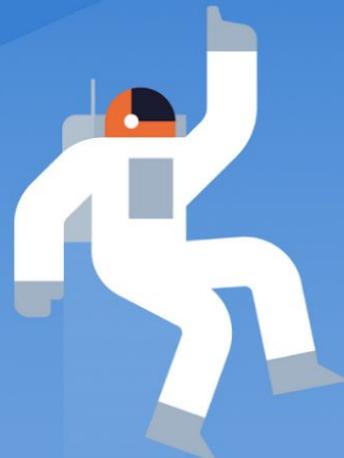


DataStax

# Introduction to NoSQL Databases



LEVEL  
**UP**  
with the

DataStax

**Developers**

# Your presenters



**Aleks Volochnev**  
Developer Advocate

*Apache Cassandra™ expert*  
*Tech lead and educator*  
*OSS Contributor*  
*Cloud architect*



@hadesarchitect  
[dtsx.io/aleks](http://dtsx.io/aleks)



**David Jones-Gilardi**  
Developer Advocate

*Apache Cassandra™ expert*  
*Experienced developer and educator*  
*Still have an Oracle 8 cert somewhere from the mid 90's*



@SonicDMG

@david-gilardi

# Your presenters



**Ryan Welford**  
Developer Advocate

*Apache Cassandra™ expert*  
*Front End Developer*



Director of Developer Advocacy  
*Apache Cassandra™ expert*  
*Open Source Developer*  
*Java Geek*

 [@RyanWelford](#)

 [@ryanwelford](#)

 [@clun](#)

  [@clunven](#)



# Your presenters



**Ryan Welford**  
Developer Advocate

*Apache Cassandra™ expert*  
*Front End Developer*



**David Jones-Gilardi**  
Developer Advocate

*Apache Cassandra™ expert*  
*Experienced developer and educator*  
*Still have an Oracle 8 cert somewhere from the mid 90's*

 [@RyanWelford](#)

 [@ryanwelford](#)

  [@SonicDMG](#)

 [@david-gilardi](#)

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Developer Advocate

*Apache Cassandra™ expert*

*Experienced developer and  
educator*

*Still have an Oracle 8 cert  
somewhere from the mid 90's*



@SonicDMG



@david-gilardi



**Stefano Lottini**

Developer Advocate

*Apache Cassandra™ expert*

*Developer/architect*



@hemidactylus



@rsprrs



@stefano-lottini

# Your presenters



**Stefano Lottini**  
Developer Advocate

*Apache Cassandra™ expert*  
*Developer/architect*



**Raghavan Srinivas**  
Developer Advocate

*Apache Cassandra™ expert*  
*All things distributed!*  
*Still working on simplifying  
the developer “inner loop!”*



[@hemidactylus](#)



[@rsprrs](#)



[@stefano-lottini](#)

[@ragsns](#)

[@ragss](#)

[@rags](#)

# Your presenters



**Aleks Volochnev**

Developer Advocate

*Apache Cassandra™ expert*

*Tech lead and educator*

*Cloud architect*



**Stefano Lottini**

Developer Advocate

*Apache Cassandra™ expert*

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@hadesarchitect  
[dtsx.io/aleks](https://dtsx.io/aleks)



**@hemidactylus**



**@rsprrs**



**@stefano-lottini**

# Your presenters



## Aleks Volochnev

Developer Advocate

*Apache Cassandra™ expert*

*Tech lead and educator*

*Cloud architect*



## Patrick McFadin

Developer Advocate

*Apache Cassandra™ expert*

*Developer/architect*

*CNCF TOC Member*



@hadesarchitect  
[dtsx.io/aleks](http://dtsx.io/aleks)



[@pmcfadin](#)

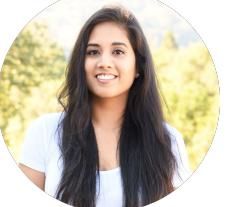


[@patrickmcfadin](#)



[@patrick-mcfadin-53a8046](#)

