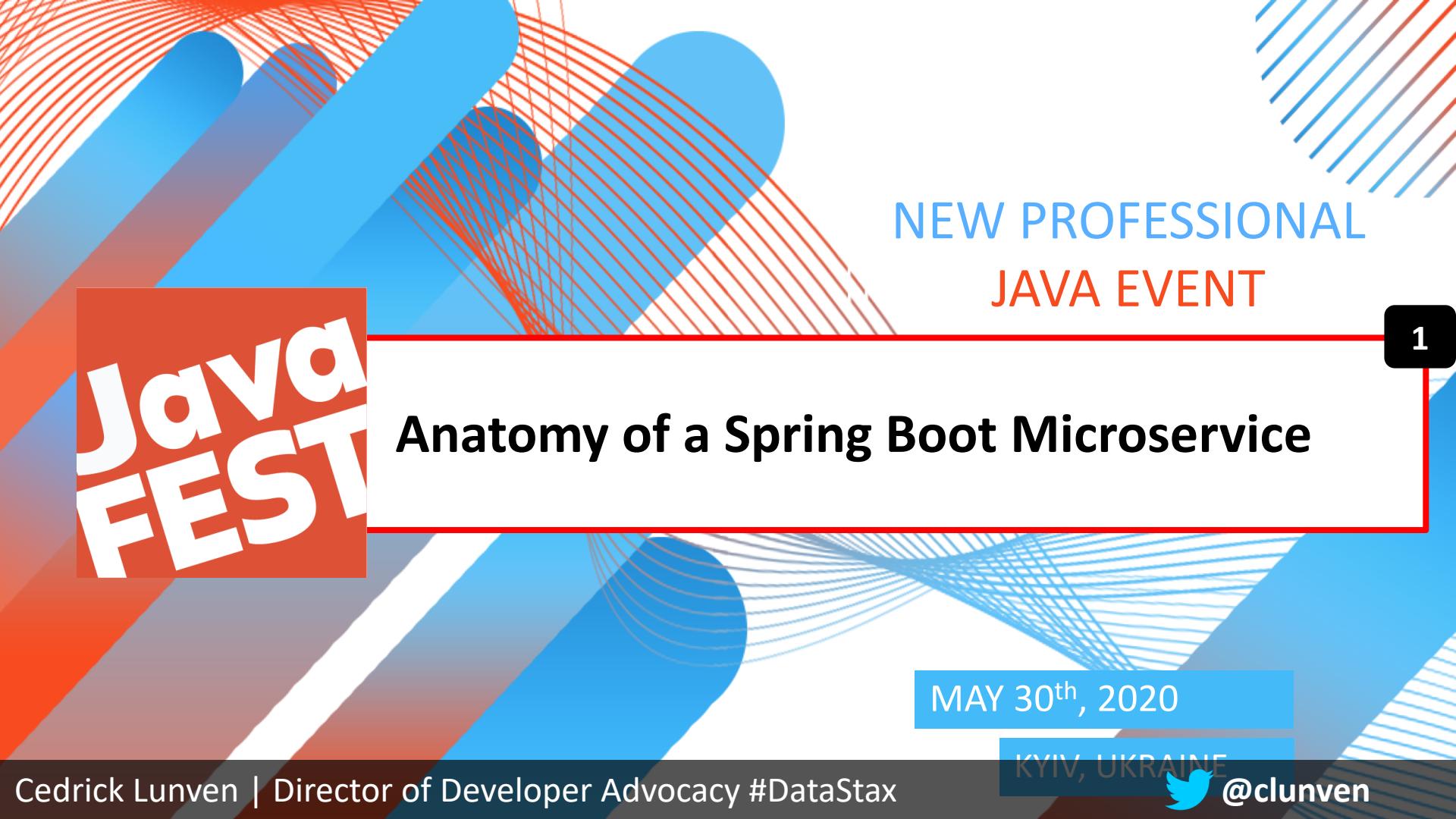


4

Decision tree

5

Take my code and slides + Q&A



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## Anatomy of a Spring Boot Microservice

1

MAY 30<sup>th</sup>, 2020

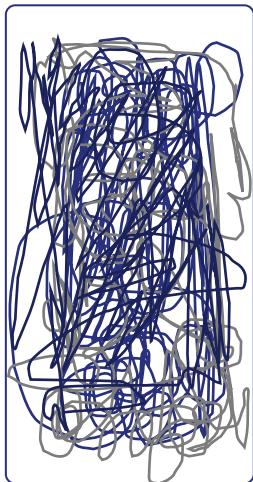
KYIV, UKRAINE



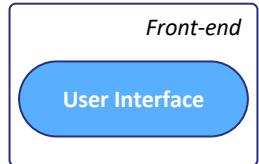
@clunven

# Microservices Architectures

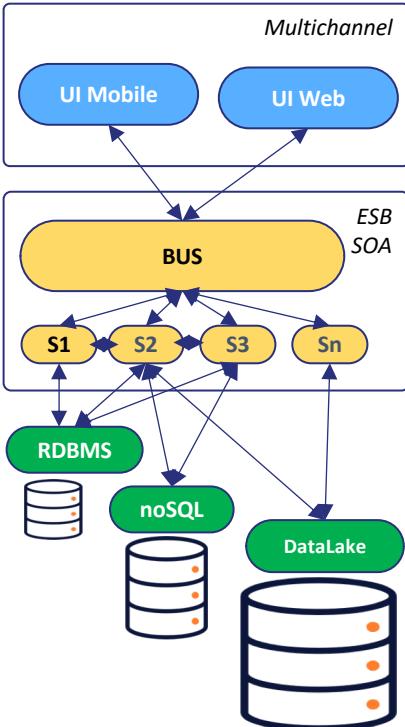
**Monolithic**



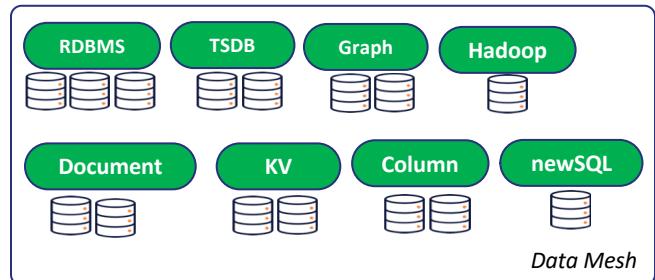
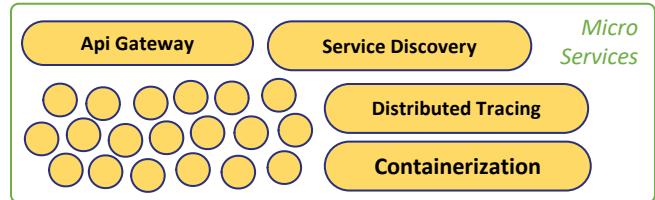
**Layers**



