

DATASTAX

DEVELOPERS

Build a clone of Good Reads with Spring Framework

Application Built in Collaboration with

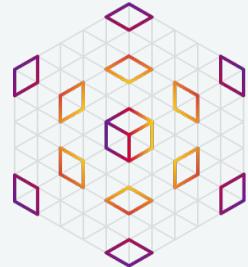
javabrains.io



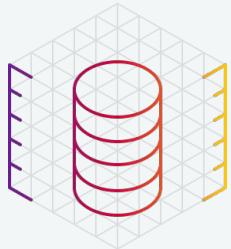


› Cédrick Lunven

Director of Developer Relations



- ❖ Trainer
- ❖ Public Speaker
- ❖ Developers Support
- ❖ Developer Applications
- ❖ Developer Tooling
- ❖ Creator of ff4j (ff4j.org)
- ❖ Maintainer for 8 years+
- ❖ Implementing APIs for 8 years



› Aaron Ploetz

DBRE/Developer Advocate



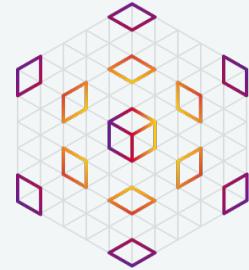
@aploetz



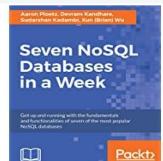
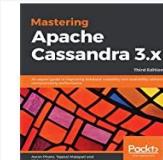
@aaronploetz

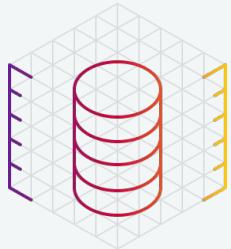


@aploetz

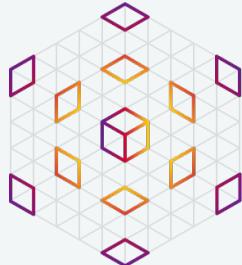


- ❖ DB Engineer, Author
- ❖ 3x Cassandra MVP
- ❖ Former SWE/DevOps/DB Lead
@ W.W. Grainger & Target
- ❖ Worked as an author on:
 - Mastering Apache Cassandra 3.x
 - Seven NoSQL Databases in a Week





» Agenda



01

HouseKeeping
Live and Hands-On

02

System Design
Use Case and Technologies

03

Database Setup
Instance, Schema, Data

04

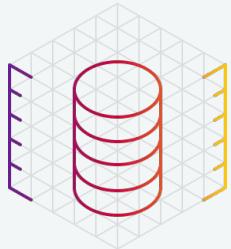
Connect and Use Data
SDK Spring Data

05

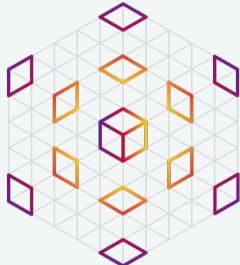
Web and Security
Controllers, Views, OAuth

06

What's next?
Homework, next sessions



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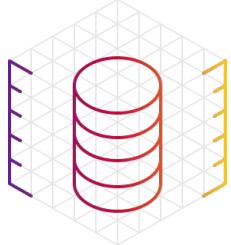
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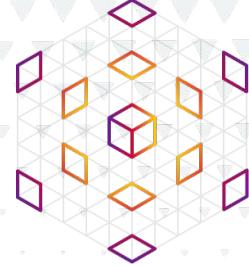
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Homework, next sessions



Advocate Team



Cedrick
Lunven



David
Dieruf



Aaron
Ploetz



Kirsten
Hunter



Artem
Chebotko



Aleksandr
Volochnev

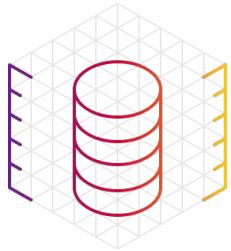


Mary
Grygleski



Stefano
Lottini

» Live & Interactive



youtube.com/DataStaxDevs

Live!

Agenda

01 PetClinic Architecture & Use Case	02 DataStax Astra Cassandra Database The Art of Data Modeling	03 Reactive Drivers Reactive vs Async
04 Spring Reactive Boot and WebFlux	05 User Interface Angular	06 Game & Resources

DataStax Developers



YouTube

!menti

How much experience do you have with the **Spring Framework**?

Quiz!

Experience Level	Percentage
Never heard about it.	41%
I know the concepts.	24%
I have already used it.	10%
I use it regularly.	25%

DataStax Developers



Mentimeter

!discord

Help!

Discord Developers

#workshop-chat

Java 17 is now available. I'm curious if anyone has tried it out yet. I've been using it for a few days now and it's been great! I've noticed some performance improvements and better memory management. What are your thoughts? #workshop-chat

David Jones-Gland

Hi! I'm new to Java 17 and I'm having trouble understanding how to use futures. Can someone help me out? #workshop-chat

Eric Lerner

With the workshop bootstrap, it's ok to run it in background too. It's ok to do it in foreground too. It depends on some programming background. If you do it in background, otherwise, it will be very difficult for you to understand the concept. #workshop-chat

Isaac

I am planning to transition as machine learning but I don't know if I should enrol in a university. But now, we can just build app with no code. What makes it different? #workshop-chat

They're not "seen how to progress"

David Jones-Gland they're not "seen how to progress"

Isaac

Isaac, my requirement is the same though. I mean faster. But Java 17 and functional is way better. Like in functional and has better #workshop-chat

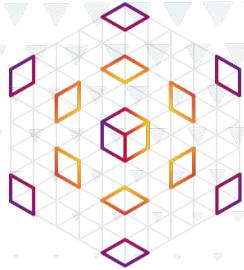
I don't know anyone what I am doing. Just really want to get out from poverty. #workshop-chat

David Jones-Gland I believe the issue is with the volume result. I commented that I did not, and was able to start with containers. #workshop-chat

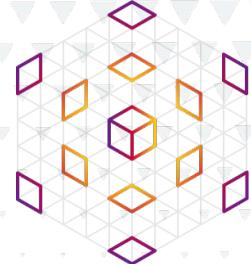
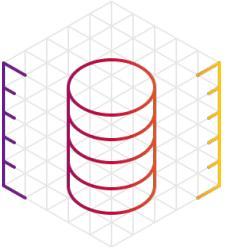
David Jones-Gland I'm unable to run the 2 containers and still facing the same issue of futures. #workshop-chat



Discord (#workshop-chat)



› Hands-on housekeeping



Source code + exercises + slides

A screenshot of a GitHub repository page for 'datastax-astra-workshop-repo'. The repository has 177 commits ahead of 'stargate'. It shows a list of files including 'github-workflows', 'functions', 'public', 'src', 'src/main/resources', 'src/test/java', 'src/test/resources', and 'README'. There are 200 commits in total, with the most recent being 'serial' 16 days ago.

IDE

A screenshot of an IDE showing the code for 'StargateDemoApplication.java'. The code includes imports for org.springframework.boot.SpringApplication, org.springframework.boot.autoconfigure.SpringBootApplication, and org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext. It defines a main method with annotations @SpringBootApplication and @SpringBootConfiguration. The code ends with a command to run the application: SpringApplication.run(StargateDemoApplication.class, args);.

```
StargateDemoApplication.java
1 package com.datastax.demo.stargate;
2
3 import org.springframework.boot.SpringApplication;
4 import org.springframework.boot.autoconfigure.SpringBootApplication;
5 import org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext;
6 import org.springframework.boot.context.embedded.EmbeddedServletContainerCustomizer;
7 import org.springframework.boot.context.embedded.tomcat.TomcatServletContainerCustomizer;
8 import org.springframework.boot.context.embedded.tomcat.TomcatWebServer;
9 import org.springframework.boot.web.support.SpringBootServletInitializer;
10
11 @SpringBootApplication
12 @SpringBootConfiguration
13 public class StargateDemoApplication {
14     public static void main(String[] args) {
15         SpringApplication.run(StargateDemoApplication.class, args);
16     }
17 }
```

GitHub

!github

Gitpod

!gitpod

Database + Api + Streaming



DATASTAX

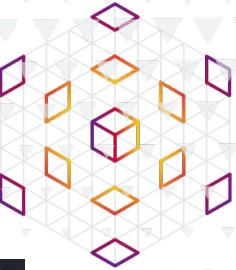
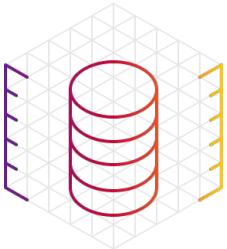
ASTRA DB

!astra

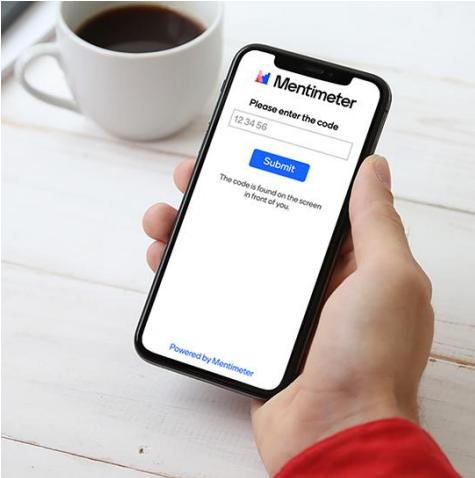
DATASTAX DEVELOPERS

Nothing to install !

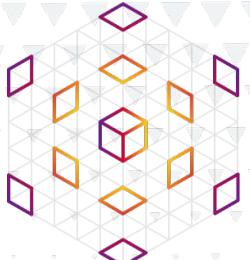
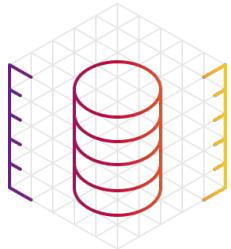
➤ "Menti" for survey and quiz



!menti



menti.com ⇒ enter code
Don't answer in YT chat
Look at phone (not at YT)
Keep it open for later



› Achievement unlocked!



BetterReads, clone of goodReads with Spring Workshop

Awarded to [REDACTED]

Issued on 9 Mar 2022 at 11:56 am

This badge confirms that the participant attended the "Build a clone of GoodReads with Spring" Workshop, successfully completed the lab and the test, and should have a basic knowledge of how to create a secured full stack application that scales with Spring.



Verified

Last verified by Canvas Badges on 20 Feb 2023

[Re-verify Badge](#)

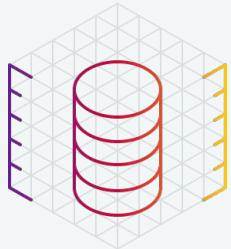
Offered by
[DataStax Developers](#)



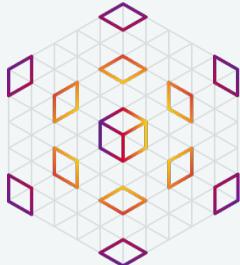
Only 10 redeemed!



Demo



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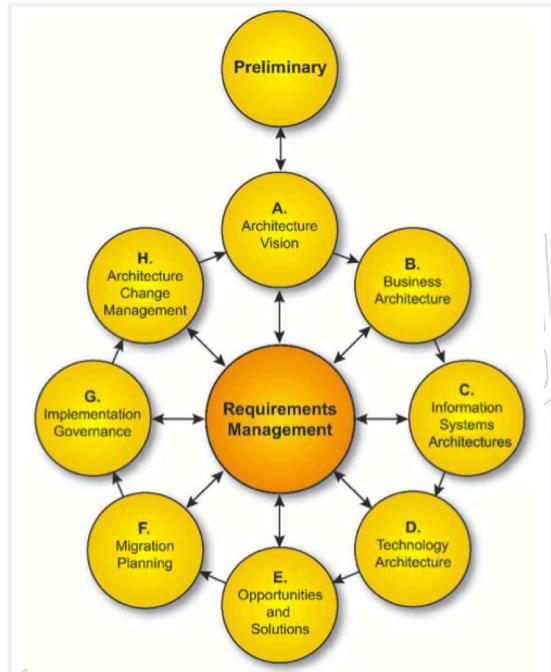
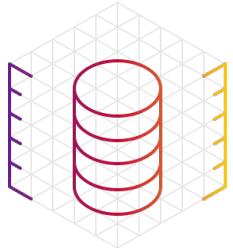
Controllers, Views, OAuth

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What's next?

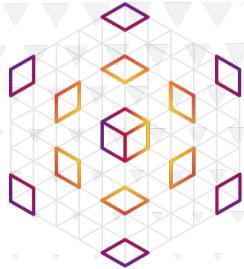
Homework, next sessions

➤ Architecture Vision



Find, get, and share books you love with everyone in the world, in realtime and all in a single application.