# DatastaxDevs: Developer Advocates Team



Cedrick  
Lunven

Aleksandr  
Volochnev

Jack  
Fryer

Kirsten  
Hunter

Stefano  
Lottini

David  
Gilardi

Ryan  
Welford

Rags  
Srinivas

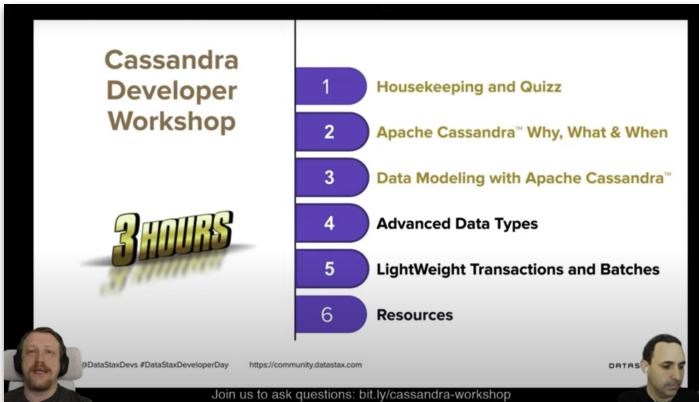
Sonia  
Siganporia

R

S

# Housekeeping #1: Attending the workshop

**Livestream:** [youtube.com/DataStaxDevs](https://youtube.com/DataStaxDevs)

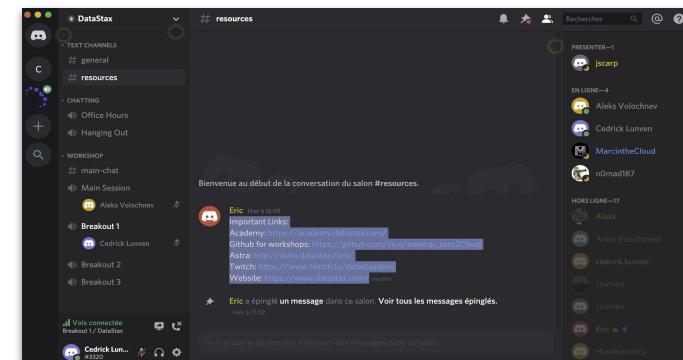


**YouTube**



**Twitch**

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



**Discord**



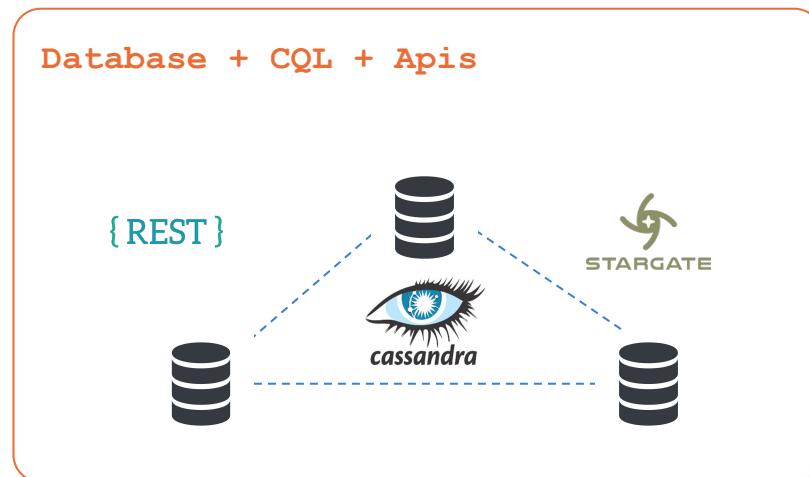
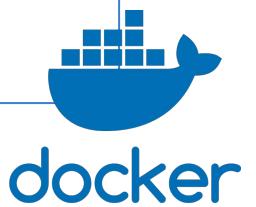
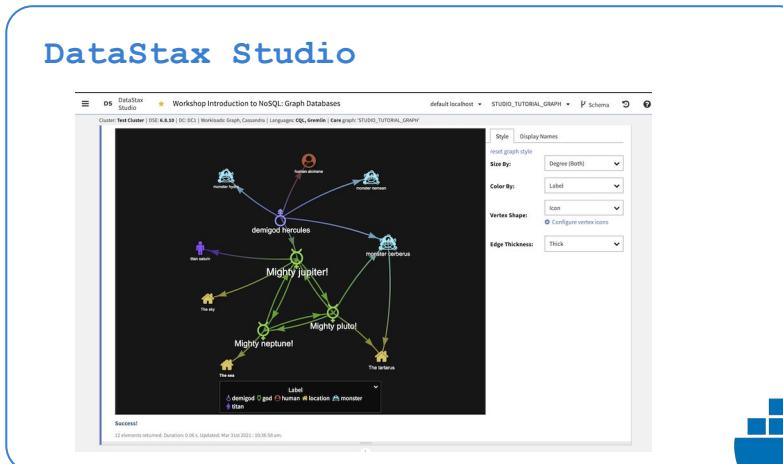
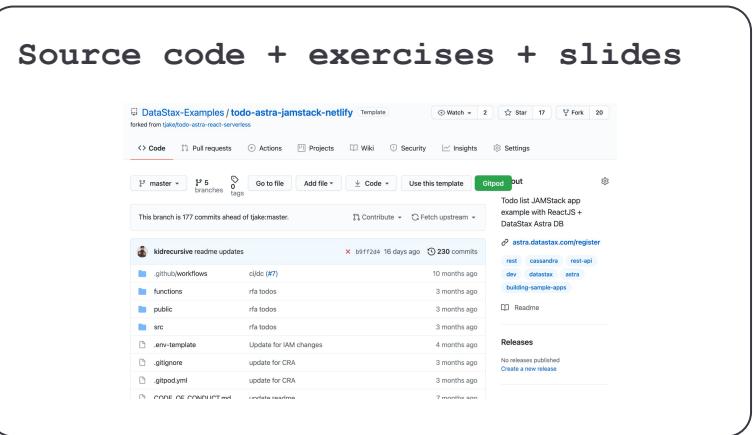
**YouTube**