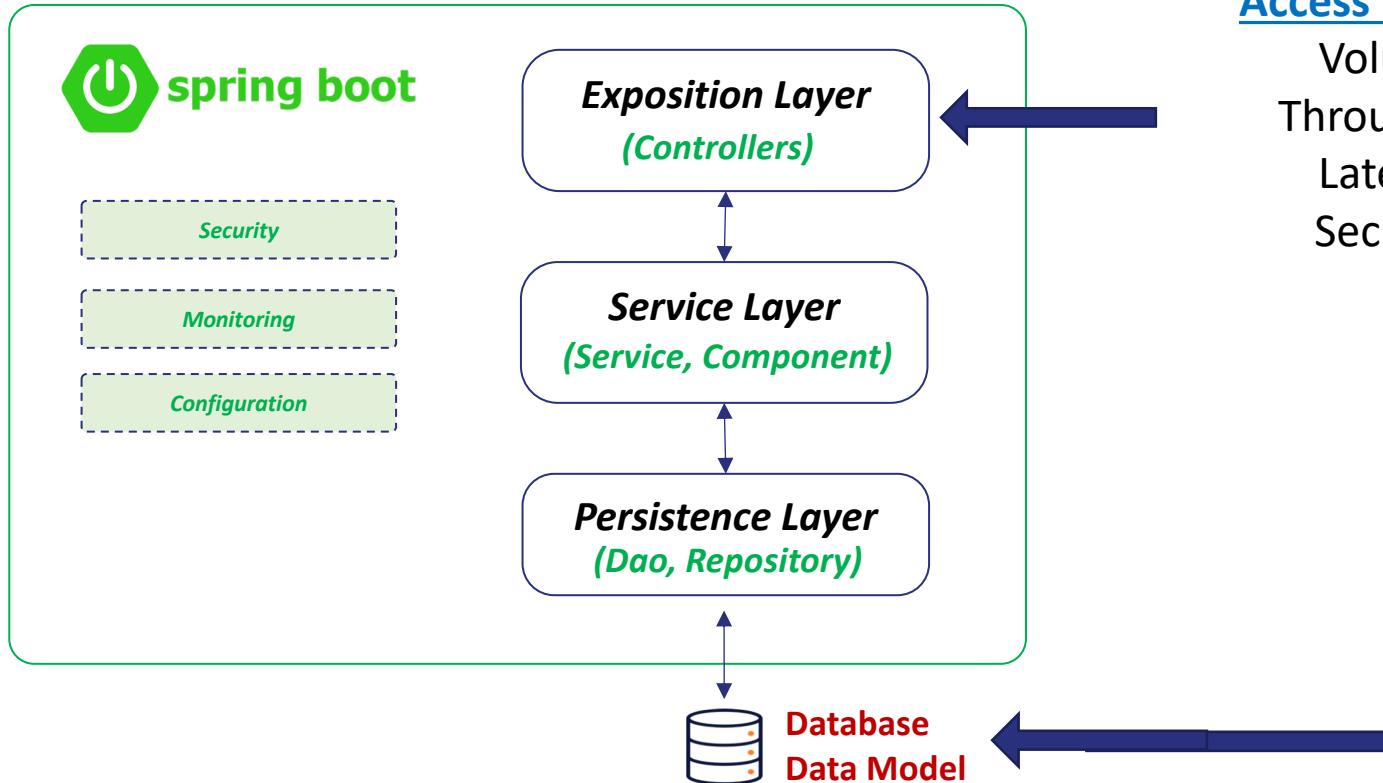
**Specialization**



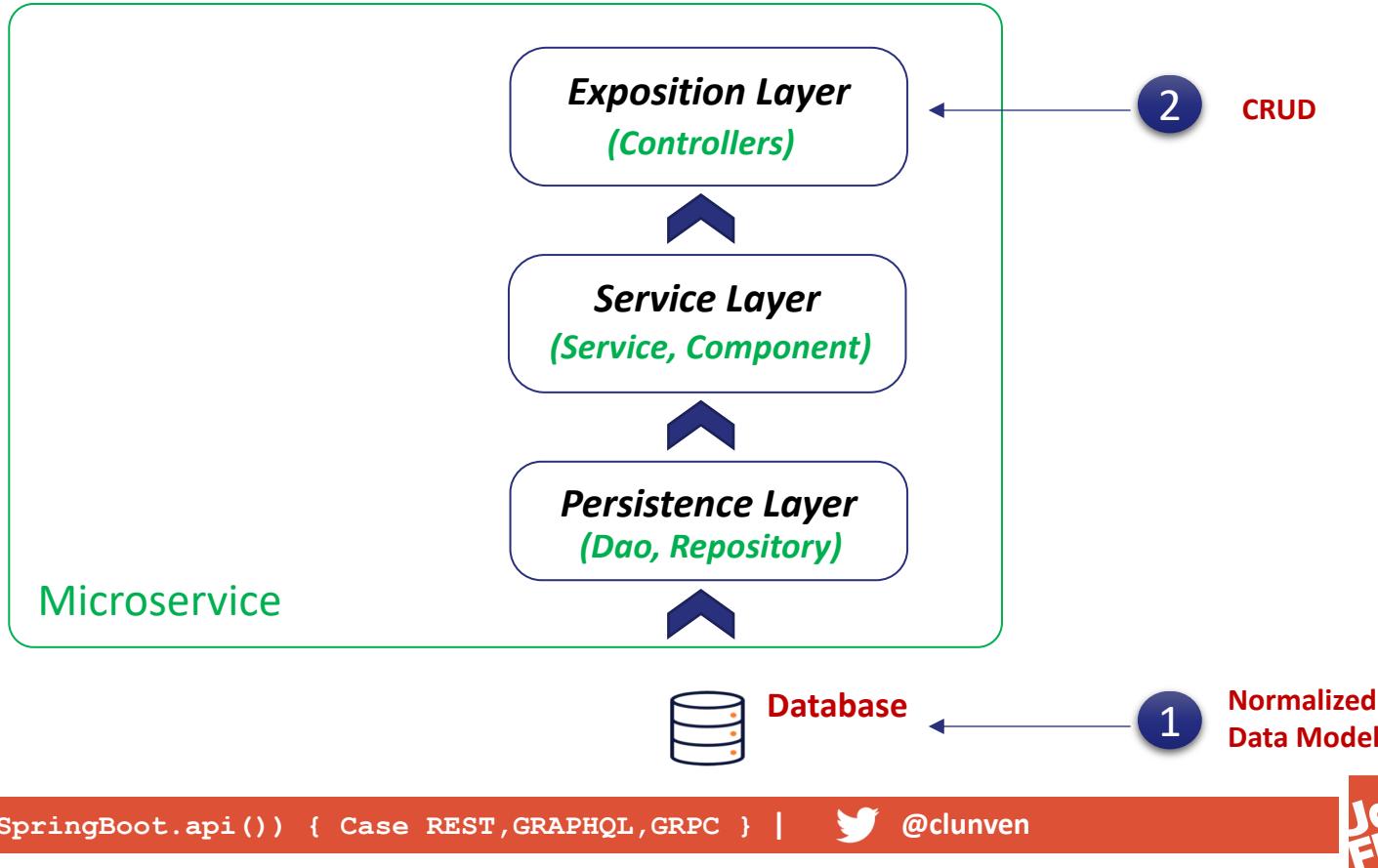
**All Things Distributed**



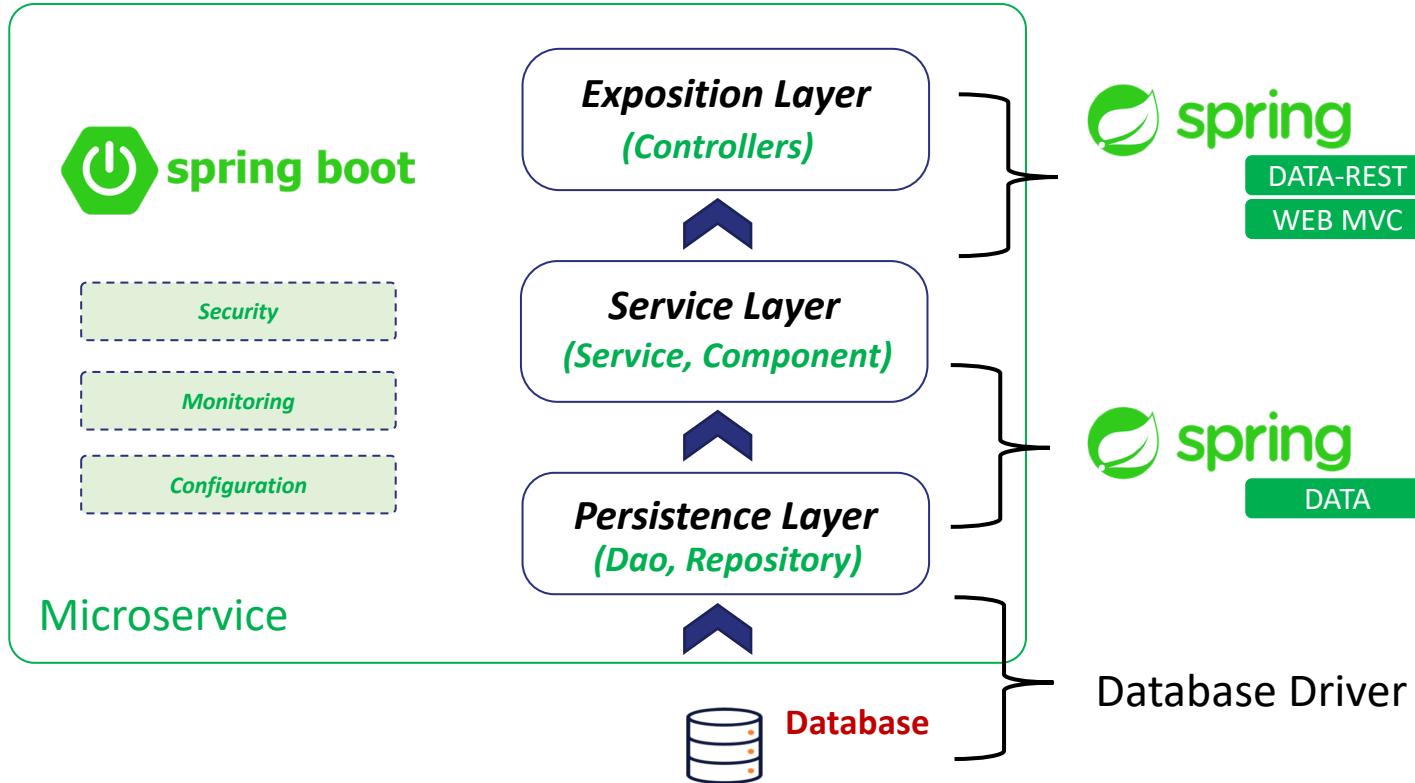
# Building a Spring Boot Microservice



# « Vanilla » So easy....



# « Vanilla » So easy....



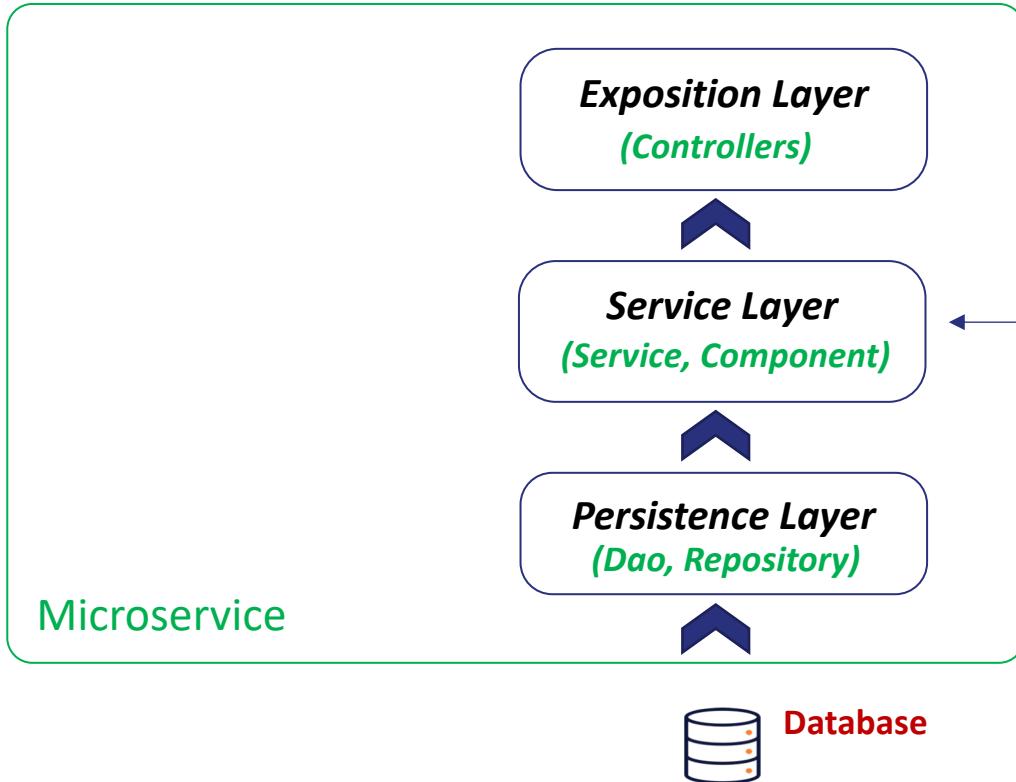
# Entity => Spring-Data => Spring-Data-REST

```
@Entity  
public class Customer {  
  
    @Id  
    @GeneratedValue(strategy=GenerationType.AUTO)  
    private Long id;  
  
    private String firstName;  
  
    private String lastName;  
  
    private Customer() {}  
  
    private Customer(  
        String firstName, String lastName) {  
        this.firstName = firstName;  
        this.lastName = lastName;  
    }  
}
```



```
@RepositoryRestResource(  
    collectionResourceRel = "customers",  
    path = "customers")  
  
public interface CustomerRepository extends  
CrudRepository<Customer, Long> {  
  
    List<Customer> findByLastName(String lastName);  
  
    Customer findById(long id);  
}
```

# When volumes grow ?



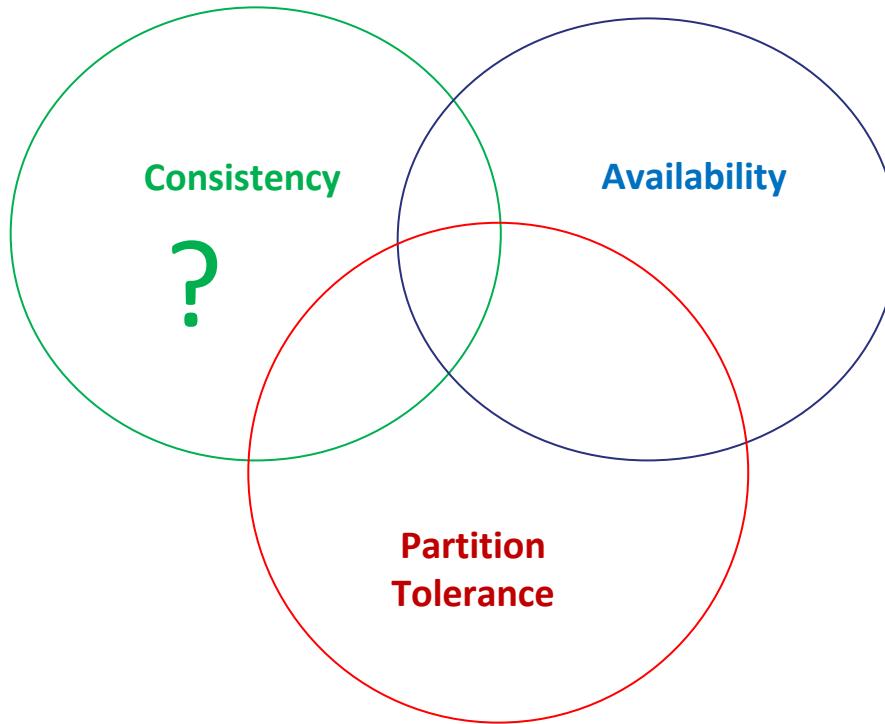
3

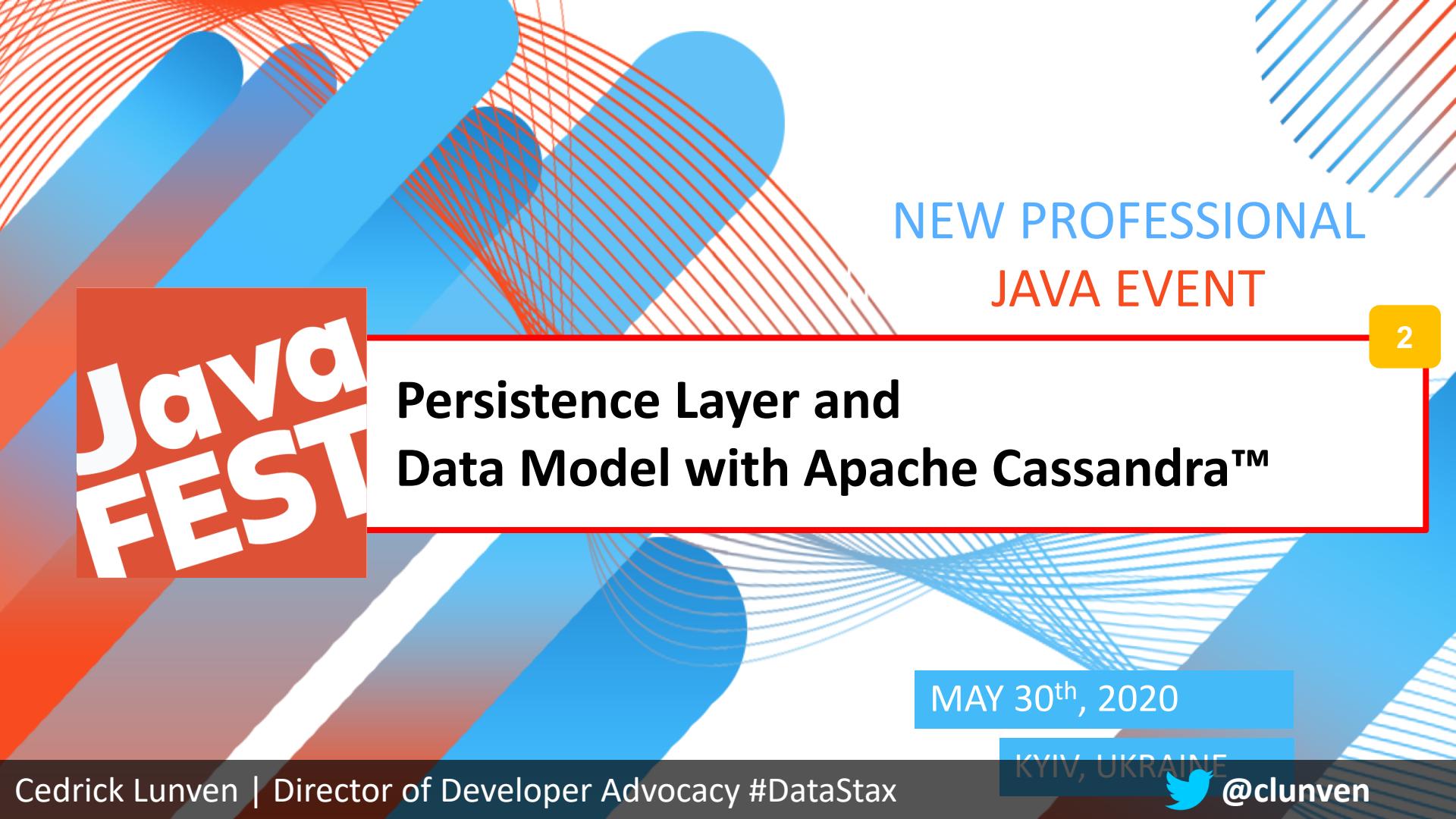
## CUSTOM QUERIES

CREATE INDEX  
JOIN  
SHARDING  
...