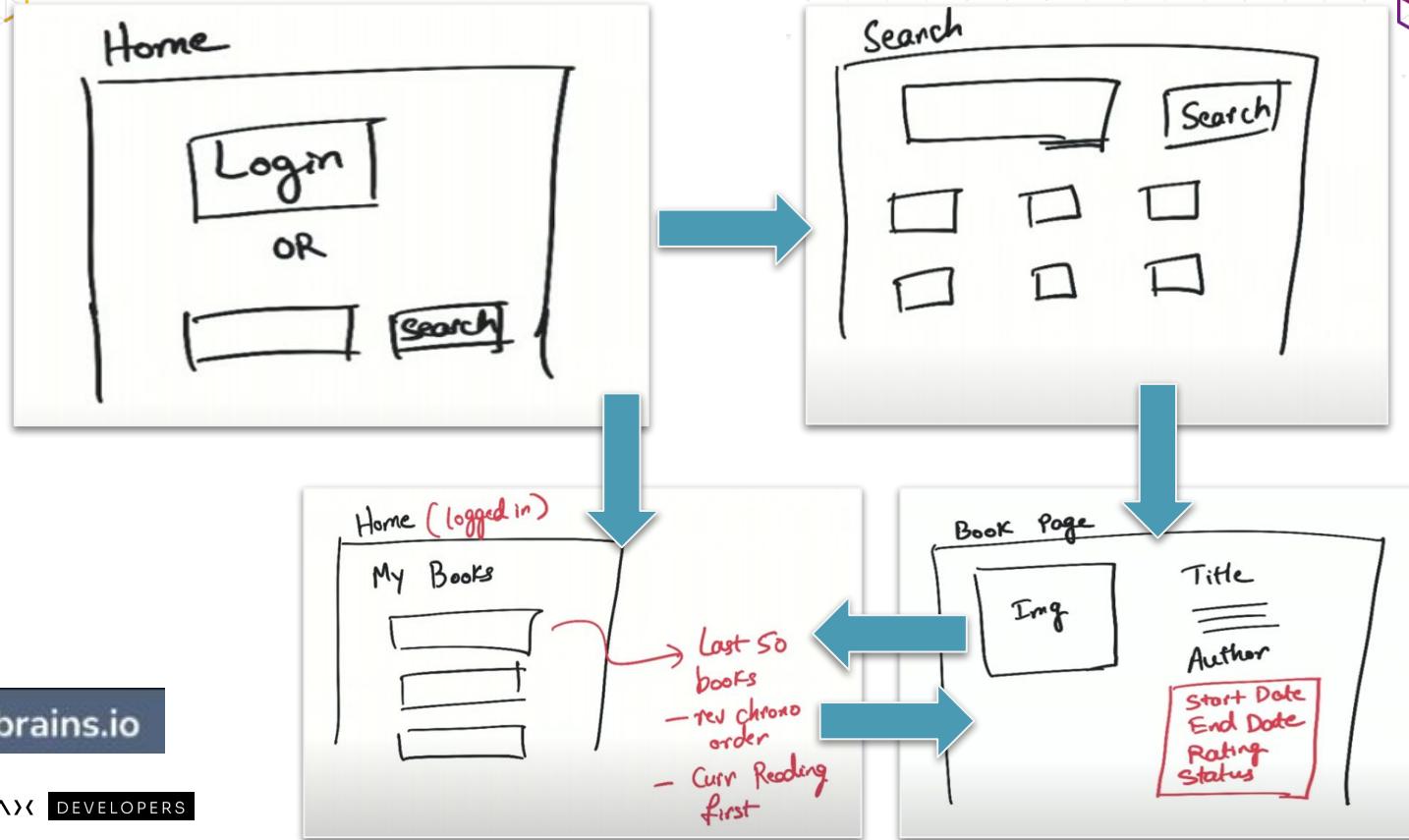
(...a clone of Good Reads)



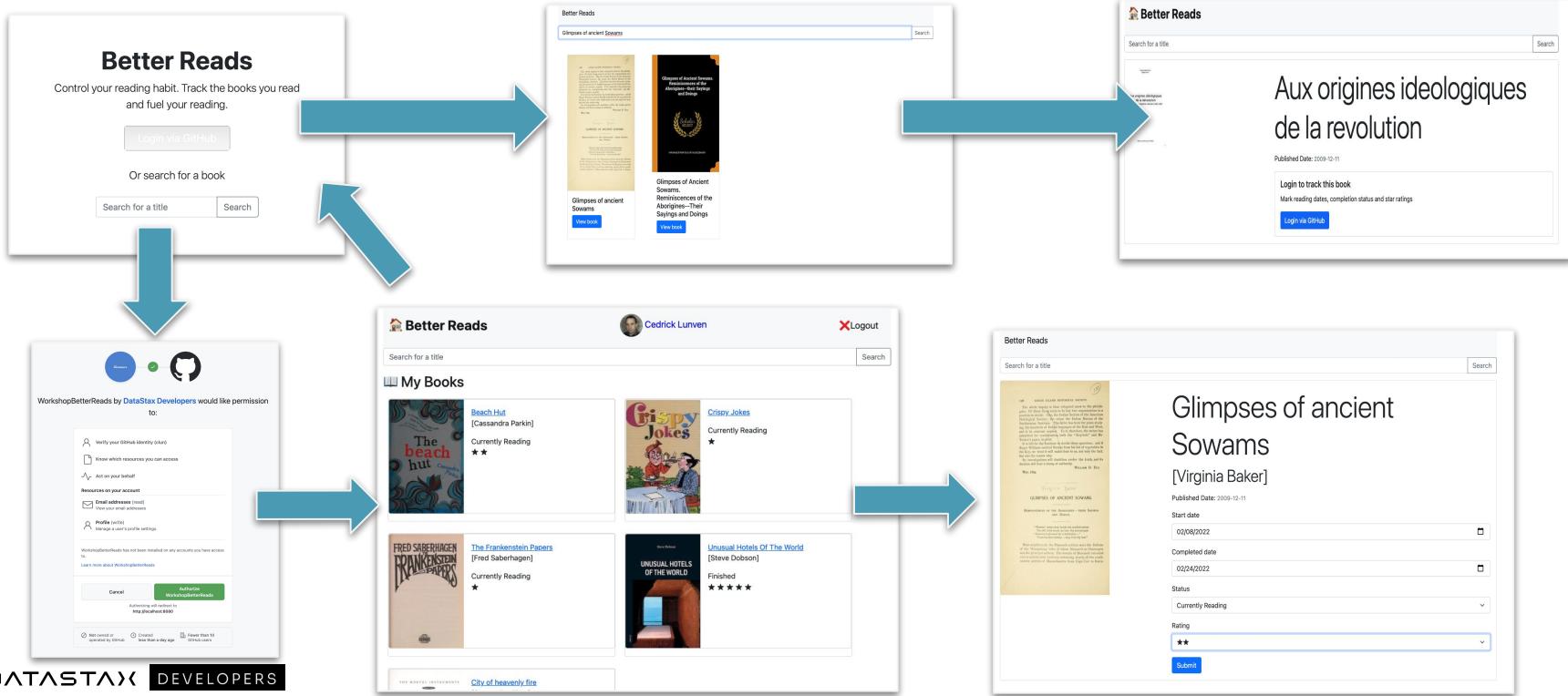
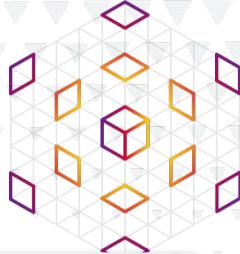
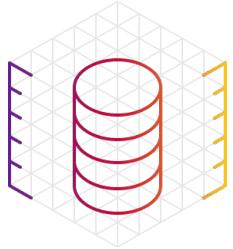
Discover books you'll love

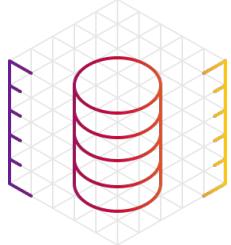


Business Architecture



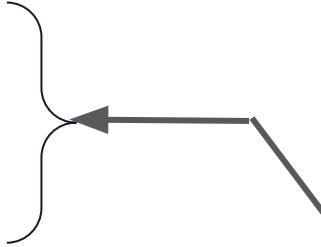
› Business Architecture



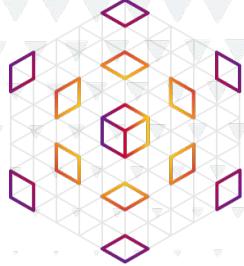


› Information System

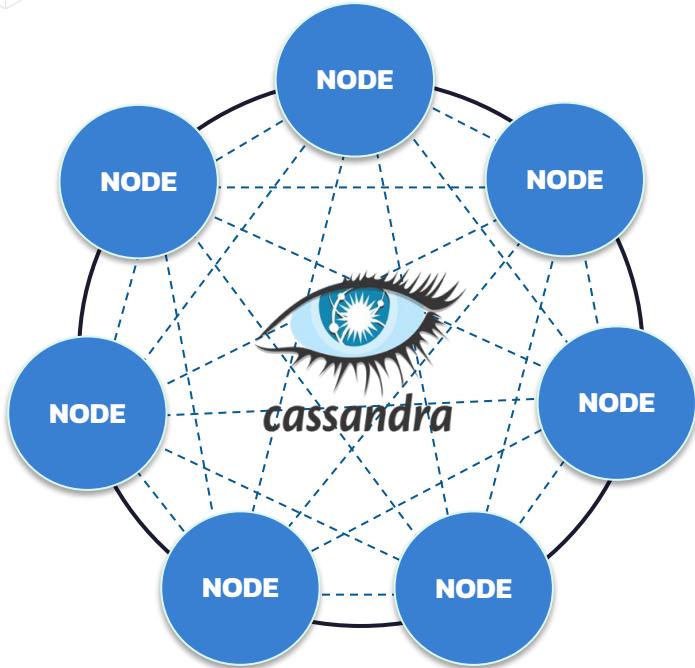
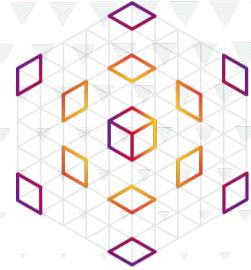
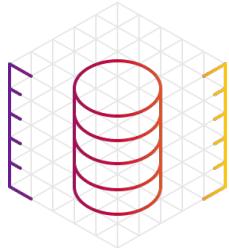
- *Web app*
- *Focus on Backend*
- *Single Language*
- *Known Framework*



Thymeleaf

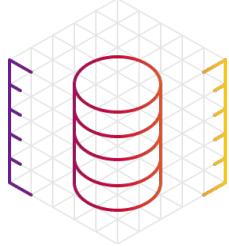


› Apache Cassandra Overview

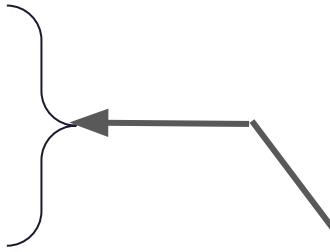


- Big Data Ready
- Read / Write Performance
- Linear Scalability
- Highest Availability
- Self-Healing and Automation
- Geographical Distribution
- Platform Agnostic
- Vendor Independent

› Information System



- Web app
- Focus on Backend
- Single Language
- Known Framework



 Thymeleaf

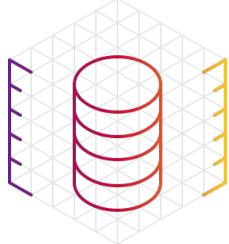


- Performant
- Reliable
- Large Data
- Geographic Distribution



NoSQL

› Information System



- Web app
- Focus on Backend
- Single Language
- Known Framework



 Thymeleaf



Better_reads



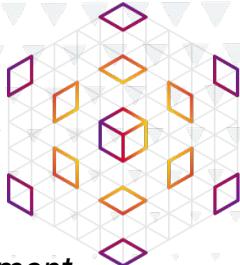
cassandra

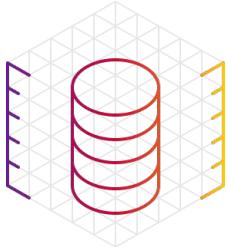
Not
Only SQL

- DataSet (dump)
- Image
- Search API

OPEN

LIBRARY





GRAPHQL API
Discoverability, Flexibility
Read only what you need

DOCUMENT API
Flexible Schema
Document-Oriented usages

REST API
Stateless, Interoperability
CRUD for Cassandra

GRPC API
Performance, Interoperability
Execute cql in the fastest way

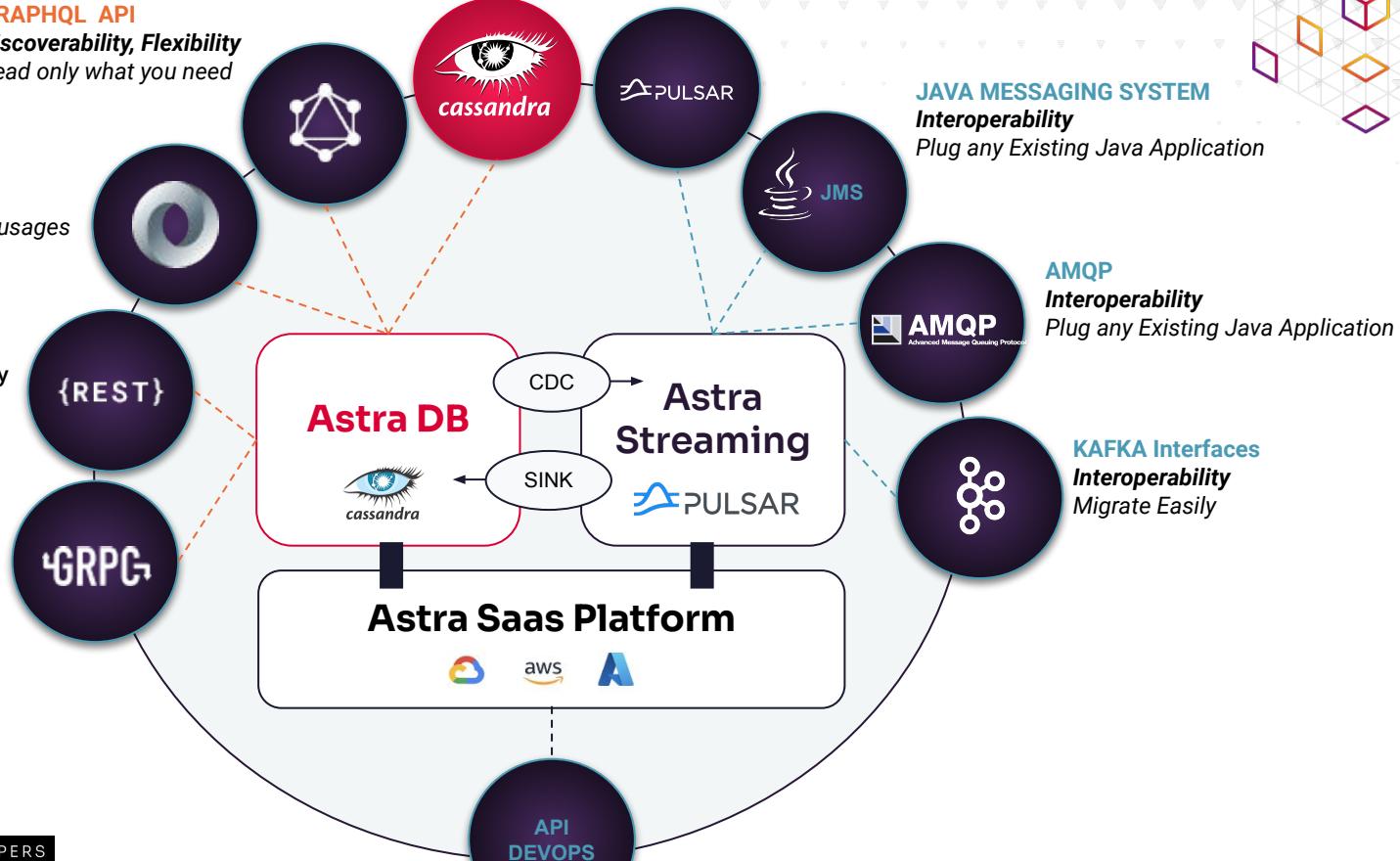
CQL API Compatibility
It is Apache Cassandra !

PULSAR CLIENT Compatibility
It is Apache Pulsar !