Available on the iPhone App Store

Nothing to install !

# Housekeeping #2: Doing Hands-On



DataStax  
**Astra DB**

DataStax Developers

# A Badge when completing homework *(certifies attendance + workshop completion)*

Intro to NoSQL Homework

cedrick.lunven@datastax.com [Switch account](#) Draft restored

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

\* Required

Email \*

cedrick.lunven@datastax.com

Full Name \*

Your full name (to be displayed on the badge)

Cedrick Lunven



# Get MORE at the upcoming workshops!

[datastax.com/workshops](http://datastax.com/workshops)



DataStax Developers



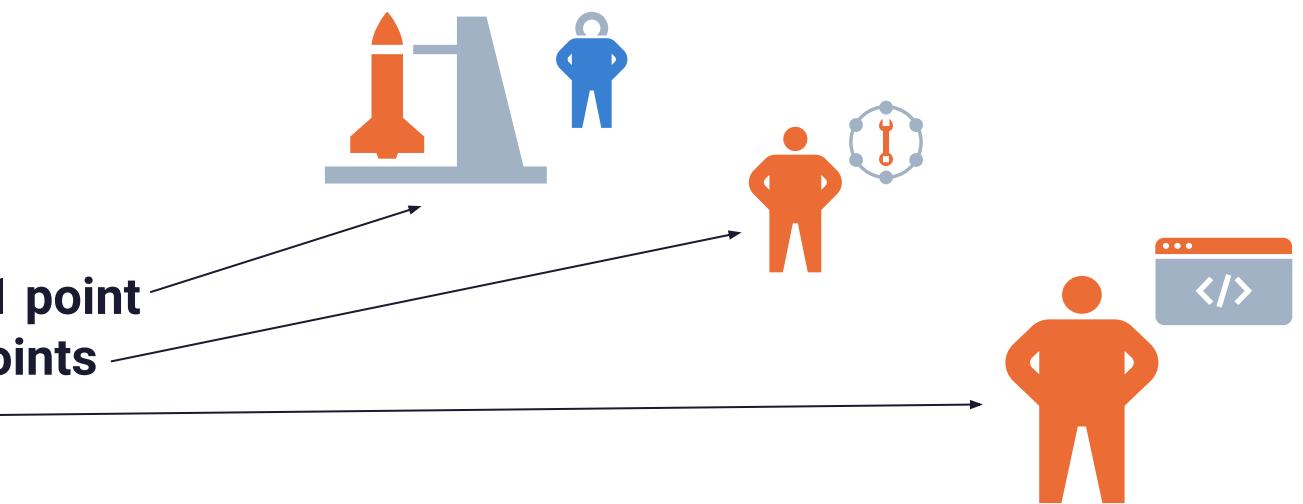
DataStax Developers

[dtsx.io/staxgiving](http://dtsx.io/staxgiving)

500\$ + 250\$ + 250\$ AMAZON gift cards to win

#### CONDITIONS

- **#engage-with-us** : Tasks that will earn you 1 point
- **#work-with-us**: Tasks that will earn you 5 points
- **#build** : Tasks that will earn you 10 points.



**DUE DATE** THANKSGIVING DAY => 25/11

Winners randomly chosen **LIVE** on 12/8

# PLAY WITH US !



# Hands-on exercise material



**Get your instance here:**

- [astra.dev/12-8](https://astra.dev/12-8)

**Repository:**

- [github.com/datastaxdevs/  
workshop-introduction-to-nosql](https://github.com/datastaxdevs/workshop-introduction-to-nosql)