# CAP Theorem for Distributed Systems





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## Persistence Layer and Data Model with Apache Cassandra™

2

MAY 30<sup>th</sup>, 2020

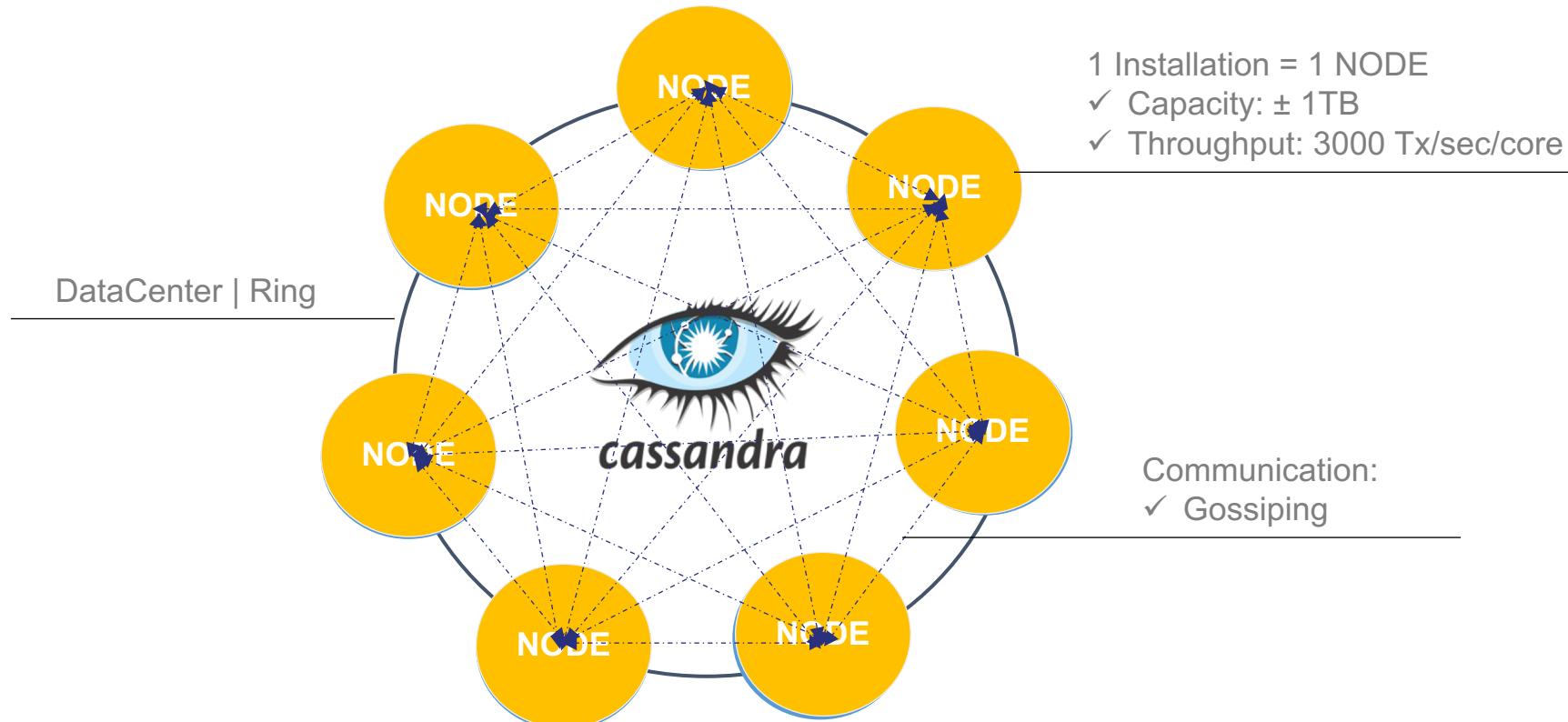
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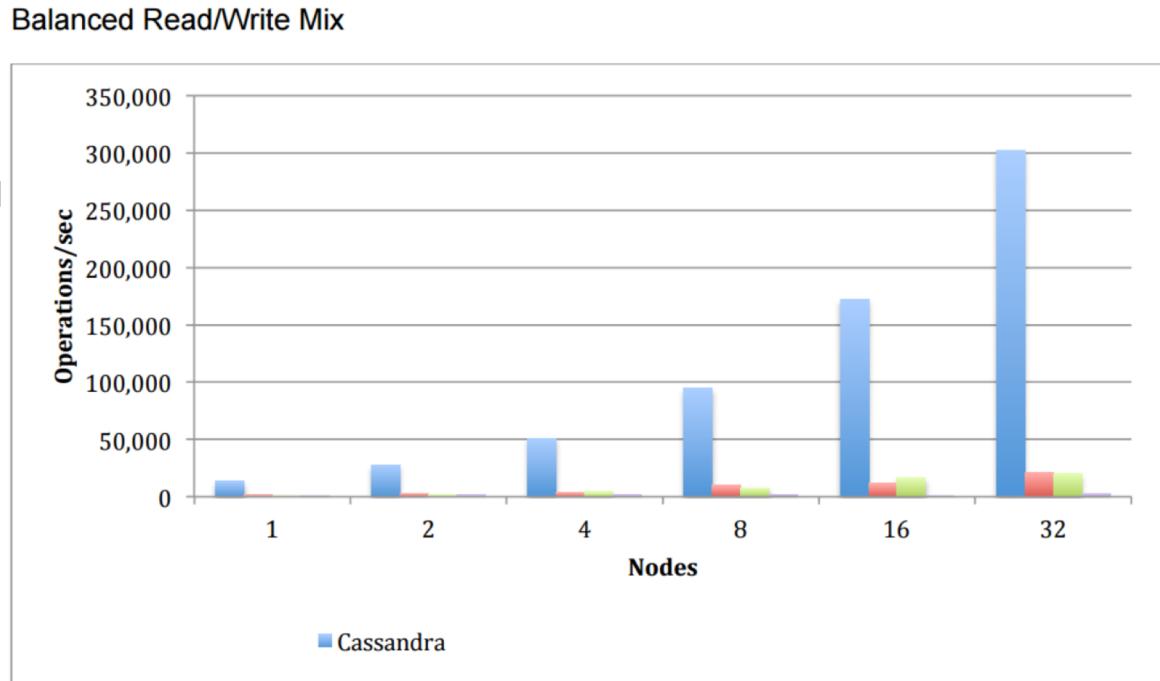
Cedrick Lunven | Director of Developer Advocacy #DataStax

# Apache Cassandra™= Distributed NoSQL Database

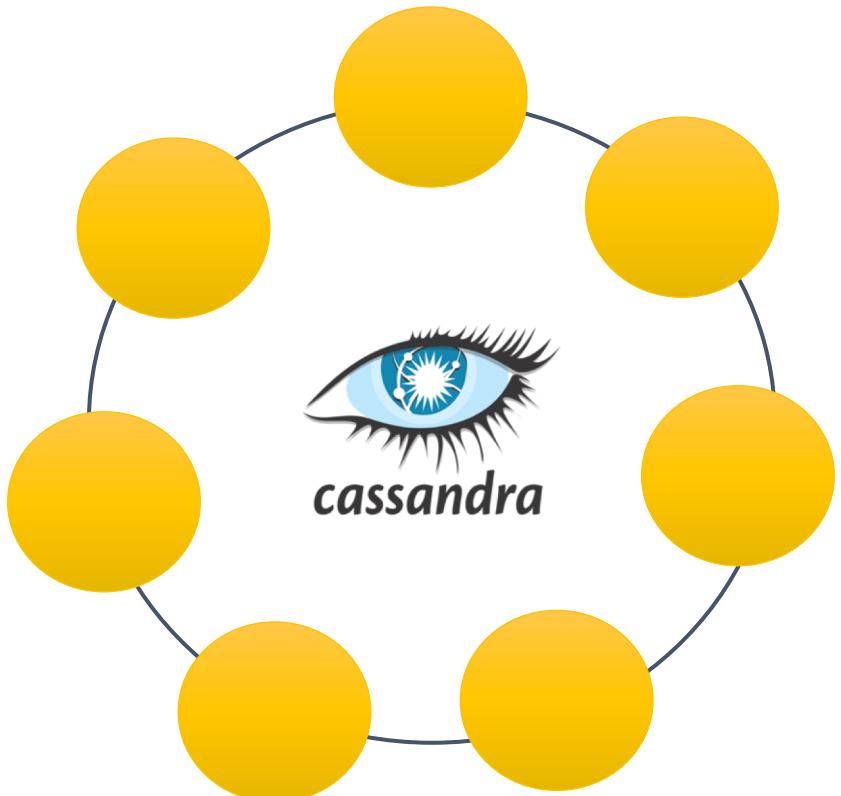


# Scales Linearly

- Need more capacity?
- Need more throughput
- Add nodes!



# Data is Distributed

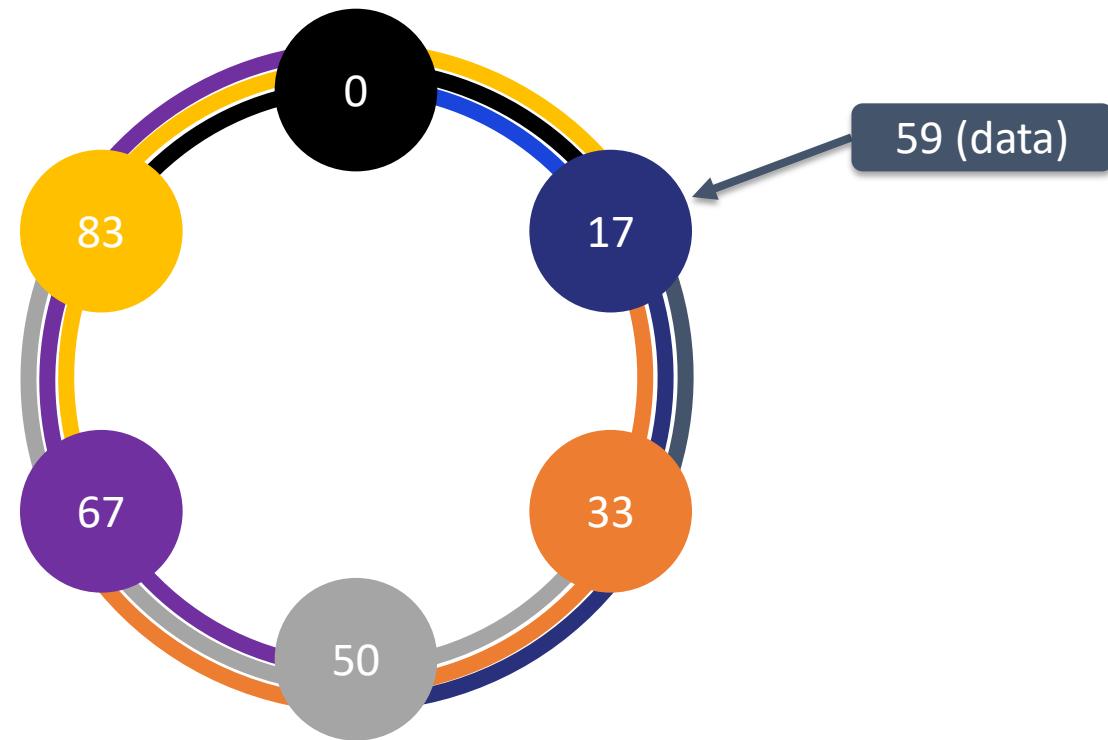


Country	City	Habitant
USA	New York	8.000.000
USA	Los Angeles	4.000.000
FR	Paris	2.230.000
DE	Berlin	3.350.000
UK	London	9.200.000
AU	Sydney	4.900.000
DE	Nuremberg	500.000
CA	Toronto	6.200.000
CA	Montreal	4.200.000
FR	Toulouse	1.100.000
JP	Tokyo	37.430.000
IN	Mumbai	20.200.000