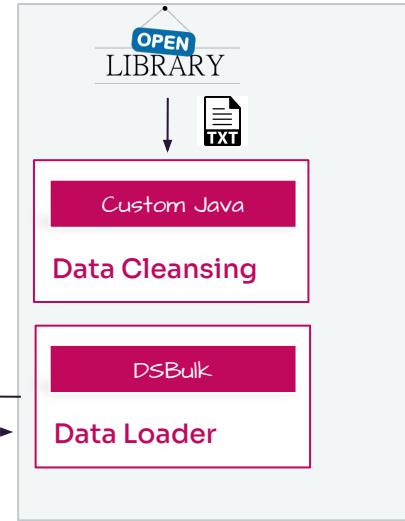
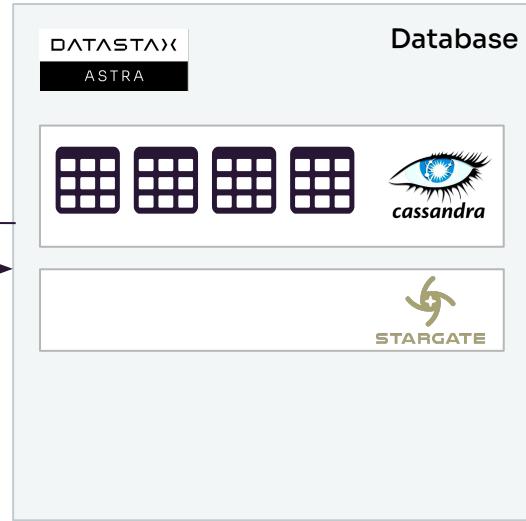
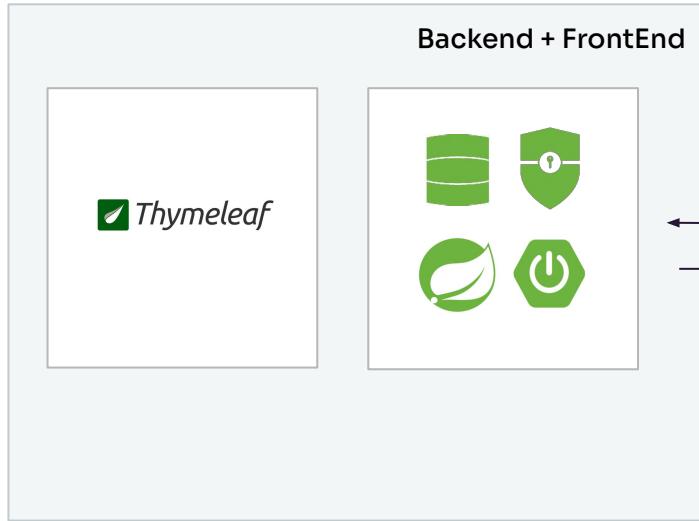
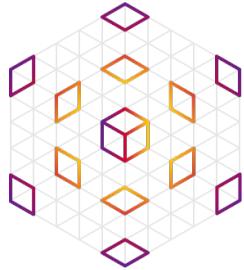
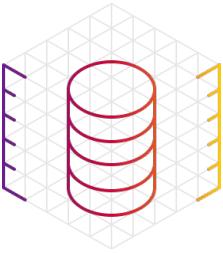
JAVA MESSAGING SYSTEM Interoperability
Plug any Existing Java Application

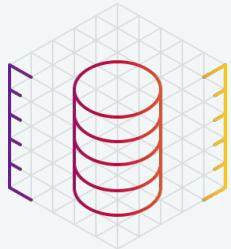
AMQP Interoperability
Plug any Existing Java Application

KAFKA Interfaces Interoperability
Migrate Easily

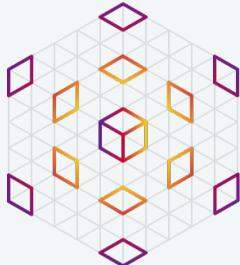


› Technology Architecture





› Agenda



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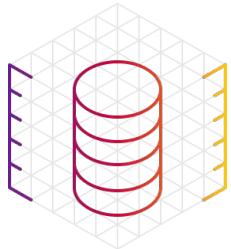
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What's next?

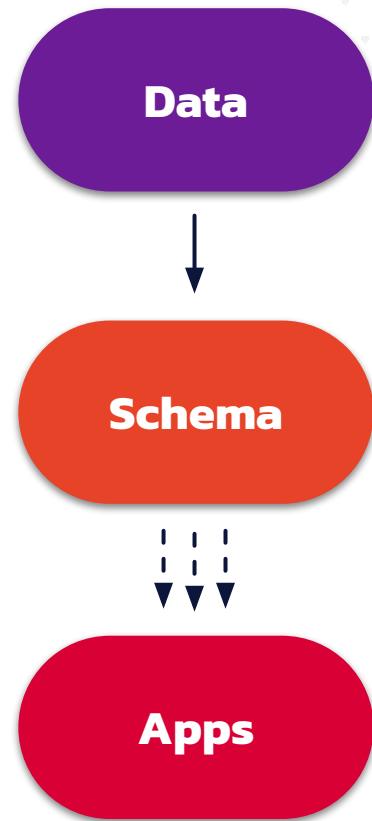
Homework, next sessions

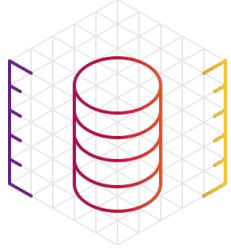


Relational vs NoSQL Schema

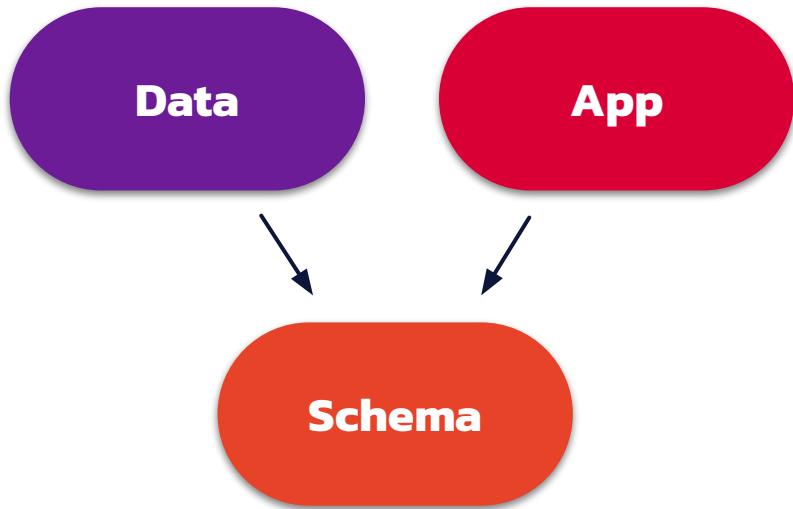
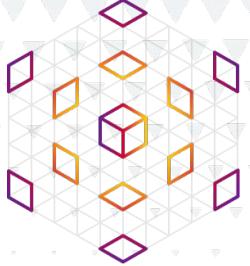


➤ Relational Database = Integration Database



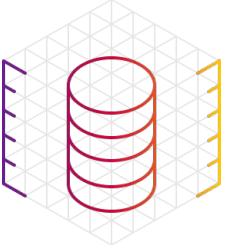


» NoSQL Database = Application Database



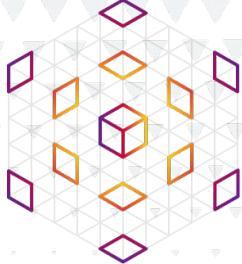


Data Modeling Methodology

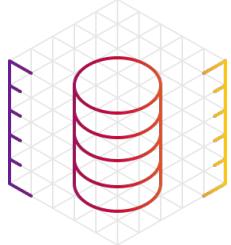


» What is Data Modeling ?

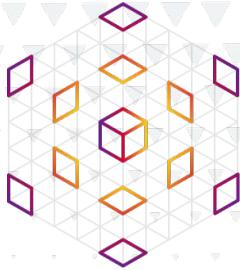
- Collection and analysis of **data requirements**
- Identification of participating entities and relationships
- Identification of data **access patterns**
- A particular way of **organizing** and structuring data
- Design and specification of a **database schema**
- Schema **optimization** and data **indexing** techniques



Data Quality: completeness consistency accuracy
Data Access: queryability efficiency scalability



» Cassandra Data Modeling Principles



Modeling principle 1: “**Know your data**”

- Key and cardinality constraints are fundamental to schema design

Modeling principle 2: “**Know your queries**”

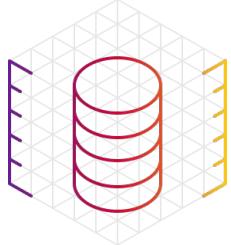
- Queries drive schema design

Modeling principle 3: “**Nest data**”

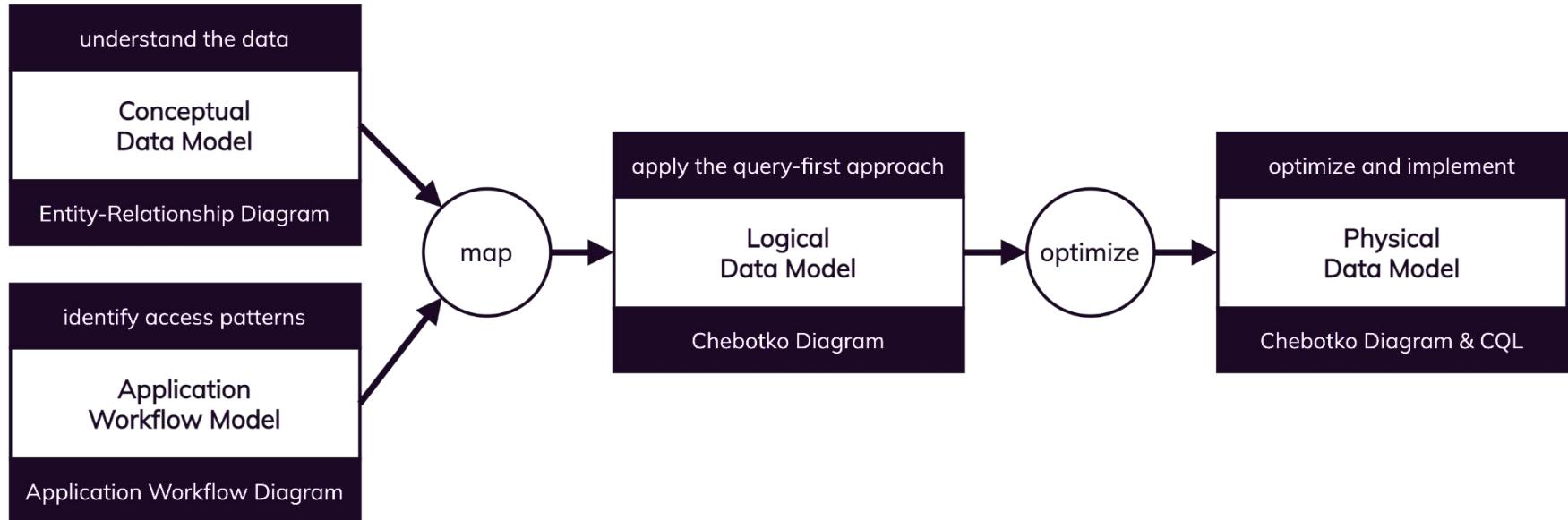
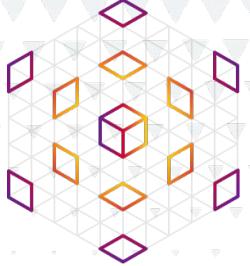
- Data nesting is the main data modeling technique

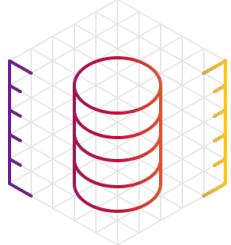
Modeling principle 4: “**Duplicate data**”

- Better to duplicate than to join

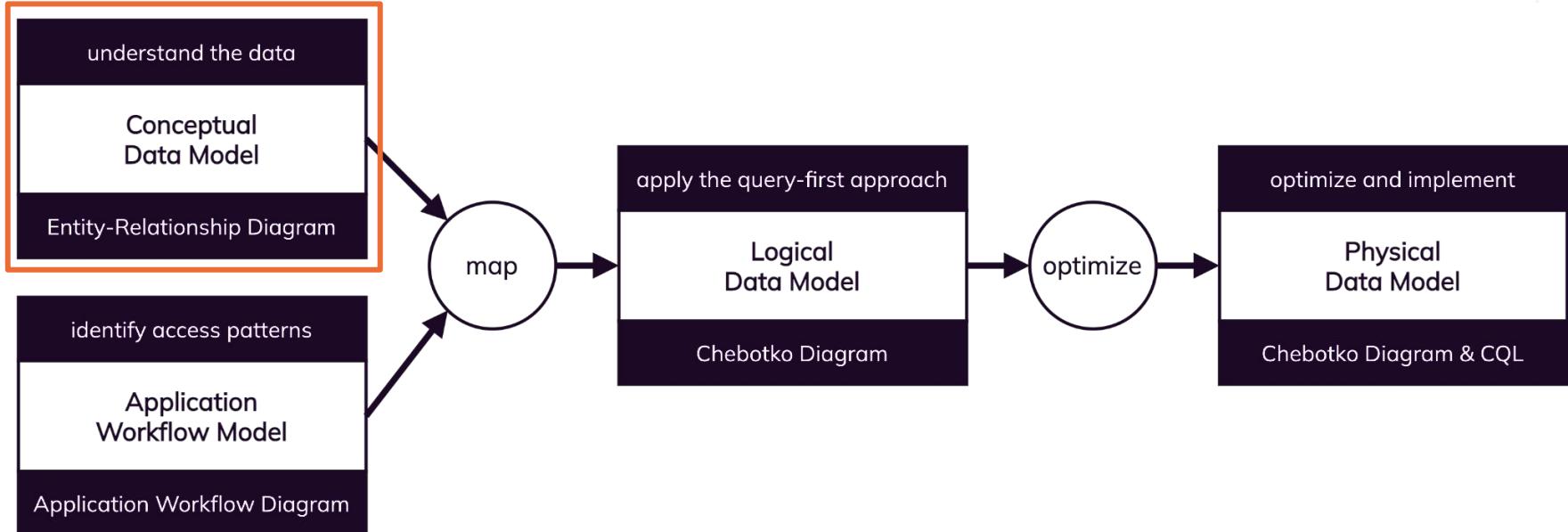
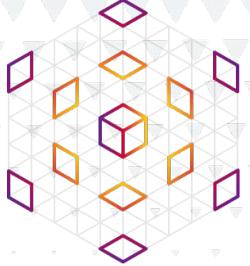