Partition Key

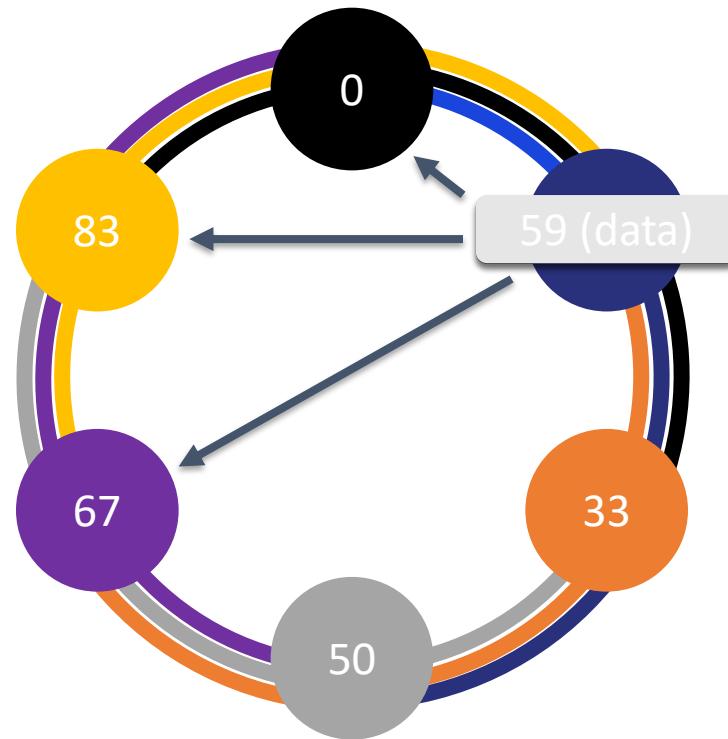
# Data is replicated

RF = 3



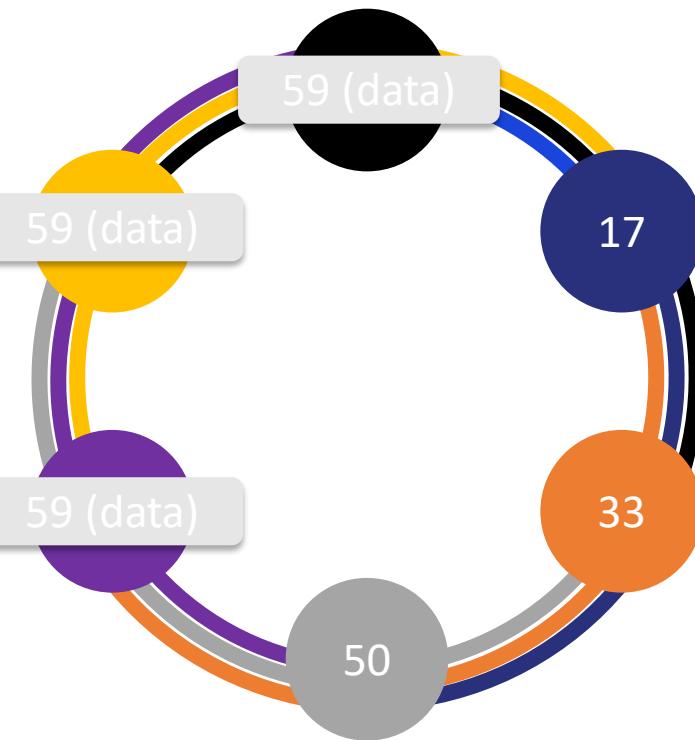
# Data is replicated

RF = 3



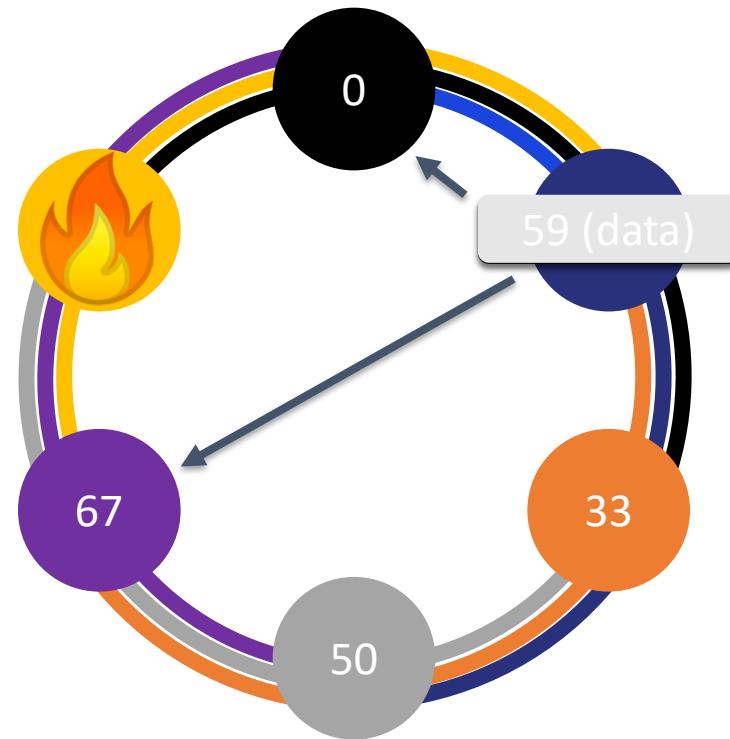
# Data is replicated

RF = 3



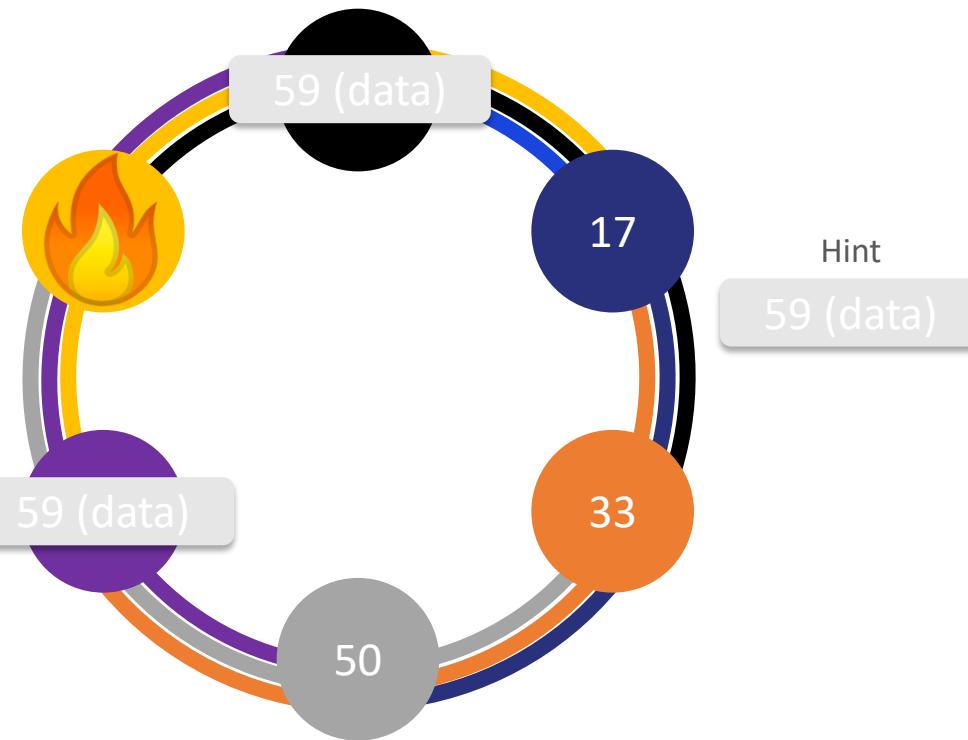
# Self Healing

RF = 3



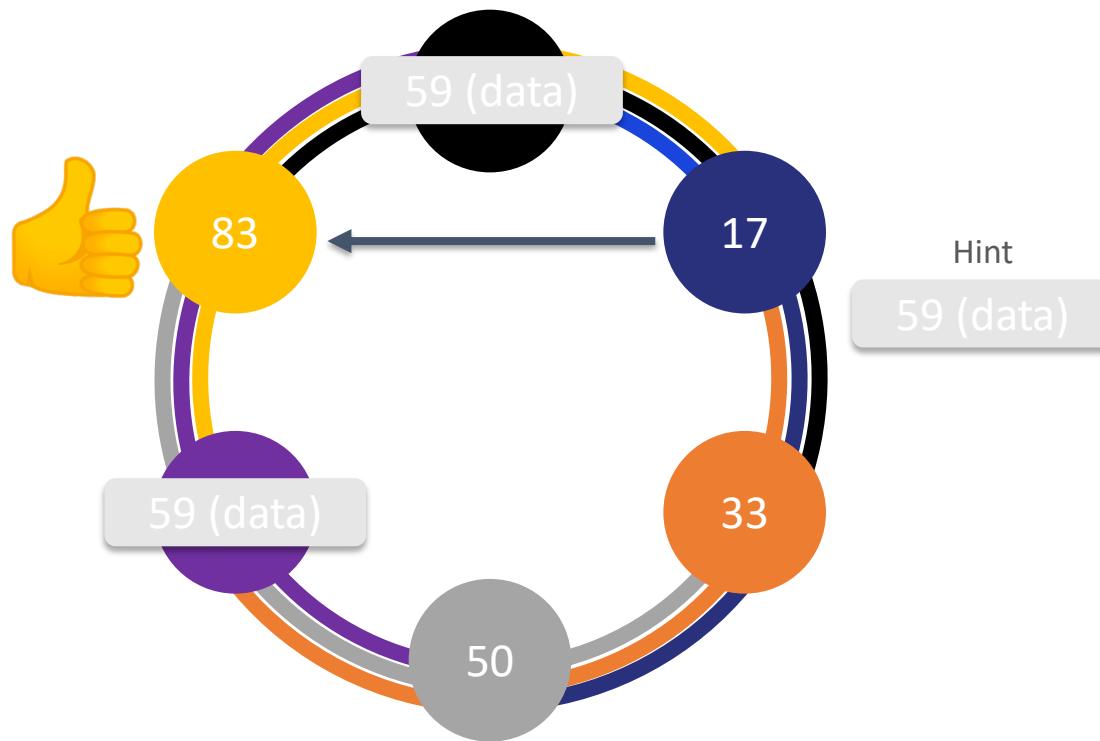
# Self Healing

RF = 3



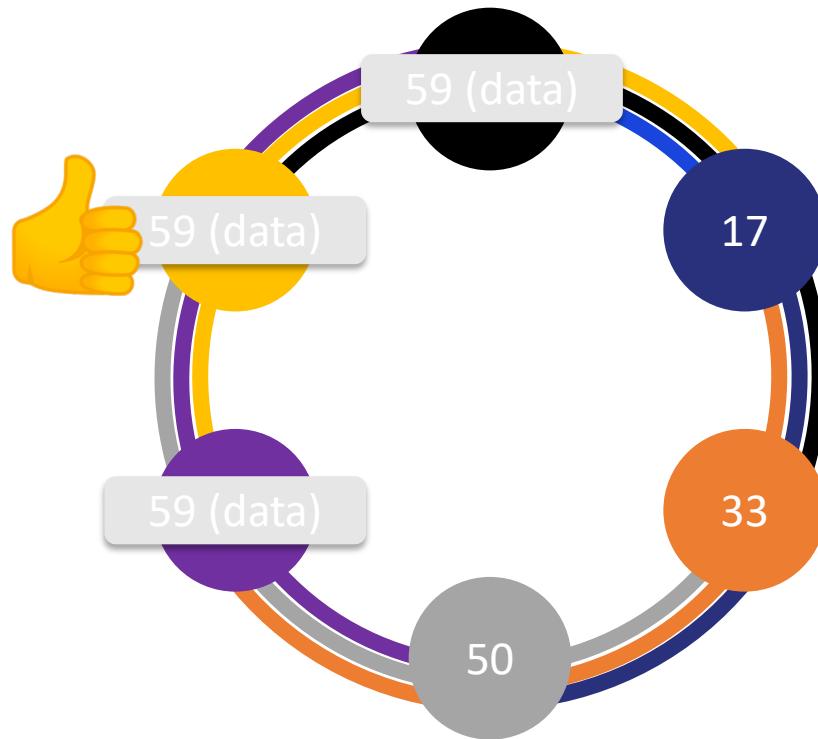
# Self Healing

RF = 3



# Self Healing

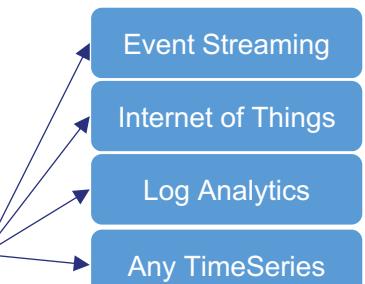
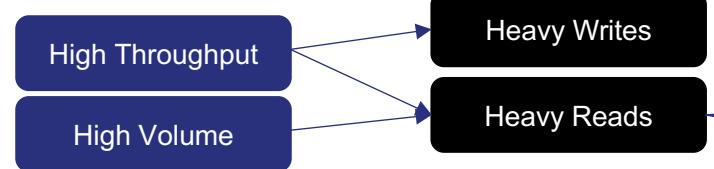
RF = 3





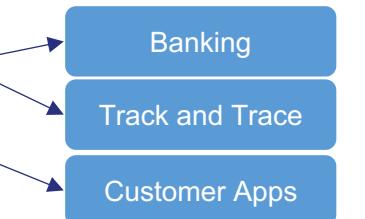
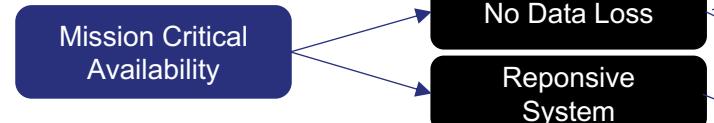
# Use Cases

S



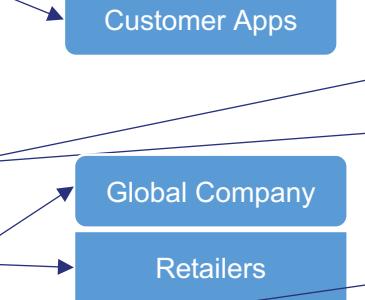
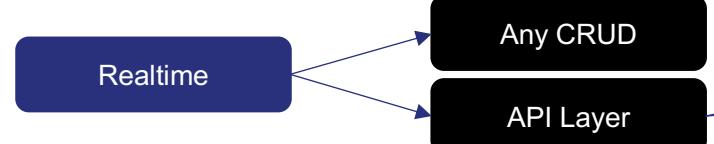
Microservices

A



Prices

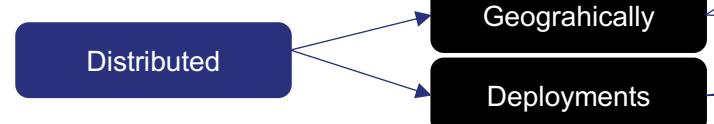
R



Enterprise Data Layer

Applications

D



Hybrid Cloud

MultiCloud

# Apache Cassandra ❤️ MicroServices

- **REALTIME REQUESTS & SCALABILITY AT CORE**
- **DISTRIBUTED ARCHITECTURES**
  - From ACID to BASE (Basic Availability, Soft-State, Eventual Consistency)
  - Implementations: CQRS, Event Sourcing
  - Colocate service and Data
- **DECOUPLING BY DESIGN**
  - 1 KEYSPACE = DOMAIN
  - 1 QUERY = 1 TABLE

# Reference Application **KILLRVIDEO**



Get Started Docs Support

Learn to build applications with Apache Cassandra and DataStax Enterprise

<http://killrvideo.github.io>

Awesome Cats Loving And Kissing Videos Compilation - Funny Cat Vines 2016

by Andrew O'Kon

Added on 4/24/2018

Awesome Cats Loving And Kissing Videos Compilation - Funny Cat Vines 2016 Subscribe for more videos — <http://bit.ly/23Vx10I> HOT

LATEST COMMENTS

Leave a comment

MORE VIDEOS LIKE THIS

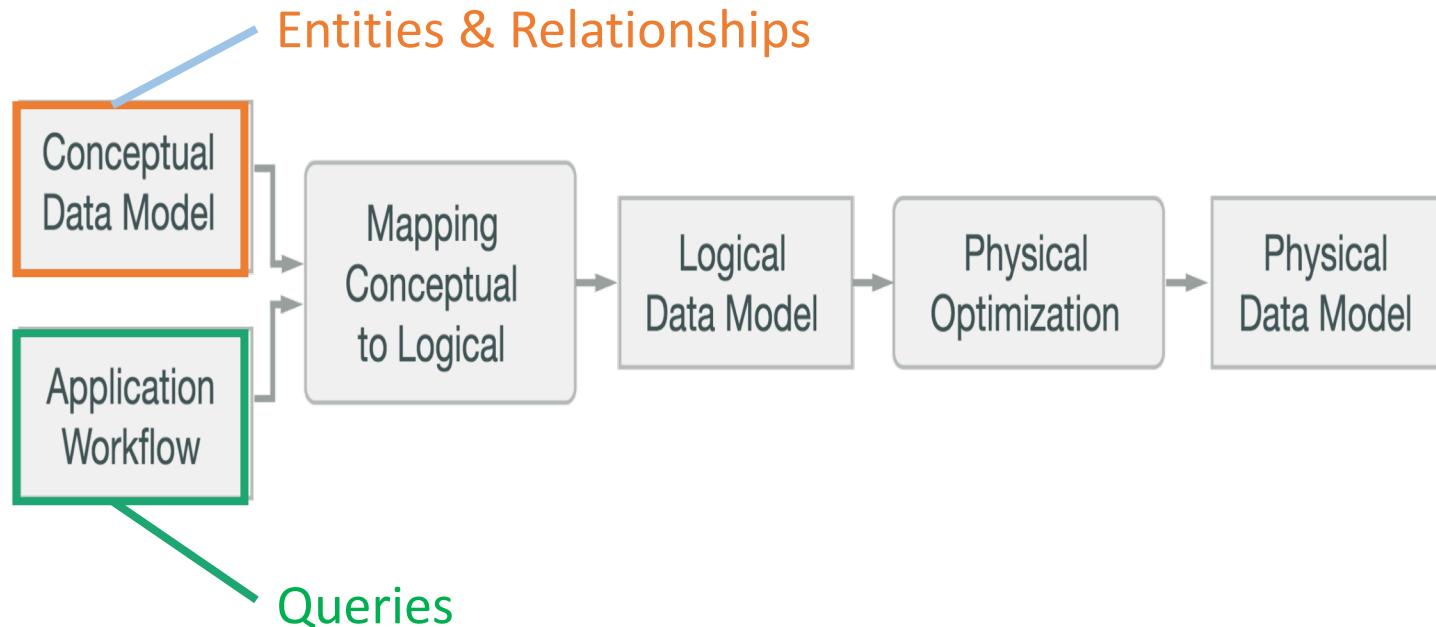
- AWESOME CATS LOVING AND KISSING VIDEOS COMPILATION - FUNNY CAT VINES 2016
- ADORABLE CATS PROTECTING AND LOVING BABIES - CAT LOVES BABY
- CAT REFUSES KISSING - FUNNY CATS HATE KISSING COMPILATION
- FUNNY AND CUTE CATS KISSING BABIES COMPILATION (2017)
- NEW FUNNY CAT VIDEOS (HD) LORD TRY NOT TO LAUGH

switch(SpringBoot.api()) { Case REST,GRAPHQL,GRPC } | [@clunven](#)

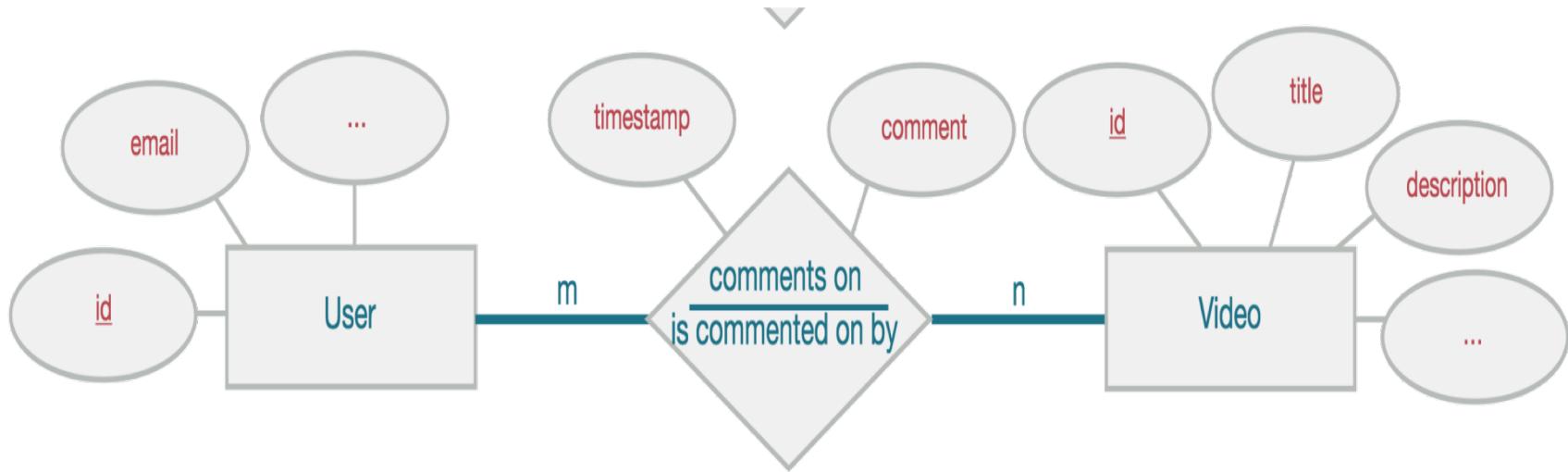


KYIV, 2020

# Data Model Design



# Conceptual Data Model



# Application Workflow

**R1:** Find **comments** related to target **video** using its identifier

- Get most recent first
- Implement Paging

**R2:** Find **comments** related to target **user** using its identifier

- Get most recent first
- Implement Paging

**R3:** Implement **CRUD** operations

# Mapping

**Q1:** Find comments for a video with a known id (show most recent first)



**Q2:** Find comments posted for a user with a known id (show most recent first)



**Q3:** CRUD Operations

# Logical Data Model

comments_by_user		
userid	K	
creationdate	C↓	
commentid	C↑	
videoid		
comment		

comments_by_video		
videoid	K	
creationdate	C↓	
commentid	C↑	
userid		
comment		

# Physical Data Model

comments_by_user			
userid	UUID	K	
commentid	TIMEUUID	C	↓
videoid	UUID		
comment	TEXT		

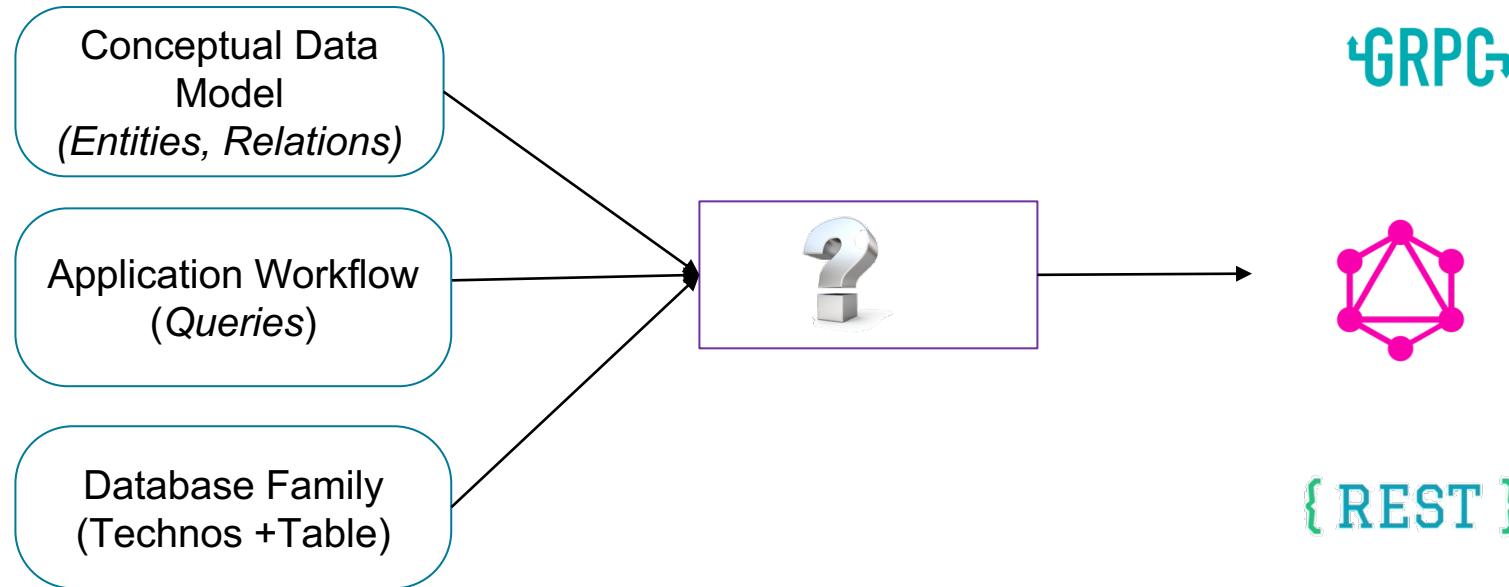
comments_by_video			
videoid	UUID	K	
commentid	TIMEUUID	C	↓
userid	UUID		
comment	TEXT		