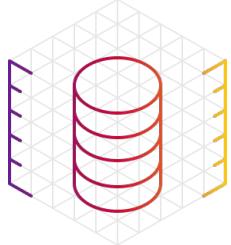
➤ Data Modelling Methodology



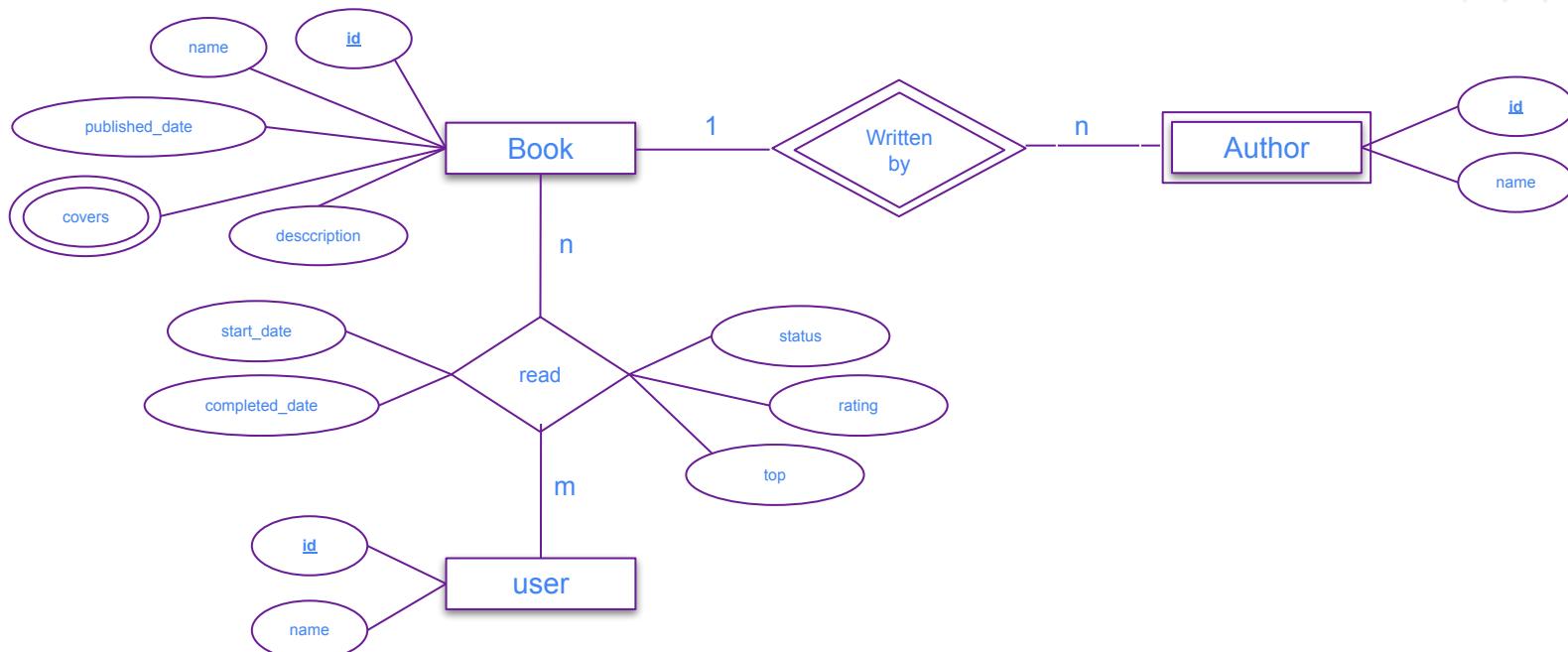
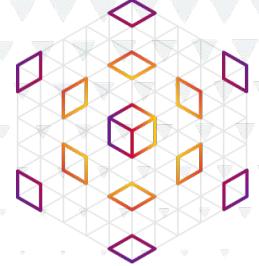


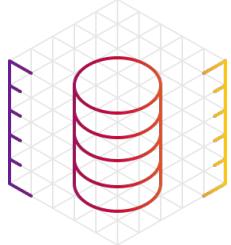
➤ Data Modelling Methodology



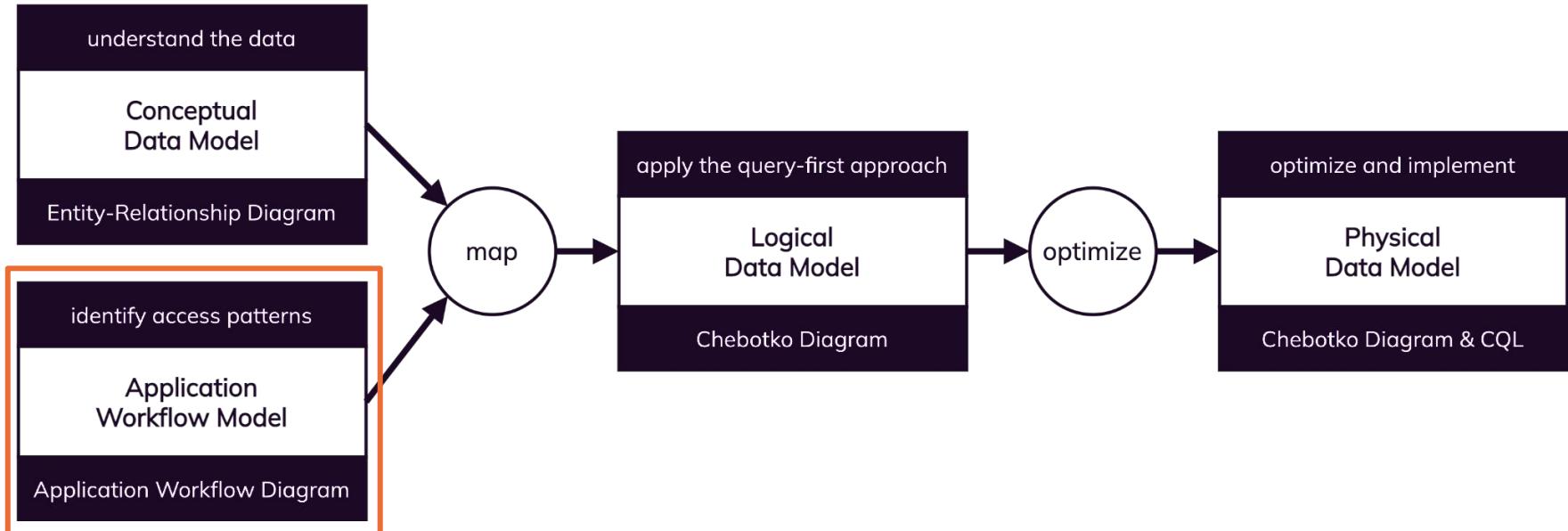
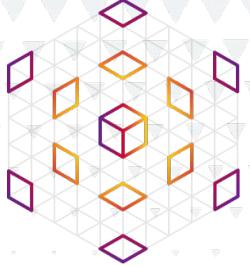


Entity relationship diagram

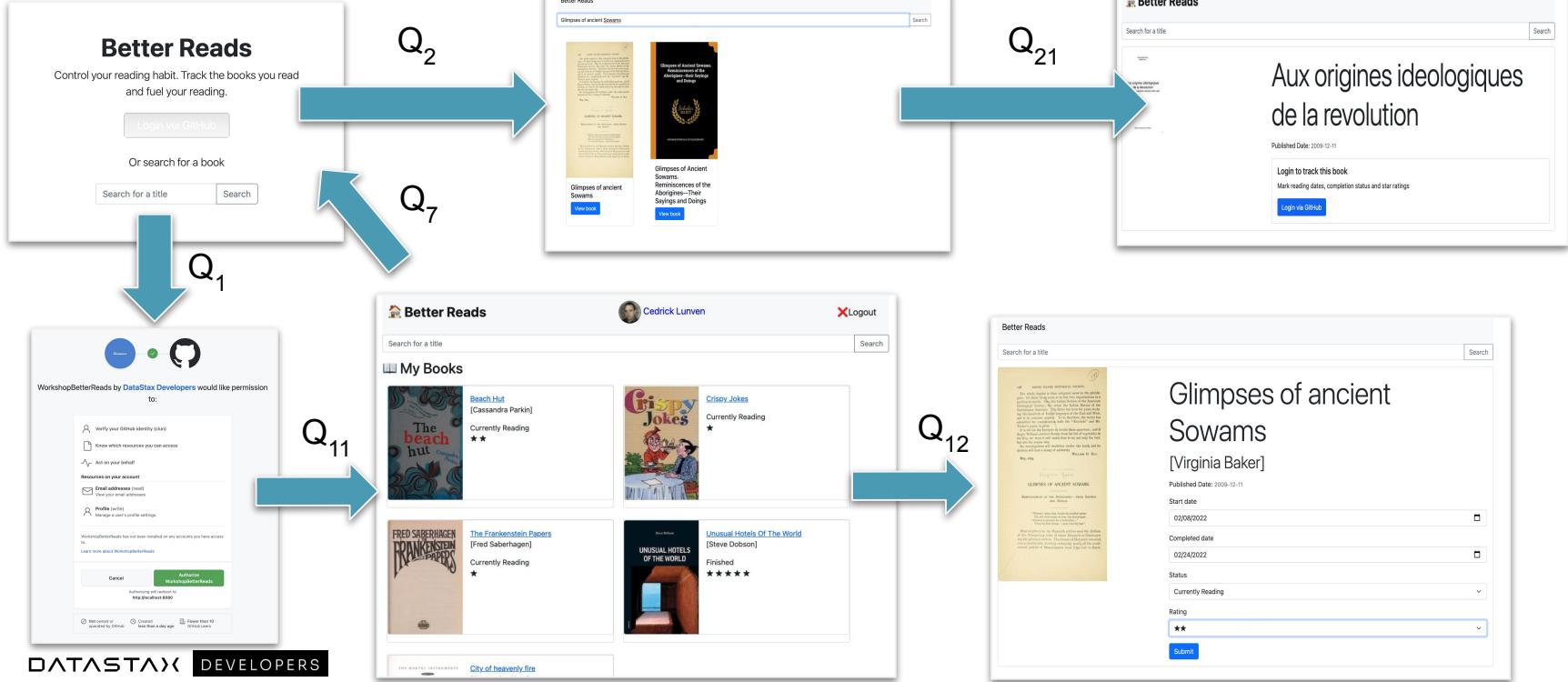
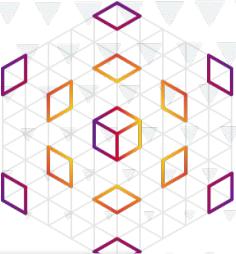
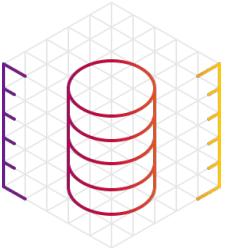


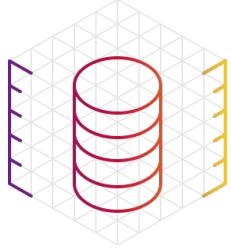


➤ Data Modelling Methodology

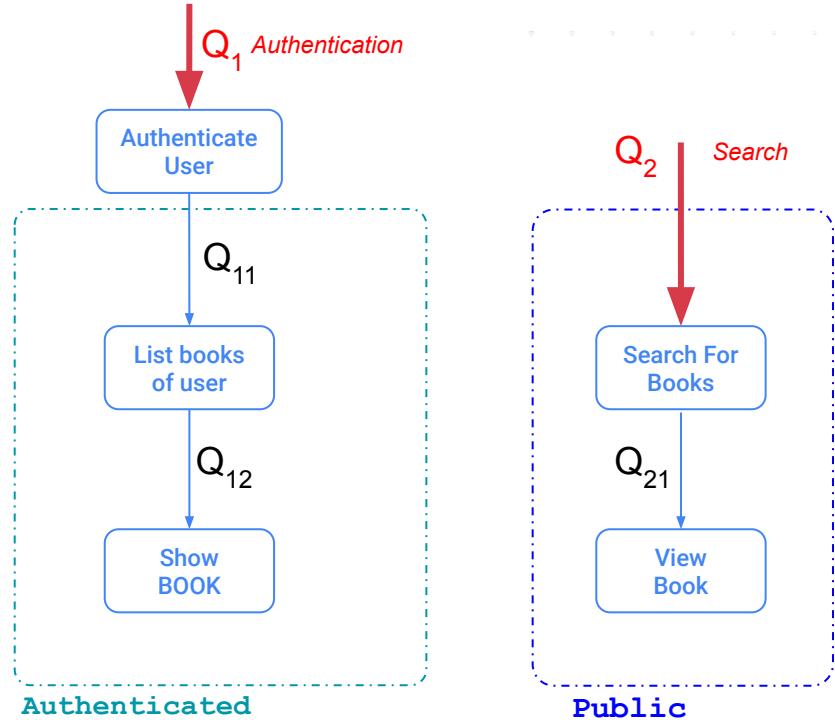


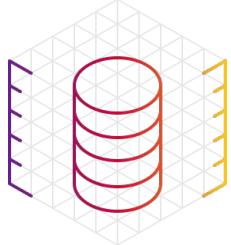
Application Workflow



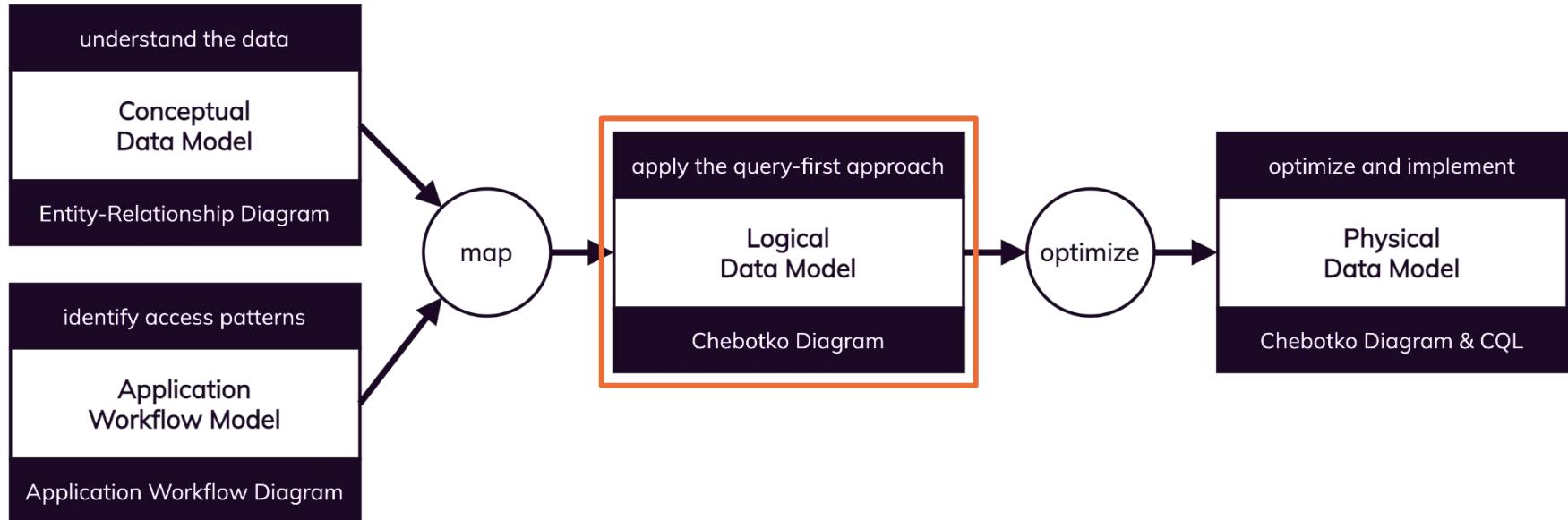
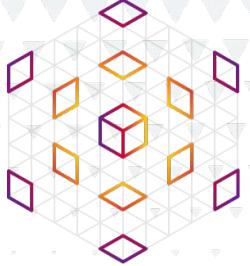