# Schema DDL

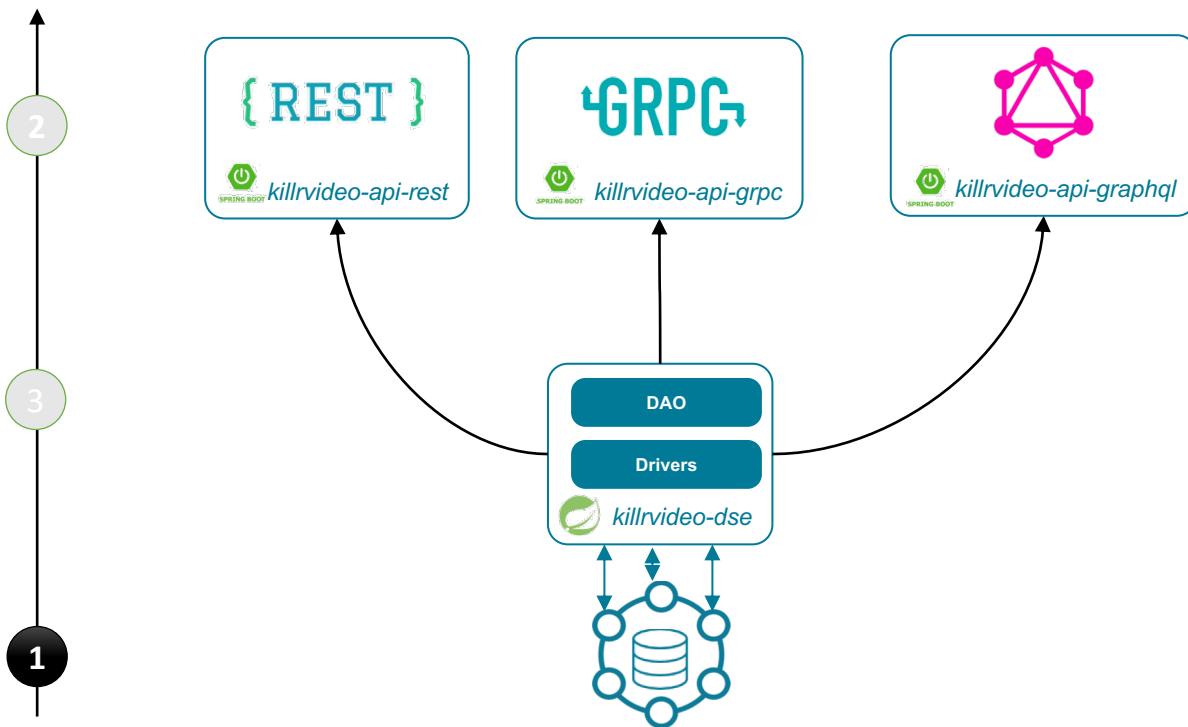
```
CREATE TABLE IF NOT EXISTS comments_by_user (
    userid uuid,
    commentid timeuuid,
    videoid uuid,
    comment text,
    PRIMARY KEY ((userid), commentid)
) WITH CLUSTERING ORDER BY (commentid DESC);
```

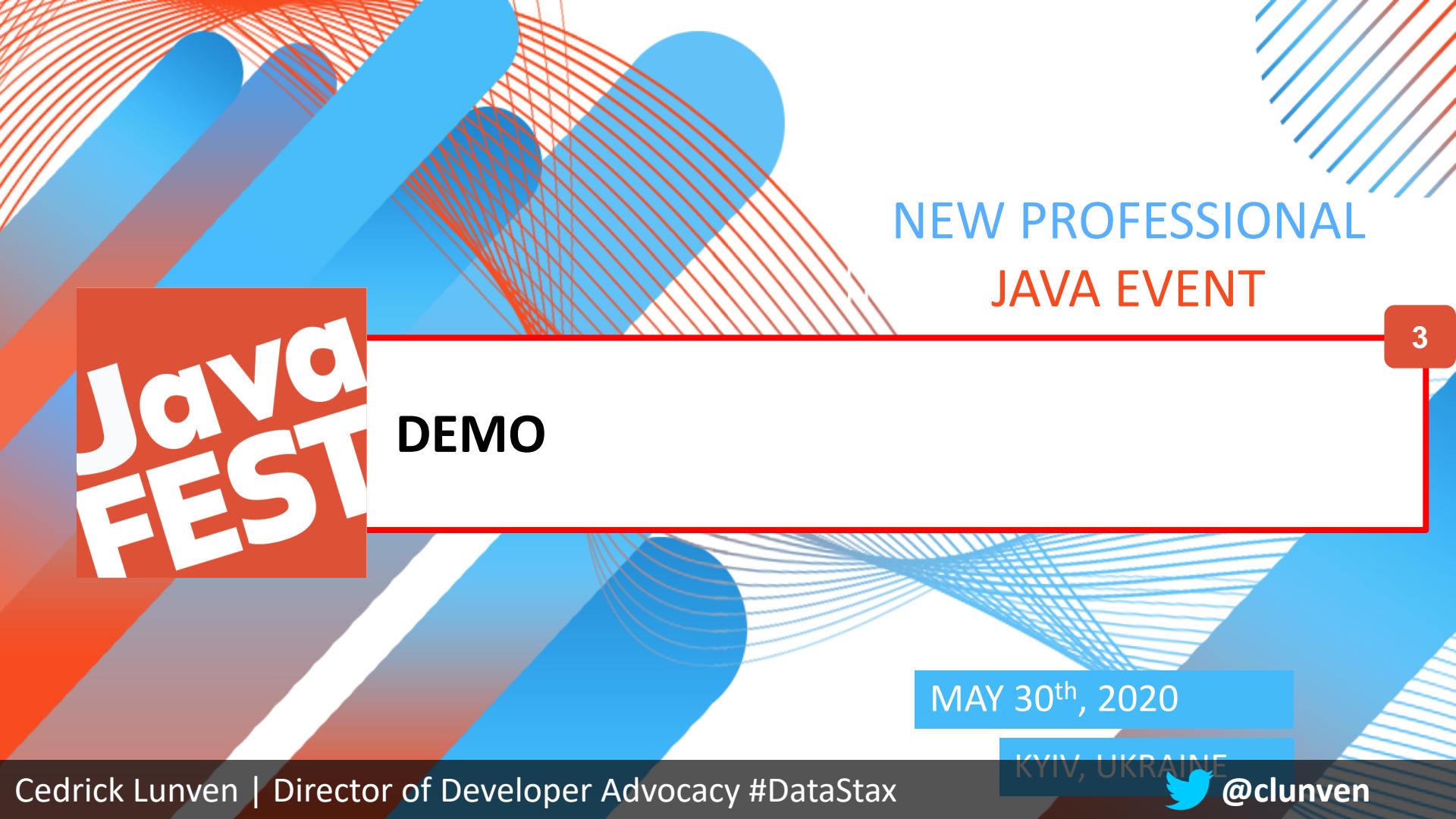
```
CREATE TABLE IF NOT EXISTS comments_by_video (
    videoid     uuid,
    commentid   timeuuid,
    userid      uuid,
    comment     text,
    PRIMARY KEY ((videoid), commentid)
) WITH CLUSTERING ORDER BY (commentid DESC);
```

# We have everything we need



# Api Design Methodology





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DEMO

3

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How to actually learn any new programming concept



Essential

Changing Stuff and  
Seeing What Happens

O RLY?

@ThePracticalDev

[https://github.com/clun  
/javafest-2020](https://github.com/clun/javafest-2020)

docker-compose up -d

# Configuration – 1# Convention

```
# -----
# Full Convention
# -----
spring:
  data:
    cassandra:
      contact-points: localhost
      port: 9042
      local-datacenter: dc1
      keyspace-name: betterbotz
      schema-action: create-if-not-exists
```

# Configuration – #2 Java Config

```
@Configuration
public class SpringDataCassandraJavaConfig
    extends AbstractCassandraConfiguration
    implements CqlSessionBuilderCustomizer {

    @Override
    protected String getKeyspaceName() {
        return keyspaceName;
    }

    @Override
    protected String getLocalDataCenter() {
        return localDataCenter;
    }
}
```