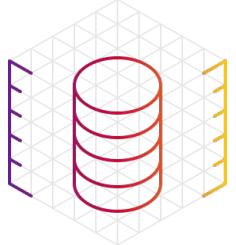
Application Workflow



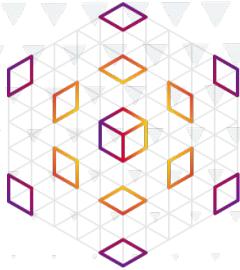
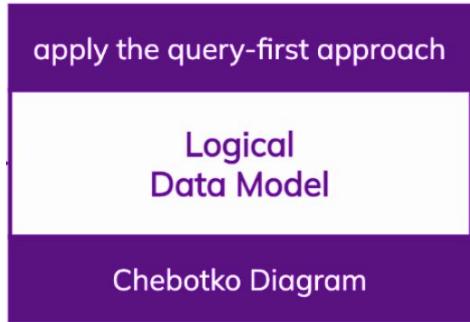


➤ Data Modelling Methodology

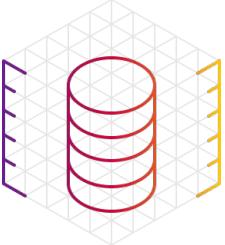




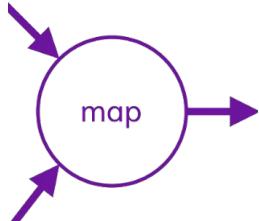
» Data Modeling Methodology: Step II



Design queries and build tables based on the queries



➤ Mapping Rules



Mapping rule 1: “Entities and relationships”

- Entity and relationship types map to tables

Mapping rule 2: “Equality search attributes”

- Equality search attributes map to the beginning columns of a primary key

Mapping rule 3: “Inequality search attributes”

- Inequality search attributes map to clustering columns

Mapping rule 4: “Ordering attributes”

- Ordering attributes map to clustering columns

Mapping rule 5: “Key attributes”

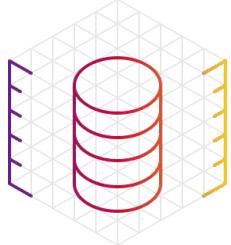
- Key attributes map to primary key columns

Based on
a conceptual
data model

Based on
a query

Based on
a conceptual
data model





Logical Data Model

Q₂₁

books_by_id

id K
author_ids
author_names
book_description
book_name
cover_ids
published_date

Q₁₂

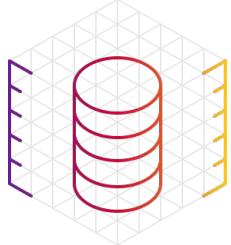
book_by_user

user_id K
readingstatus C↑
timeuuid C↓
book_id C↑
book_name
author_names
cover_ids
rating

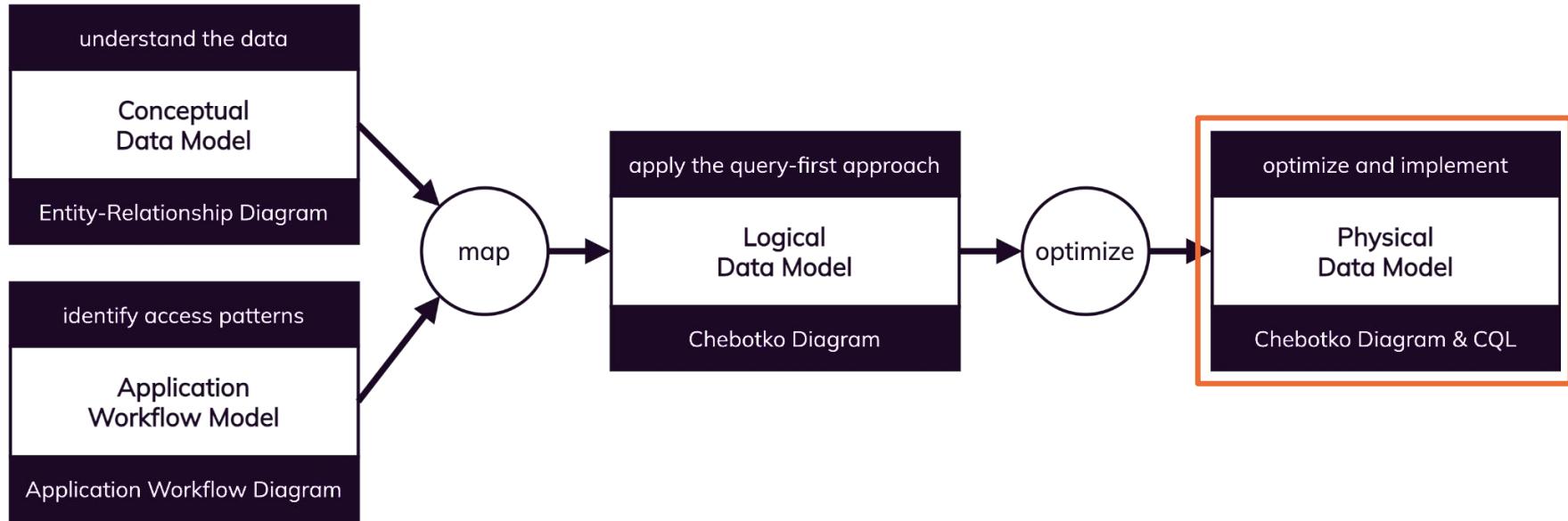
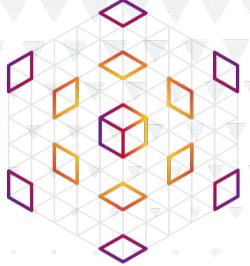
Q₁₁

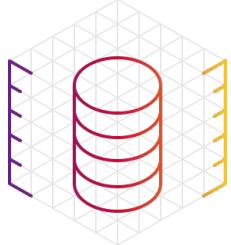
book_by_user_and_bookid

user_id K
book_id K
rating
reading_status
started_date
completed_date

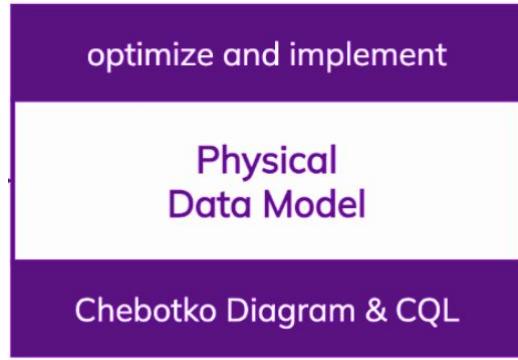


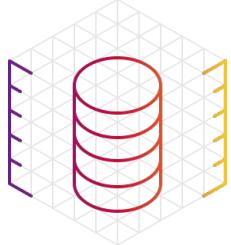
» Data Modelling Methodology



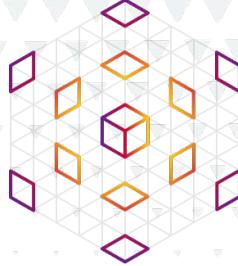


» Data Modeling Methodology: Step III



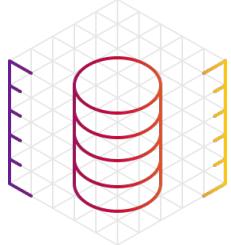


Optimization Techniques



- Partition size limits and splitting large partitions
- Data duplication and batches
- Indexes and materialized views*
- Concurrent data access and lightweight transactions*
- Dealing with tombstones*

* Explained in details at our free DS220 course at academy.datastax.com



➤ Physical Data Model

Q₂₁

books_by_id

id	text	K
author_ids	list<text>	
author_names	list<text>	
book_description	text	
book_name	text	
cover_ids	list<text>	
published_date	date	

Q₁₂

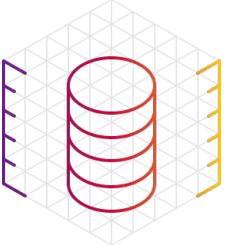
book_by_user_and_bookid

user_id	text	K
readingstatus	text	
timeuuid	timeuuid	C↑
book_id	text	C↓
book_name	text	
author_names	list<text>	C↑
cover_ids	list<text>	
rating	int	

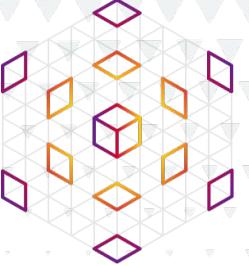
Q₁₁

book_by_user

user_id	text	K
book_id	text	K
rating	int	
reading_status	text	
started_date	date	
completed_date	date	



› Cassandra Query Language



```
CREATE TABLE better_reads.book_by_id (
    id              text,
    author_id       list<text>,
    author_names    list<text>,
    book_description text,
    book_name       text,
    cover_ids       list<text>,
    published_date  date,
    PRIMARY KEY((id))
);

CREATE TABLE better_reads.books_by_user (
    user_id         text,
    book_id         text,
    book_name       text,
    author_names    list<text>,
    cover_ids       list<text>,
    readingstatus   text,
    timeuuid        timeuuid,
    rating          int,
    PRIMARY KEY ((user_id), readingstatus, timeuuid, book_id)
) WITH CLUSTERING ORDER BY (readingstatus ASC, timeuuid DESC, book_id ASC);

CREATE TABLE better_reads.book_by_user_and_bookid (
    user_id         text,
    book_id         text,
    rating          int,
    reading_status  text,
    started_date    date,
    completed_date  date,
    PRIMARY KEY ((user_id, book_id))
);
```



Lab 1

Database Initialization

1.1 Create Astra Instance

1.2 Create Astra Token



Data Loading

Source

The screenshot displays three versions of the Open Library website's developer section:

- Developer Center (Home) | Web**: A general overview of the developer hub, featuring sections for "Classic Books" (with a thumbnail of a book cover), "Books for February" (with a thumbnail of a book cover), and "Partners". It includes a "Read" button and links to "Client Libraries" and "Contributing".
- Developer Center (Home) | Web**: A detailed view of the "Developer Center" page, showing the "Developer Center (Home) | Web" header and the "Books for February" section.
- Open Library Data Dumps**: A specific page for data dumps, last edited by [cavbb](#) on November 17, 2021. It lists various dump types and their descriptions:

Open Library Data Dumps

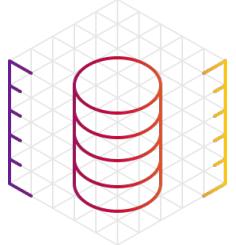
Last edited by [cavbb](#)
November 17, 2021 | [History](#) [Edit](#)

Open Library provides dumps of all its data, generated every month. All of the dumps are formatted as tab separated files with the following columns:

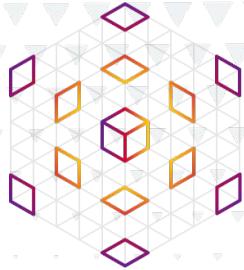
- type – type of record (/type/edition, /type/work etc.)
- key – unique key of the record. (/books/OL1M etc.)
- revision – revision number of the record
- last_modified – last modified timestamp
- JSON – the complete record in JSON format

Dumps:

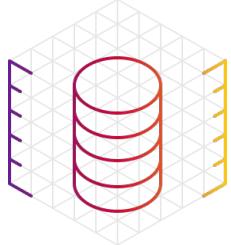
- [editions dump \(~ 7.0G\)](#)
- [works dump \(~ 2.0G\)](#)
- [authors dump \(~ 0.4G\)](#)
- [all_types dump \(~ 10.0G\)](#): includes editions, works, authors, redirects, etc.
- [complete dump \(~ 23.3G\)](#): also includes past revisions of all the records in Open Library
- [ratings dump \(~ .5G\)](#): with columns: "Work Key, Edition Key (optional), Rating, Date"
- [reading_log dump \(~ .20GB\)](#): with columns "Work Key, Edition Key (optional), Shelf Data"



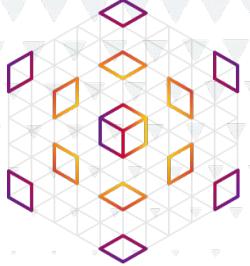
➤ Book Reference list



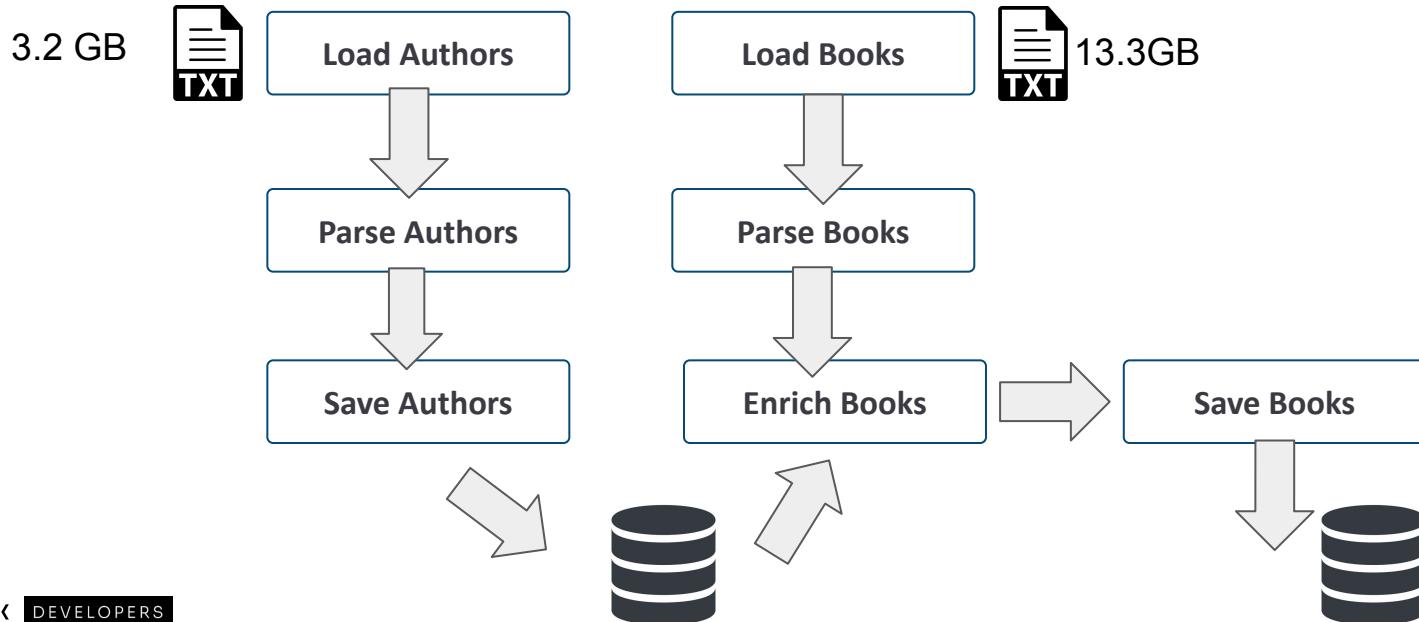
books_by_id	
id	K
author_ids	
author_names	
book_description	
book_name	
cover_ids	
published_date	