# Configuration - #3 Custom Definition

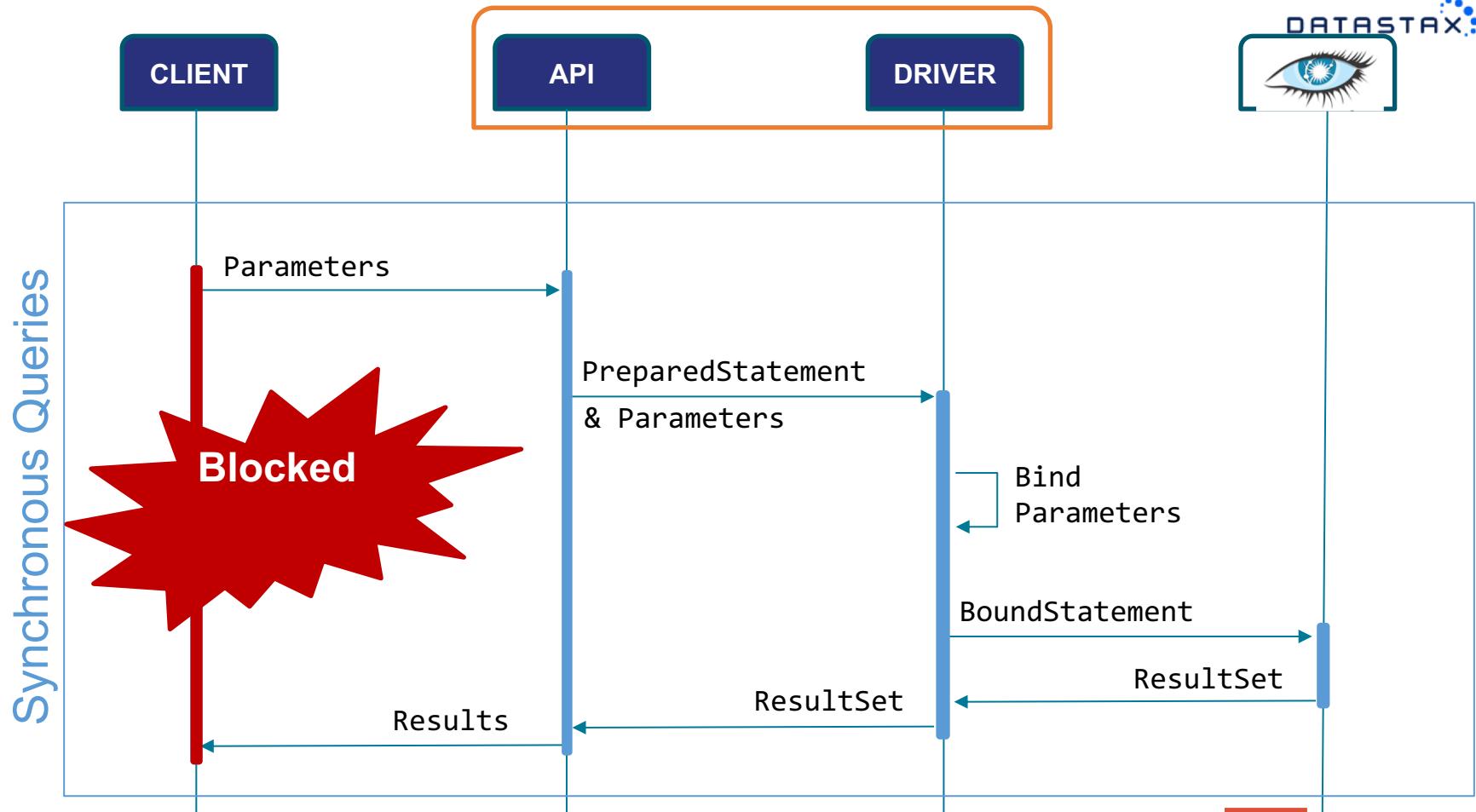
```
@Configuration
public class DseConfiguration {

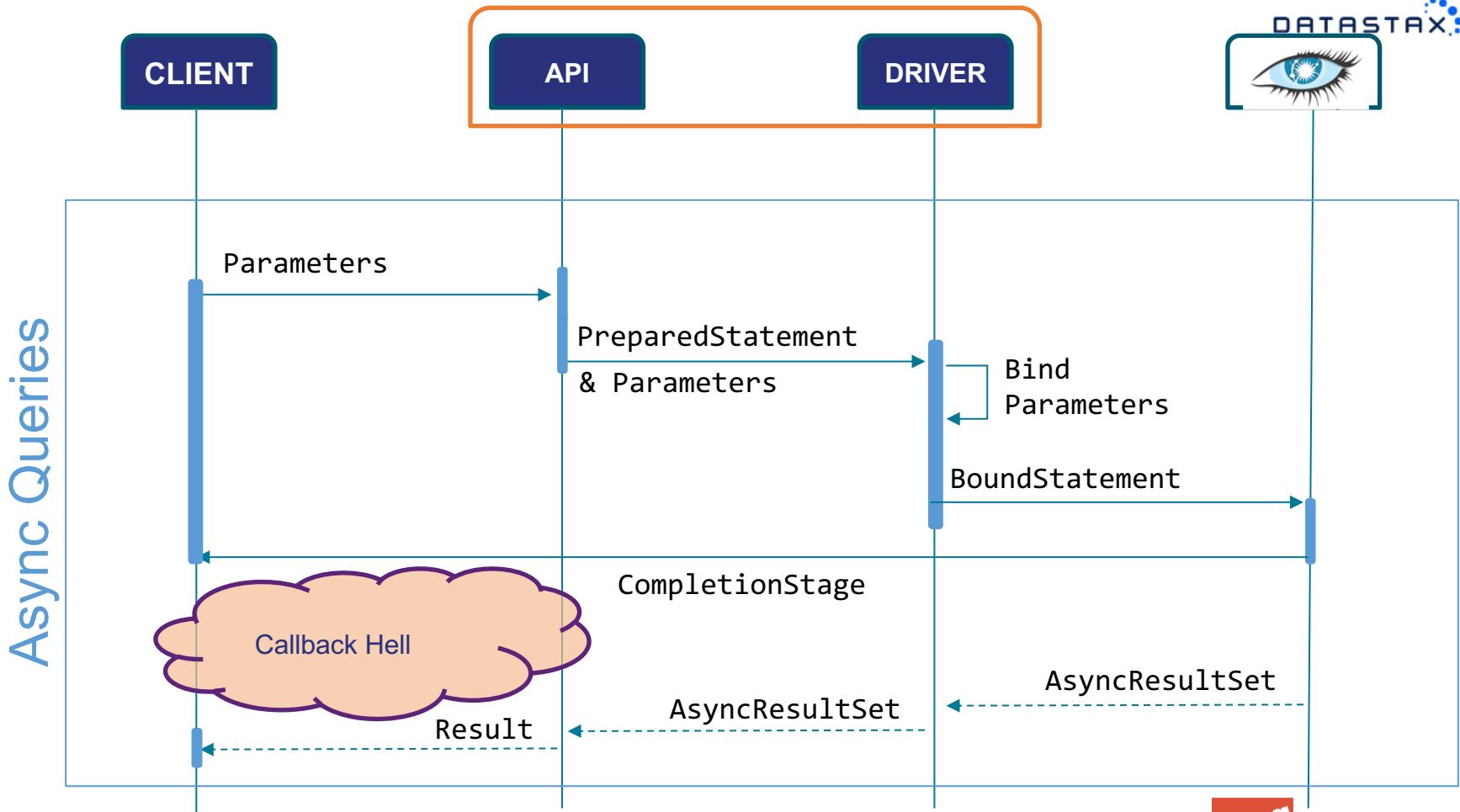
    /** Internal logger. */
    private static final Logger LOGGER = LoggerFactory.getLogger(DseConfiguration.class);

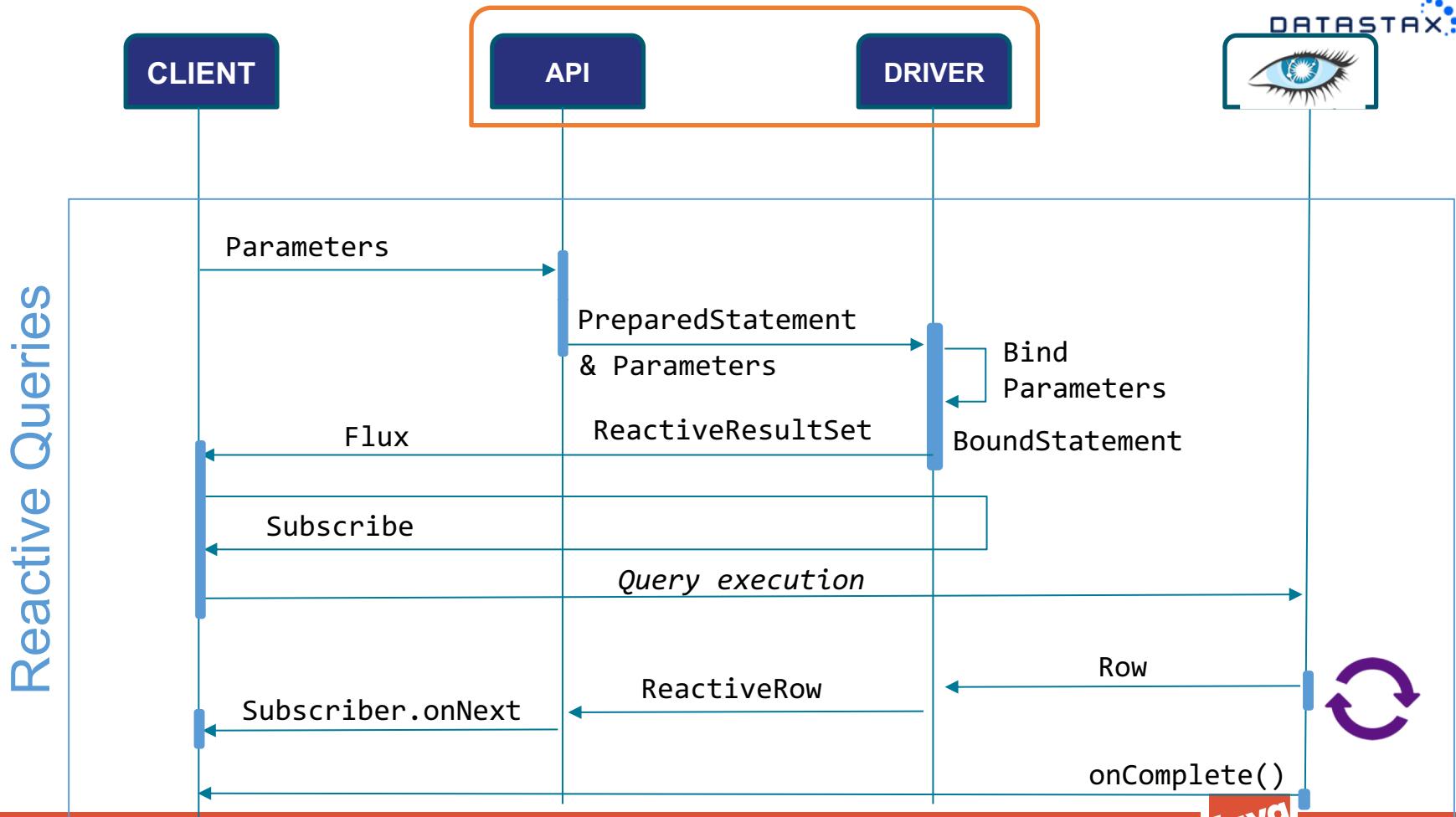
    @Value("#{${dse.contactPoints}'.split(',')}")
    public List < String > contactPoints;

    @Bean
    public DseSession dseSession() {
        long top = System.currentTimeMillis();
        LOGGER.info("Initializing connection to DSE Cluster");

        Builder clusterConfig = new Builder();
        LOGGER.info(" + Contact Points : {}", contactPoints);
        contactPoints.stream().forEach(clusterConfig::addContactPoint);
        LOGGER.info(" + Listening Port : {}", port);
        clusterConfig.withPort(port);
    }
}
```









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## DECISION TREE

4

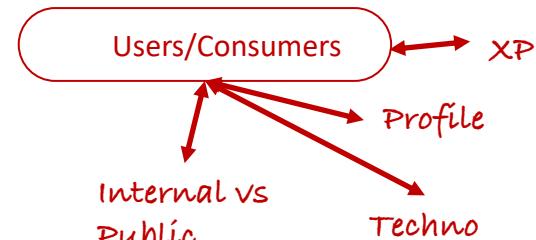
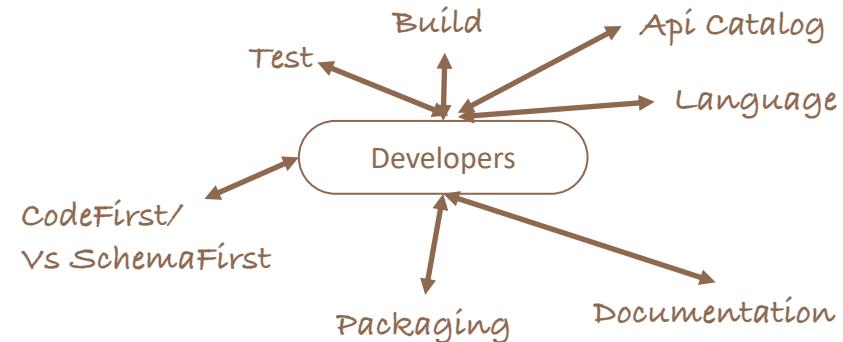
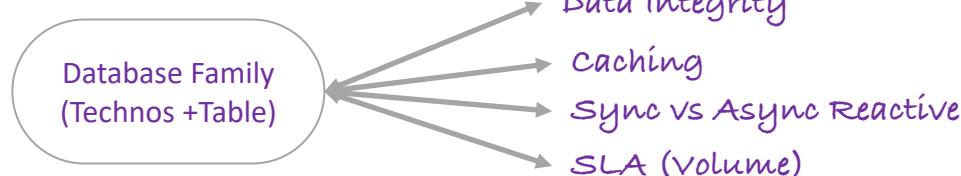
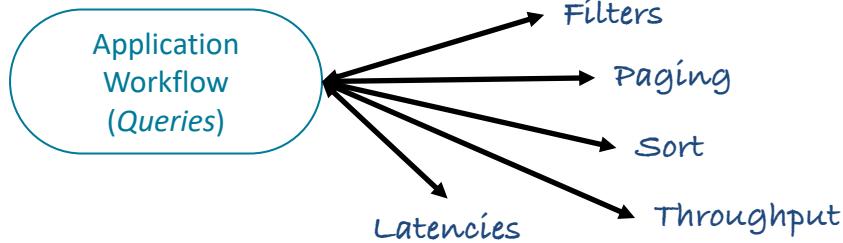
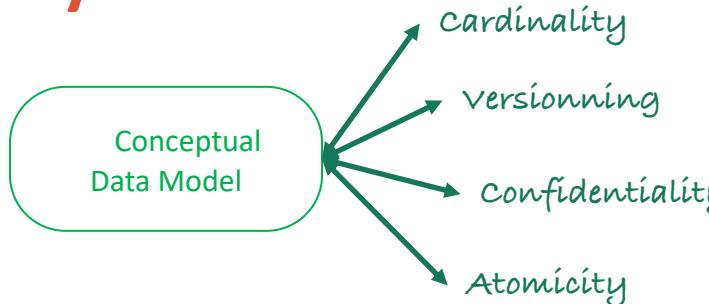
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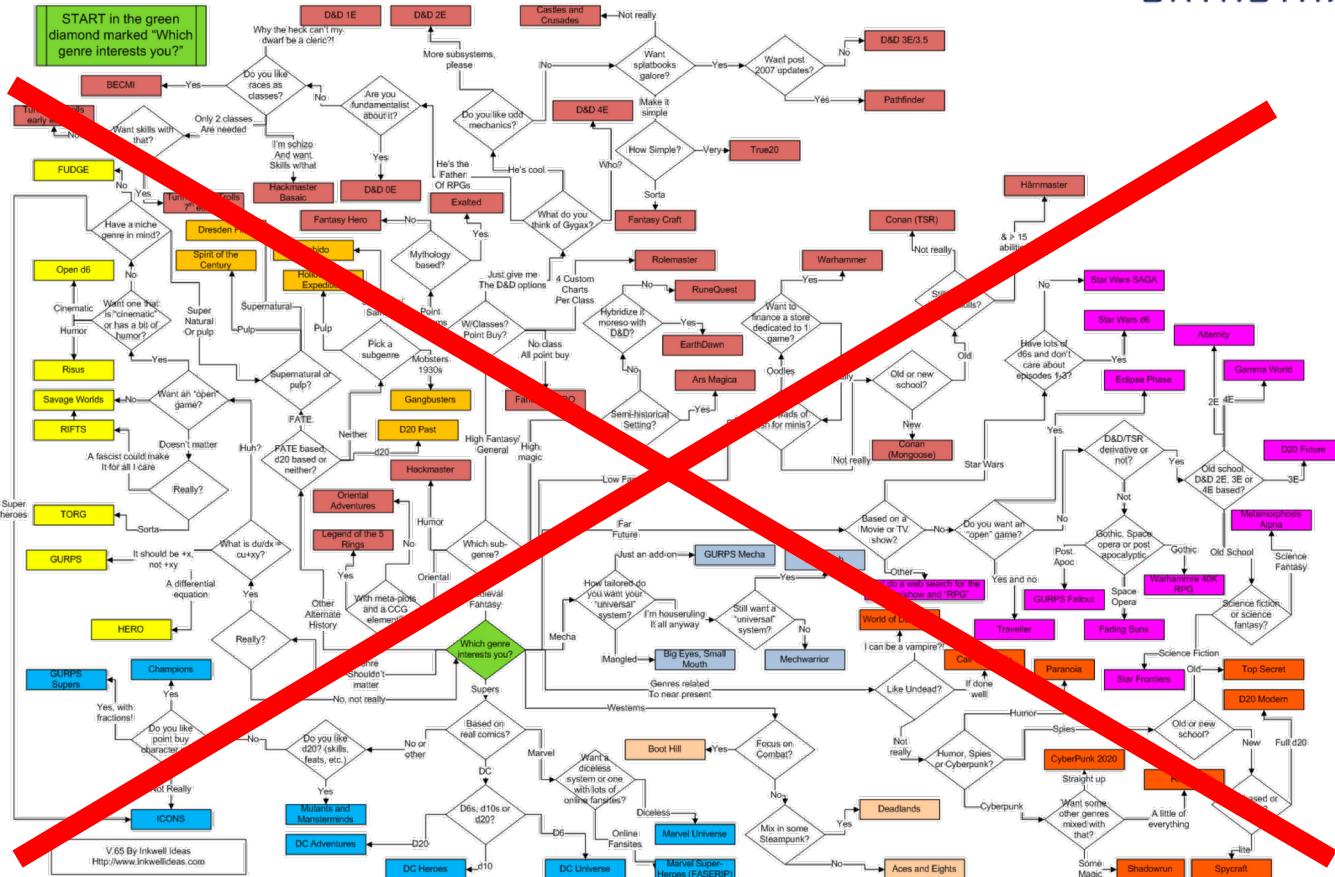
# Analysis Criteria