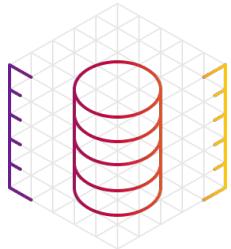


>Loading Dumps Workflow



- Authors containing : Author id and Author Names
- Works containing the Books informations and only author_id





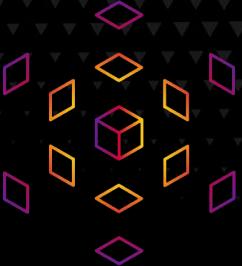
Load Dumps Demo



mvn test -Dtest=io.javabrains.betterreads.Test02_ImportDataSetWithSpring

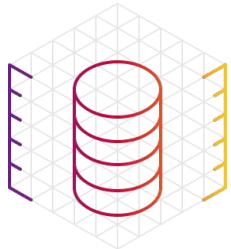
```
22:14:14.577 INFO com.datastax.astra.sdk.AstraClient : [AstraClient] has been initialized.  
1: Saving author: Colombe Plante  
2: Saving author: Cabanes/  
3: Saving author: Damenie Louis  
4: Saving author: Damenie Louis  
5: Saving author: Jerome Maran  
6: Saving author: Alain Renk  
7: Saving author: Francois G. Ricaud  
8: Saving author: Jacqueline Bregetzer  
9: Saving author: Jacky Loufrani  
10: Saving author: Brigitte Engammare  
11: Saving author: Mouret
```

See you in 10 days... for the 9M authors.
See you in 280 days.. For the 260M books...



Do not optimize too soon...
Should we do better ?
Can we do better ?
When is too soon?

Datastax Bulk



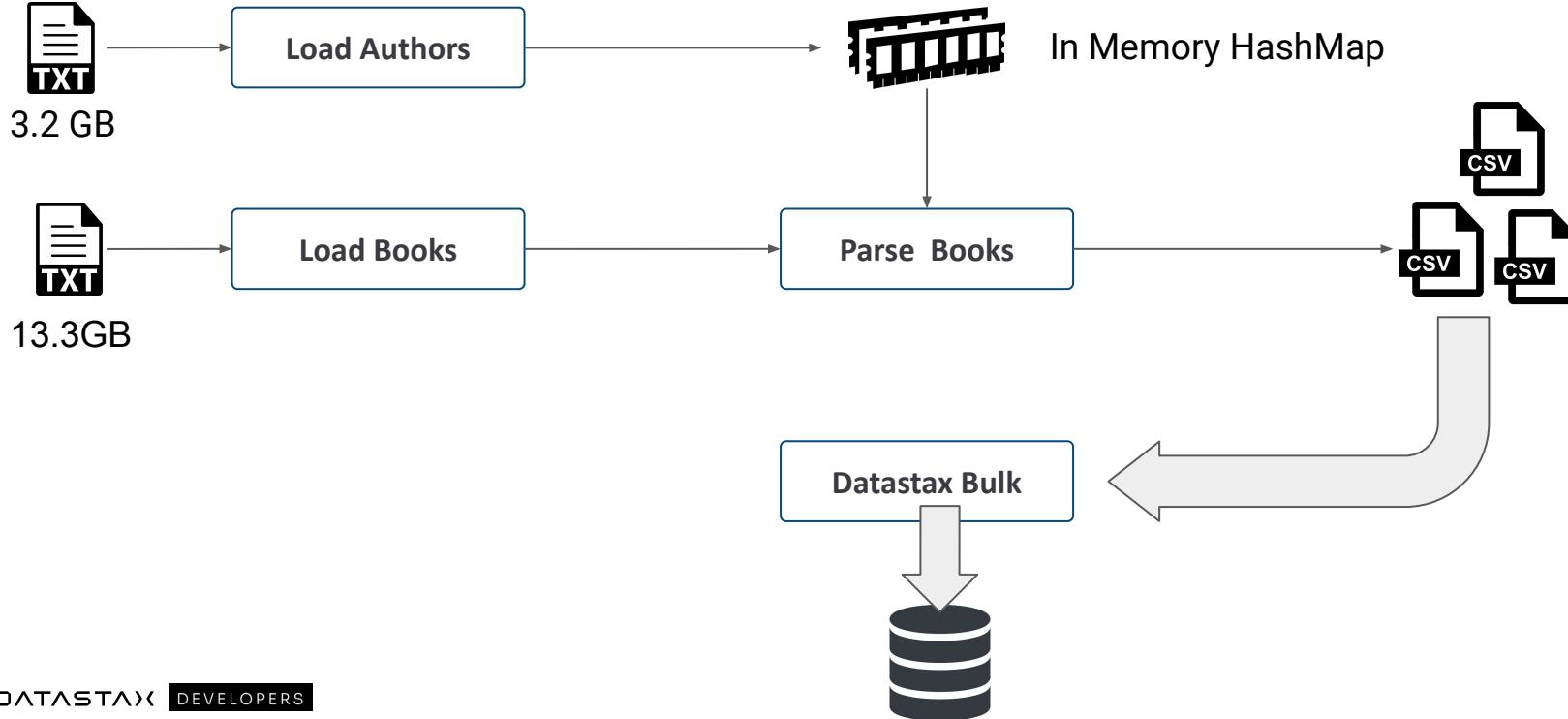
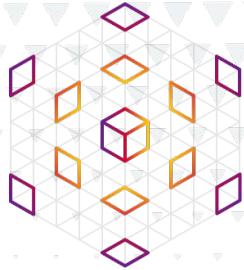
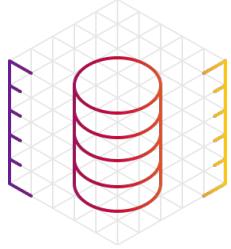
› DSBulk Unload

```
astra db unload workshops \
  -url /workspace/workshop-betterreads/export/ \
  -k better_reads
  -t book_by_id
```



id,author_id,author_names,book_description,book_name,cover_ids,published_date
OL10012695W,"[\"OL3979418A\", \"OL3979418A\"],[],Les écrits Bick,["\\"3162295\\\""],2009-12-11
OL1000768W,"[\"OL92956A\"],[],Spooksville - The Wicked,"[\"4648894\",\"4973718\",\"9206708\"],2009-12-09
OL10005850W,"[\"OL3971678A\"],[],L'espace rural au moyen age,"[\"5418328\"],2009-12-11
OL10003205W,"[\"OL3968648A\"],[],Manuel de pilotage de montgolfières,"[\"3146614\"],2009-12-11
OL10002825W,"[\"OL4954686A\"],[],Fragmentarium,"[\"3146154\"],2009-12-11
OL10009701W,"[\"OL3976143A\"],[],Traitement de données avec Excel,"[\"3158138\"],2009-12-1

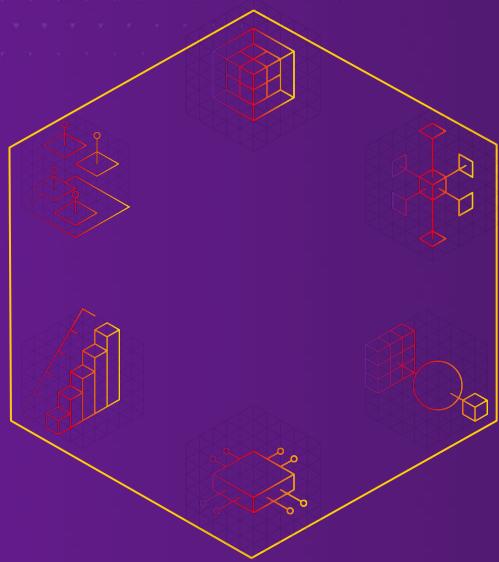
Generating CSV Files



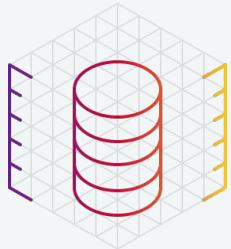


Lab 1

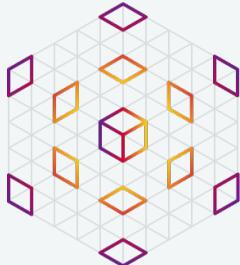
Database Initialization



- 1.3 - Open your environment**
- 1.4 - Setup Astra CLI**
- 1.5 - Create Database**
- 1.6 - Create Schema**
- 1.7 - Load Data**



» Agenda



01

HouseKeeping

Live and Hands-On

02

System Design

Use Case and Technologies

03

Database Setup

Instance, Schema, Data

04

Connect and Use Data

SDK Spring Data

05

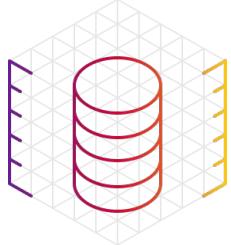
Web and Security

Controllers, Views, OAuth

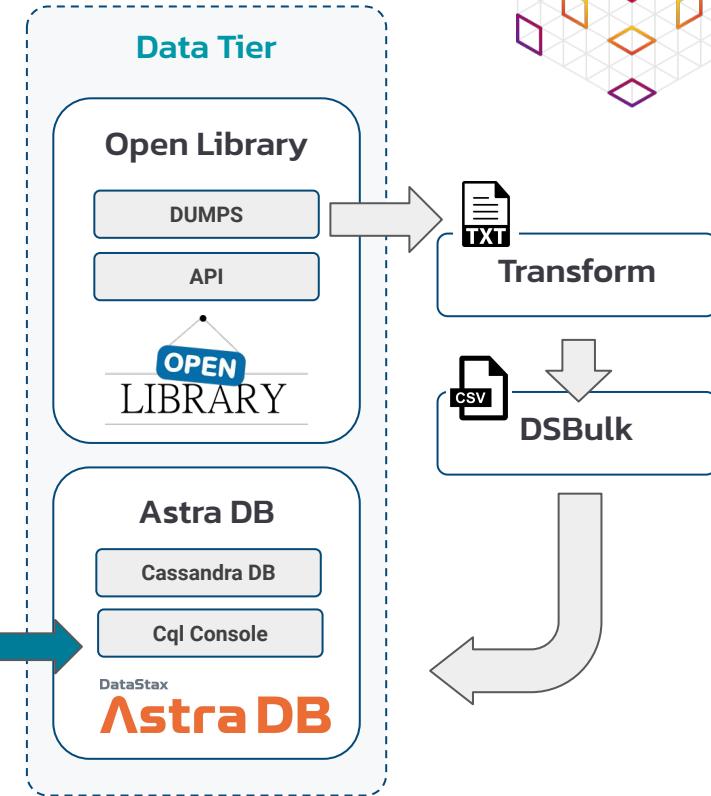
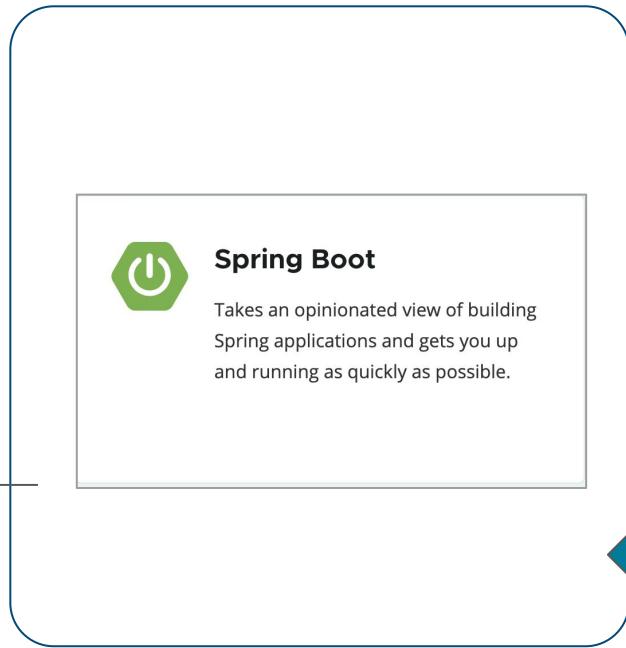
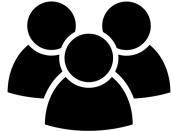
06

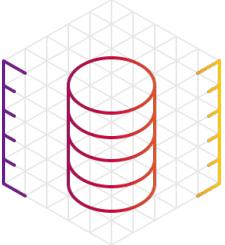
What's next?

Homework, next sessions

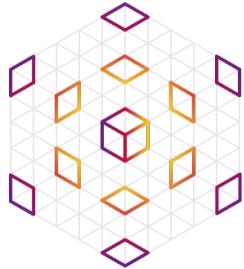


Architecture





Java Cassandra Drivers



Connectivity

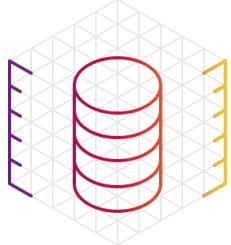
- Token & Datacenter Aware
- Load Balancing Policies
- Retry Policies
- Reconnection Policies
- Connection Pooling
- Health Checks
- Authentication | Authorization
- SSL

Query

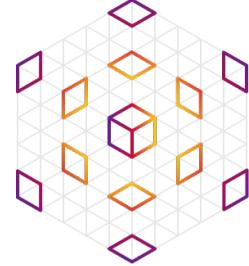
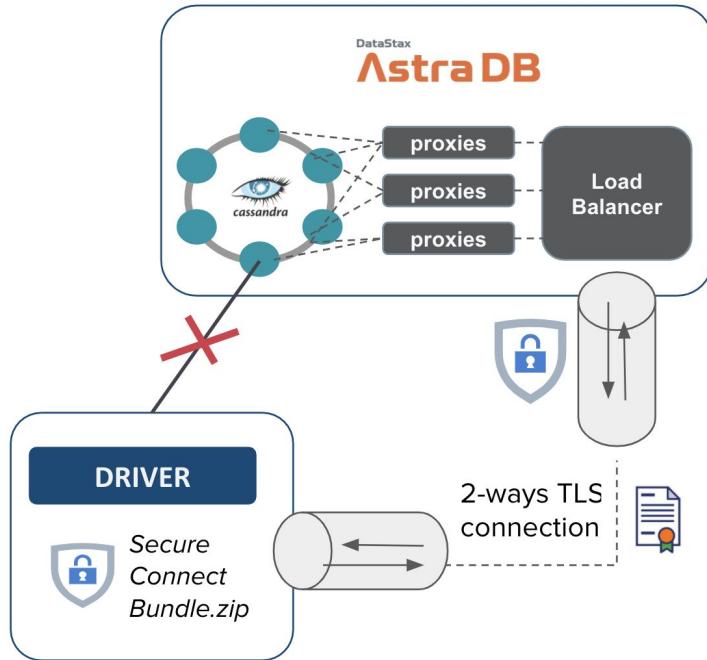
- CQL Support
- Schema Management
- Sync/Async/Reactive API
- Query Builder
- Compression
- Paging

Parsing Results

- Lazy Load
- Object Mapper
- Spring Support
- Paging

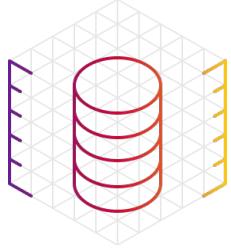


› Connecting to Astra

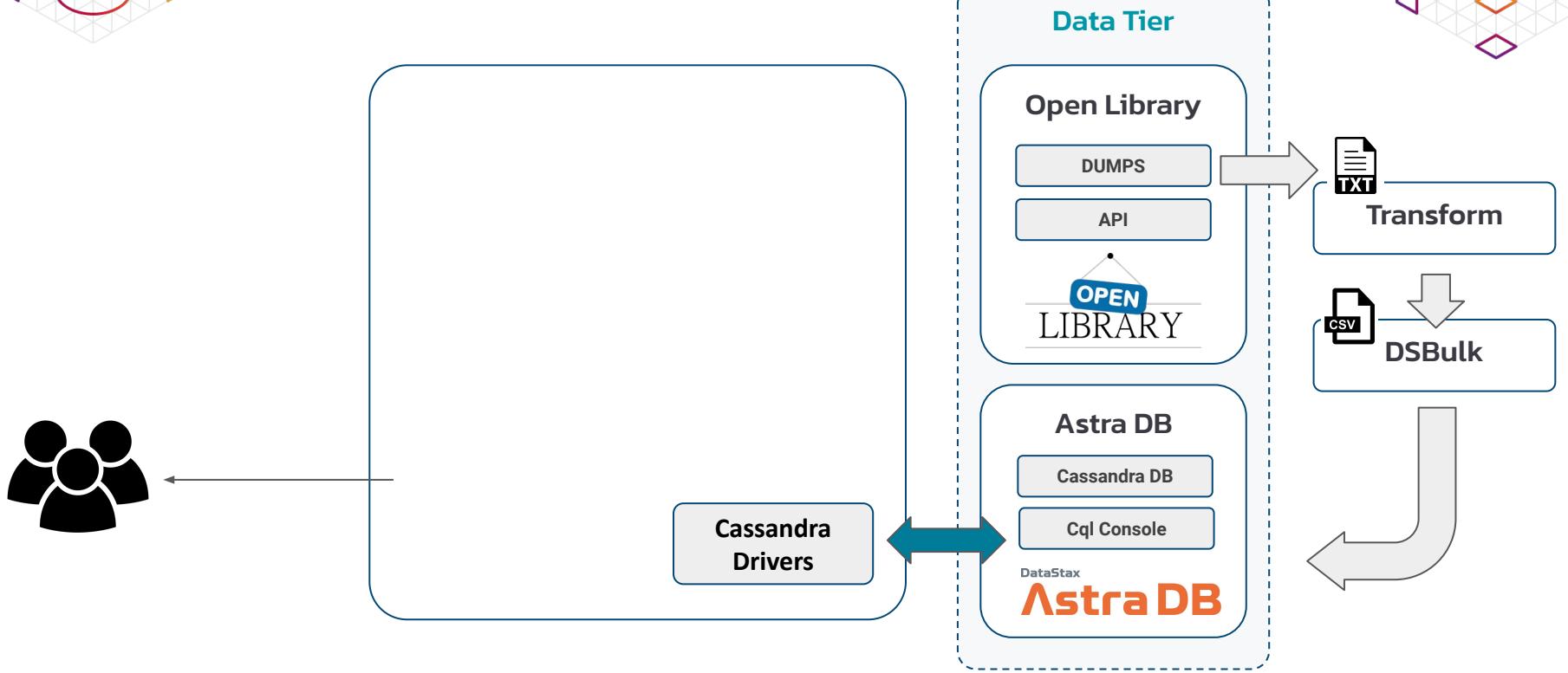


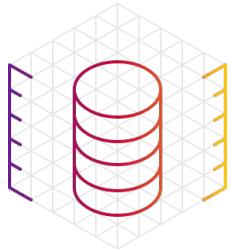
Astra

- Cql Interface
- CqlSession object
- Need SSL configuration
- Need X509 Certificates
- ZIP Secure connect Bundle
- [astra-spring-boot-starter](#)



Positioning Cassandra Drivers





› Spring Data Cassandra

Spring-Data

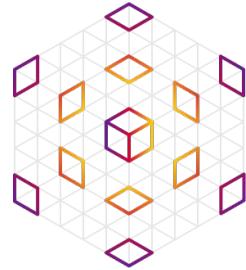
- CrudRepository<BEAN, ID>
- Working with interface
- Object Mapping
- Working with templates
- Conventions over code
- spring-boot-starter
- autoconfiguration
- keys in application.yaml
- Schema Management

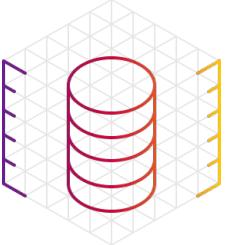
For Cassandra

- Leveraging **CqlSession**
- **CassandraRepository<ID, BEAN>**
- CassandraTemplate, CassandraOperations
- @Table, @PrimaryKey, @Column, @Query

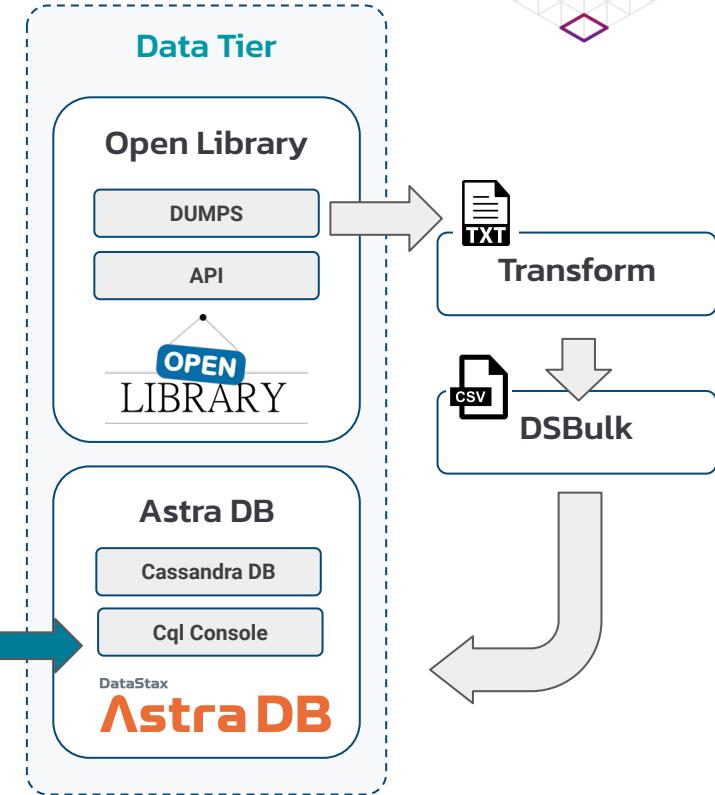
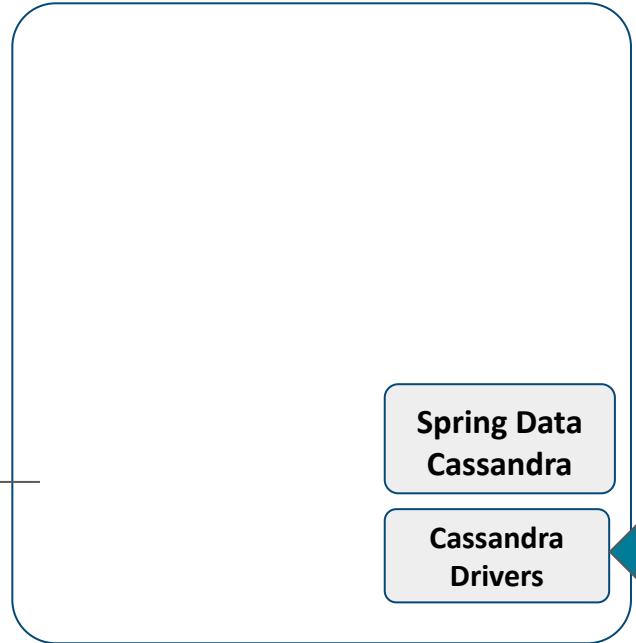
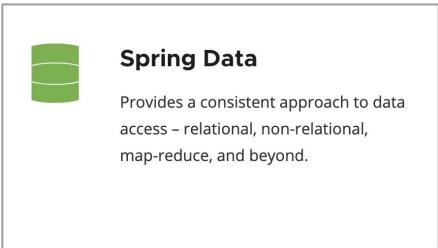
Be “aware”:

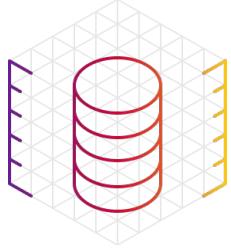
- **findAll()**, **@AllowFiltering**,
- Create your own **CqlSession** bean
- Schema creation not recommended
- Data Model first, objects second
- **SimpleCassandraRepository<ID, BEAN>**



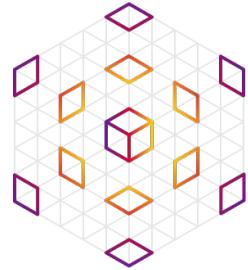


Spring Data





› Spring Rest Client vs RestTemplate



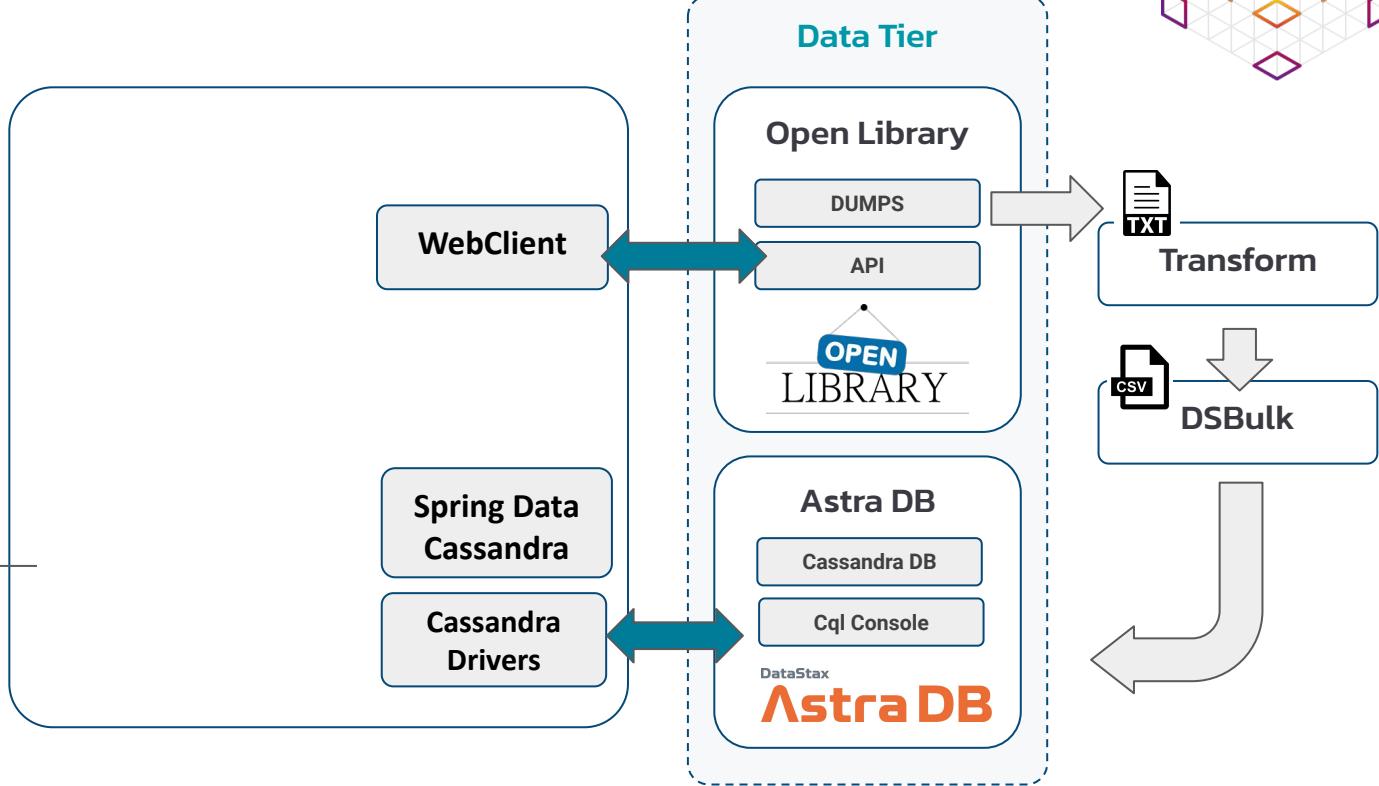
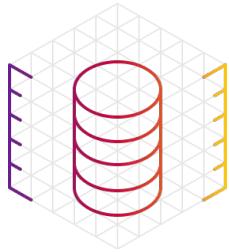
RestTemplate

- Part of Spring Web
- Java Servlet API
- Blocking Api
- Thread per request
- Context switching = CPU

Spring-WebClient

- Part of Webflux (reactive)
- Asynchronous, non blocking
- Build responses with Mono, Flux
- Client Back Pressure