# Analysis Matrix

Concept	GraphQL	REST	gRPC
<b>Modèle conceptuel de données (Entités, Relations)</b>			
Cardinalité	1	5	3
Versionning	1	8	9
Confidentialité	6	9	1
Atomicité	6	7	0
<b>Parcours Applicatifs</b>			
Filtres	2	3	4
Pagination	3	3	6
Tris	4	4	6
Throughput	4	3	6
Latence	6	4	6
Base de données	2	3	6
Intégrité	6	4	7
Cache	7	0	6
Sync vs Async vs Reactive	1	2	4
SLA	6	3	4
<b>Development</b>			
Language	1	4	5
API Catalog	6	7	8
Test	3	2	0
Build	4	5	6
Packaging	4	6	7
Code first / Schema First	5	7	8
Documentation	2	5	1
<b>Client</b>			
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

# 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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## RESOURCES

5

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# Github repo

<https://github.com/clun/javafest-2020>

clun Code	Latest commit 4926edc 22 hours ago
killrvideo-api-graphql	Code 22 hours ago
killrvideo-api-grpc	Code 22 hours ago
killrvideo-api-rest	Code 22 hours ago
killrvideo-dse	Code 22 hours ago
killrvideo-studionotebooks	Code 22 hours ago
LICENSE	Code 22 hours ago
README.md	Code 22 hours ago
docker-compose.yaml	Code 22 hours ago
pom.xml	Code 22 hours ago

README.md

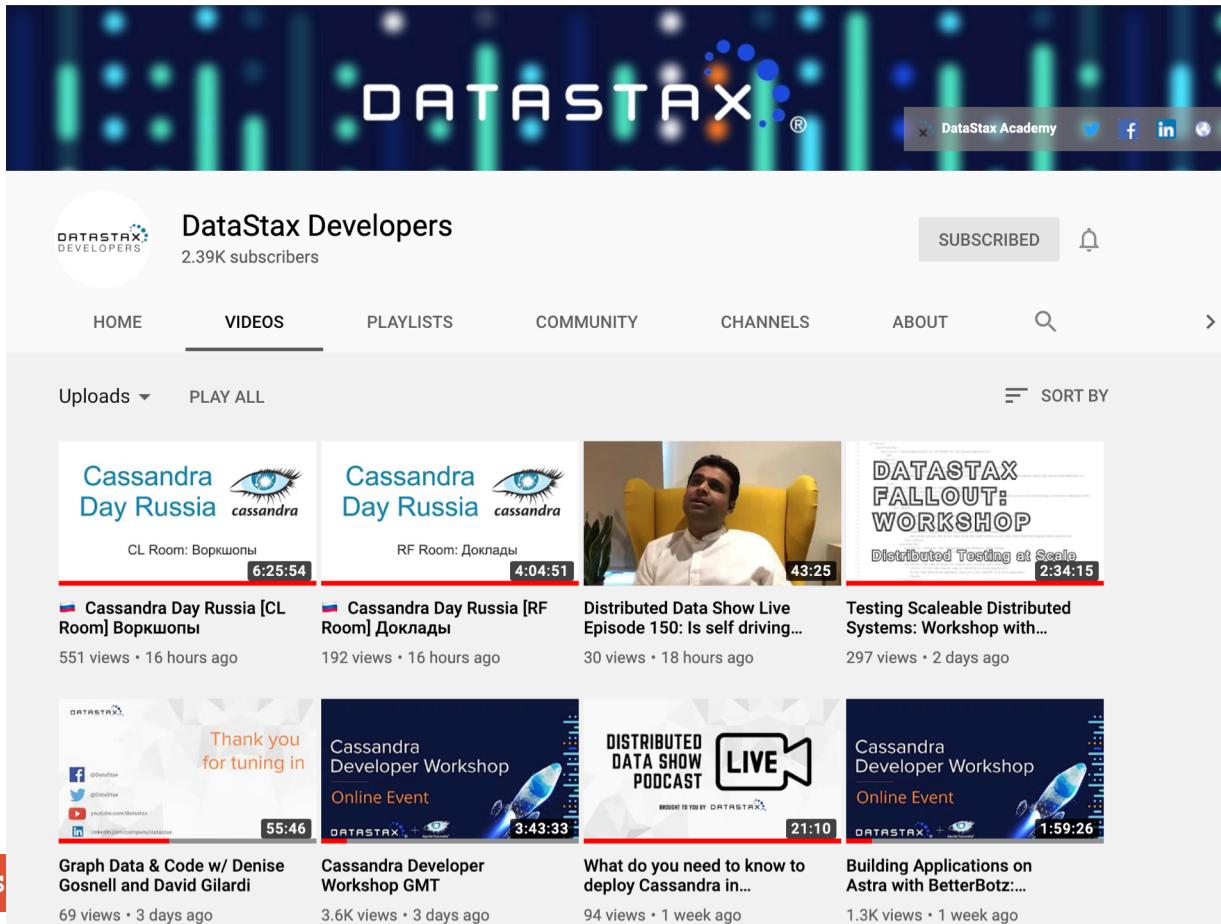
JavaFest 2020

Support code for talk Java Fest 2020



# DataStax Developers on Youtube

- <https://www.youtube.com/channel/UCAIQY251avaMv7bBv5PCo-A>



The screenshot shows the YouTube channel page for "DataStax Developers". The channel has 2.39K subscribers and is marked as "SUBSCRIBED". The "VIDEOS" tab is selected, showing the following content:

- Cassandra Day Russia [CL Room] Воркшопы** (6:25:54) - 551 views • 16 hours ago
- Cassandra Day Russia [RF Room] Доклады** (4:04:51) - 192 views • 16 hours ago
- Distributed Data Show Live Episode 150: Is self driving...** (43:25) - 30 views • 18 hours ago
- DATASTAX FALLOUT: WORKSHOP Distributed Testing at Scale** (2:34:15) - 297 views • 2 days ago
- Thank you for tuning in** (55:46) - 96 views • 3 days ago
- Cassandra Developer Workshop Online Event** (3:43:33) - 3.6K views • 3 days ago
- DISTRIBUTED DATA SHOW PODCAST LIVE** (21:10) - 94 views • 1 week ago
- Cassandra Developer Workshop Online Event** (1:59:26) - 1.3K views • 1 week ago

```
switch(SpringBoot.api()) { Case RES
```

# Sample CODES

Micro-service REST

{ REST }

<https://bit.ly/31RL62I>

Micro-service GraphQL



<https://bit.ly/2MVicup>



Micro-service GRPC

<https://bit.ly/2pofk0b>

Micro-service Kafka



<https://bit.ly/2JwsFdM>



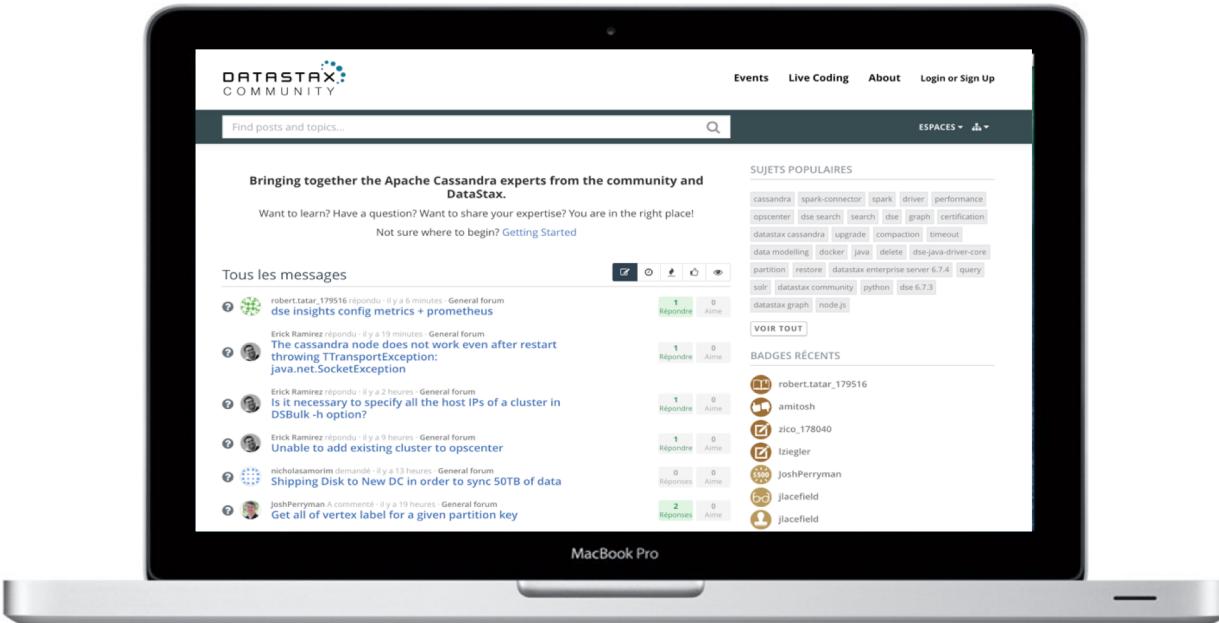
Reactive with Webflux

<https://bit.ly/34ePzhL>



Micro-service Serverless

<https://bit.ly/31VQz8G>





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THANK YOU ! (@clunven)

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