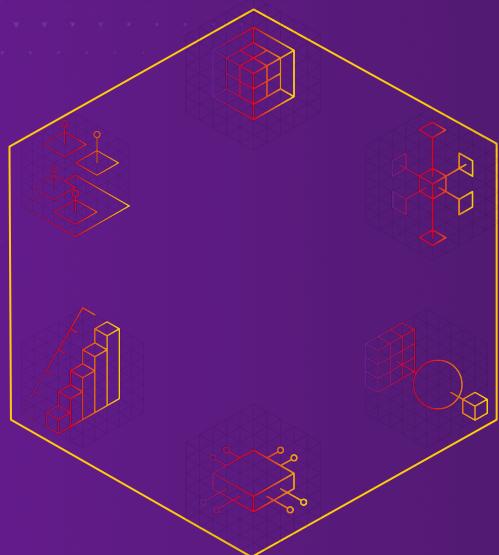
Web Client



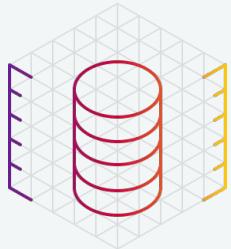


Lab 2

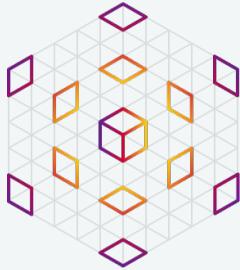
Application Implementation



- 2.1 - Configuration**
- 2.2 - Start application**



» Agenda



01

HouseKeeping

Live and Hands-On

02

System Design

Use Case and Technologies

03

Database Setup

Instance, Schema, Data

04

Connect and Use Data

SDK Spring Data

05

Web and Security

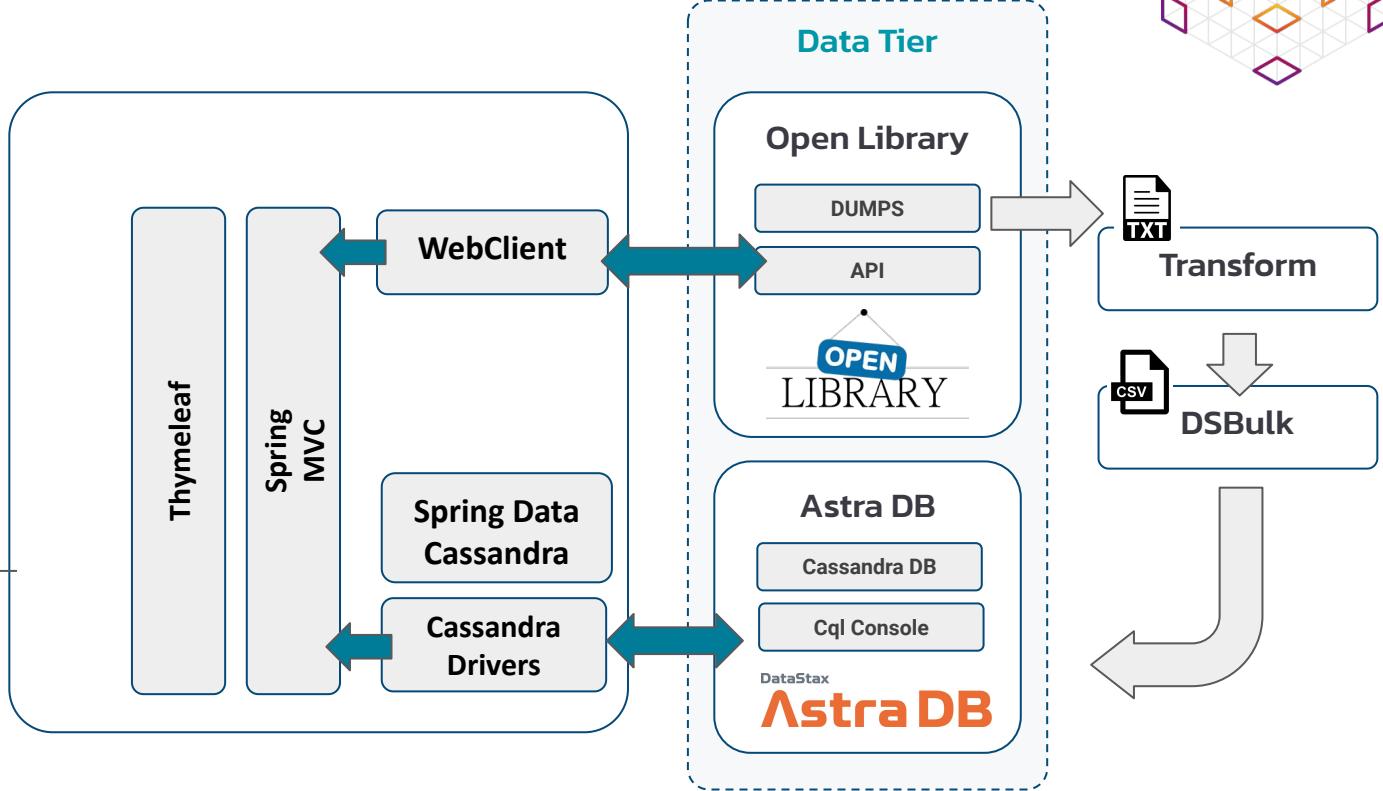
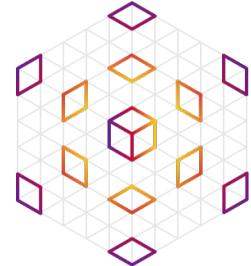
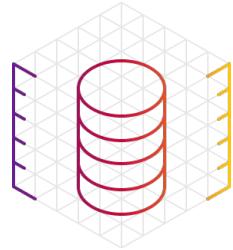
Controllers, Views, OAuth

06

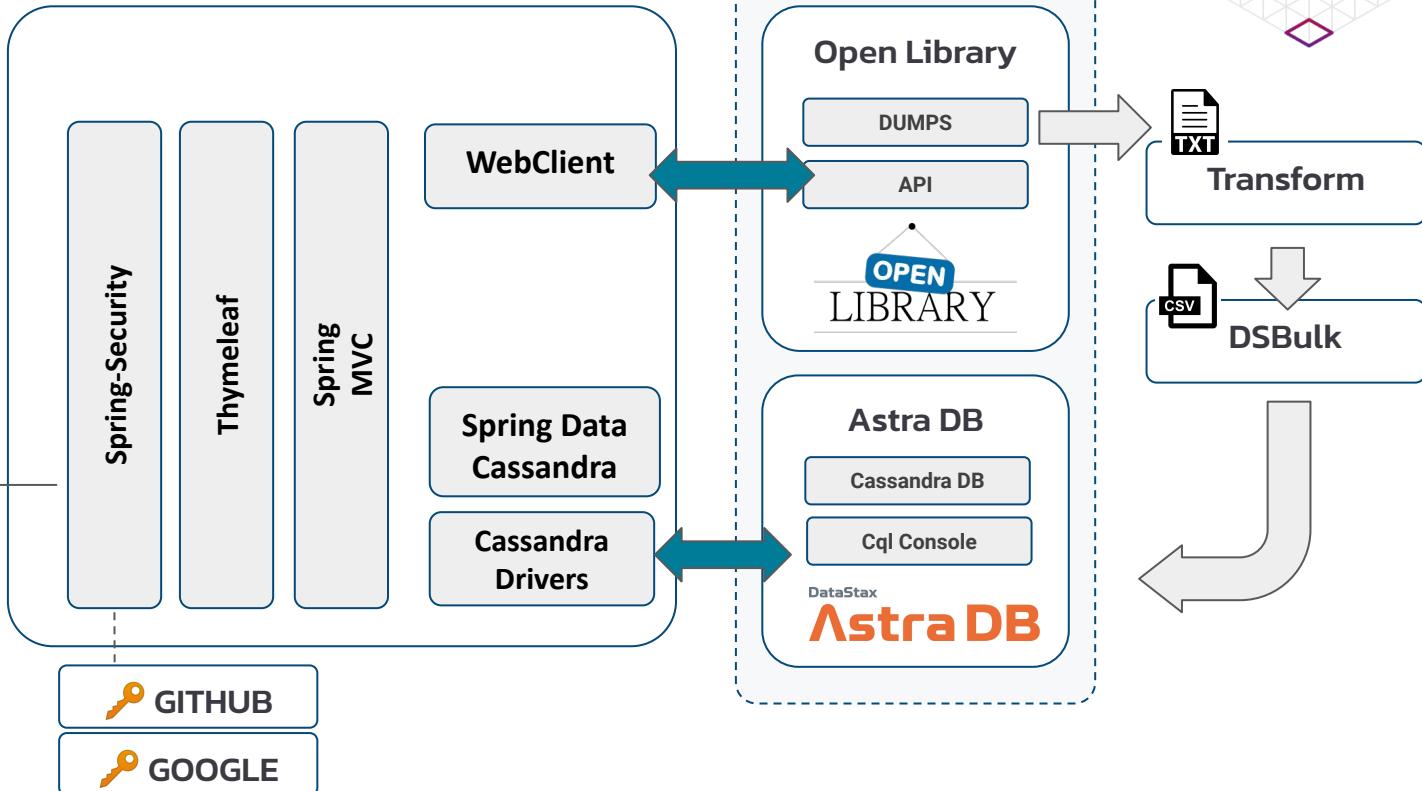
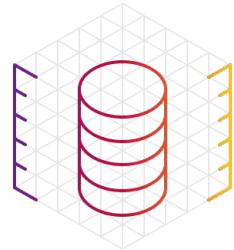
What's next?

Homework, next sessions

Web Application



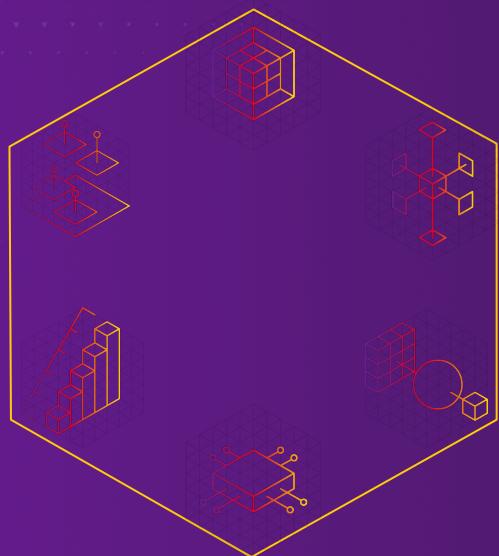
Spring Security





Lab 2

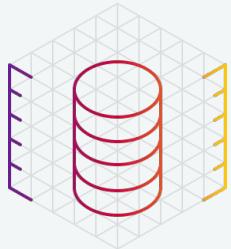
Application Implementation



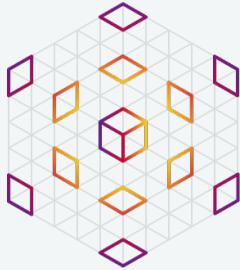
2.3 - Setup authentication for Google

2.4 - Setup authentication for Github

2.5 - Authentication with OAuth 2



› Agenda



01

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Connect and Use Data
SDK Spring Data

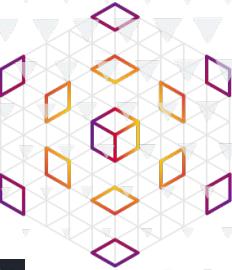
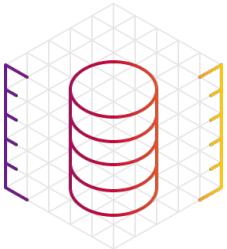
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Web and Security
Controllers, Views, OAuth

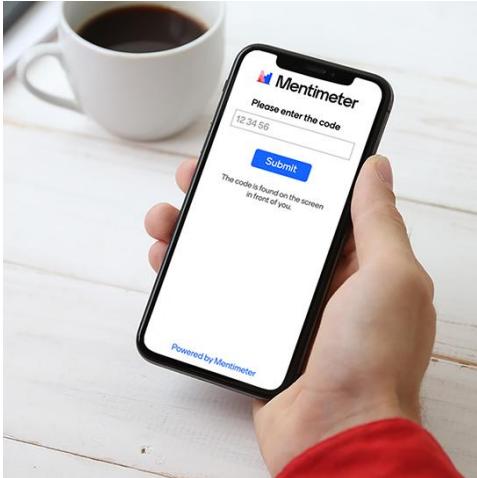
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What's next?
Homework, next sessions

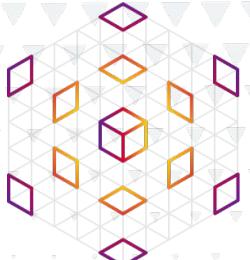
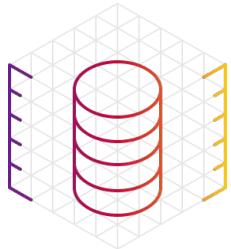
➤ "Menti" for survey and quiz



!menti



menti.com ⇒ enter code
Don't answer in YT chat
Look at phone (not at YT)
Keep it open for later



› Achievement unlocked!



BetterReads, clone of goodReads with Spring Workshop

Awarded to [REDACTED]

Issued on 9 Mar 2022 at 11:56 am

This badge confirms that the participant attended the "Build a clone of GoodReads with Spring" Workshop, successfully completed the lab and the test, and should have a basic knowledge of how to create a secured full stack application that scales with Spring.



Verified

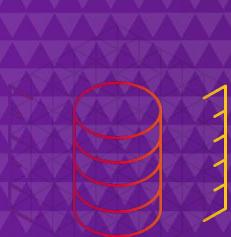
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Offered by
[DataStax Developers](#)



Only 10 redeemed!



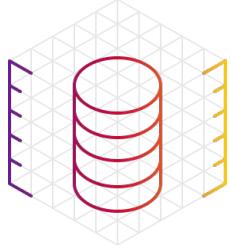
Register Now!

dtsx.io/cassandra-forward-meetup

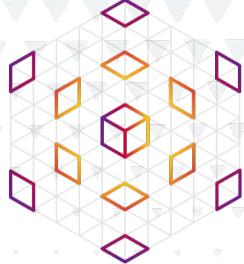


Cassandra Forward

MARCH 14, 2023 • FREE • ONLINE



Stay in touch!

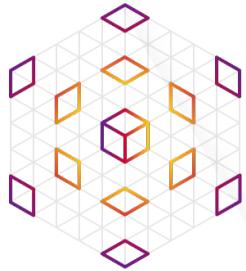
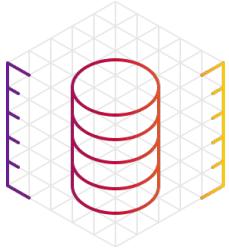


Discord: dtsx.io/discord

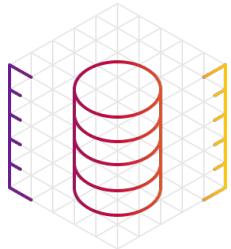
Academy: academy.datastax.com

Workshops: datastax.com/workshops

YouTube: [@DataStax Developers](#)



Thank You



Key Takeaways

Data Modeling Principles

- Know your data
- Know your queries
- Nest data
- Duplicate data

The Most Efficient Access Pattern

A query is satisfied by accessing one partition

Primary Key

Data uniqueness
Data distribution
Data queryability

The Cassandra Data Modeling Methodology

It is not more complex than the relational data modeling methodology