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**01**

Definitions and  
objectives of NoSQL

**02**

Tabular  
Databases



**03**

Document  
Databases



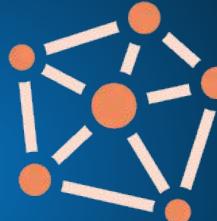
**04**



Key/values  
Databases

**05**

Graph  
Databases



**06**

Games  
TakeAways



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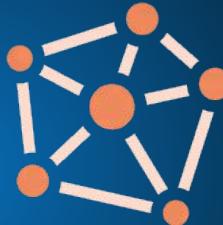
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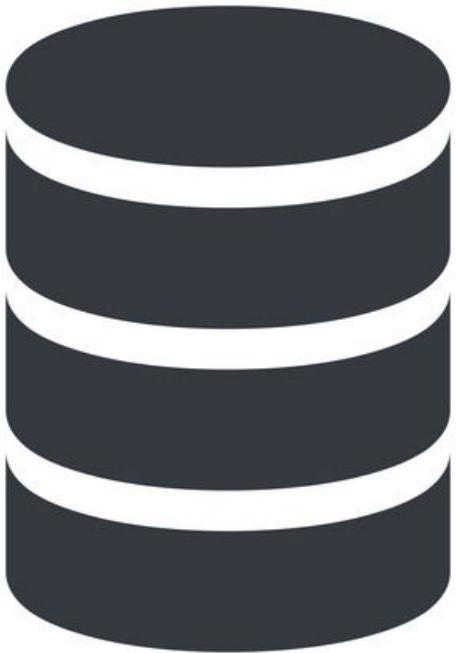


**06**

Games  
TakeAways



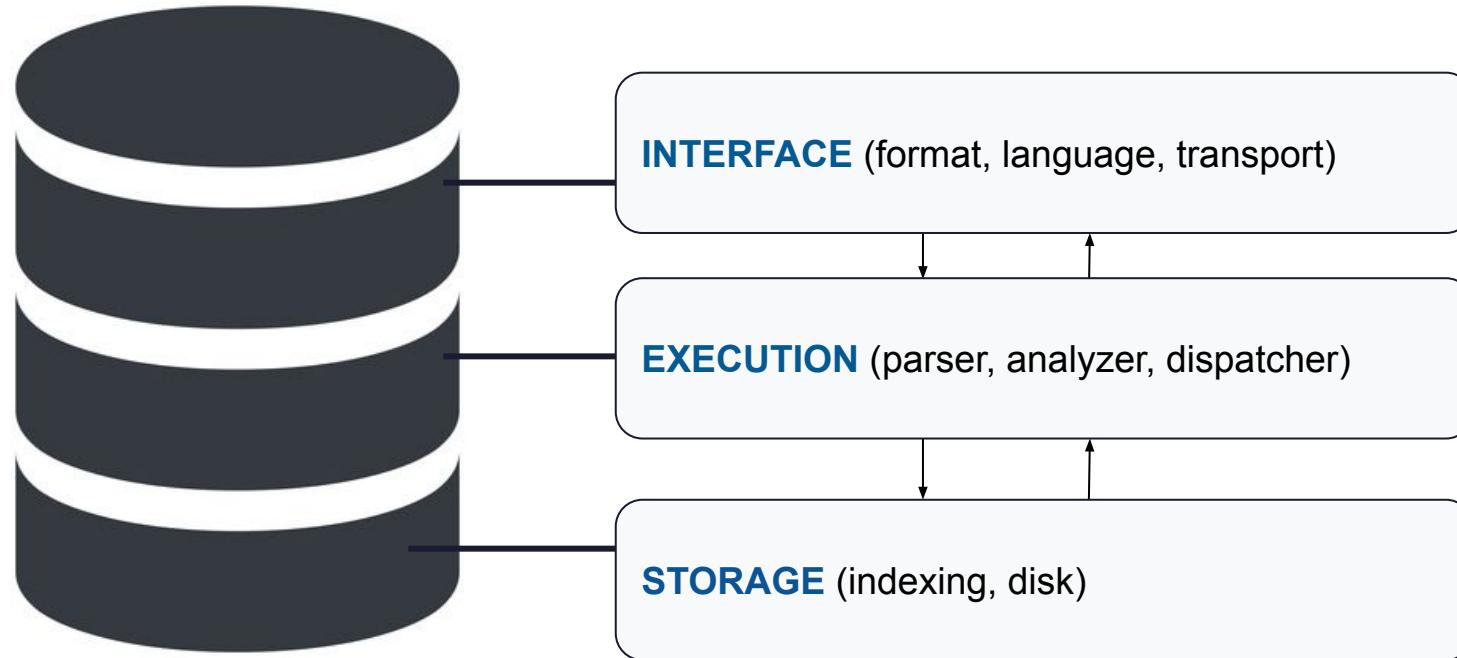
# Databases



**Software to save things  
and retrieve them later  
with queries**

“That's all Folks!”

# Databases



# Why NoSQL was invented?

Relational Databases dominated the database market for decades. Why change?

# 3V: Volume

Relational Database Management Systems weren't ready to cope with the new data volume.

# Velocity

## 3V:

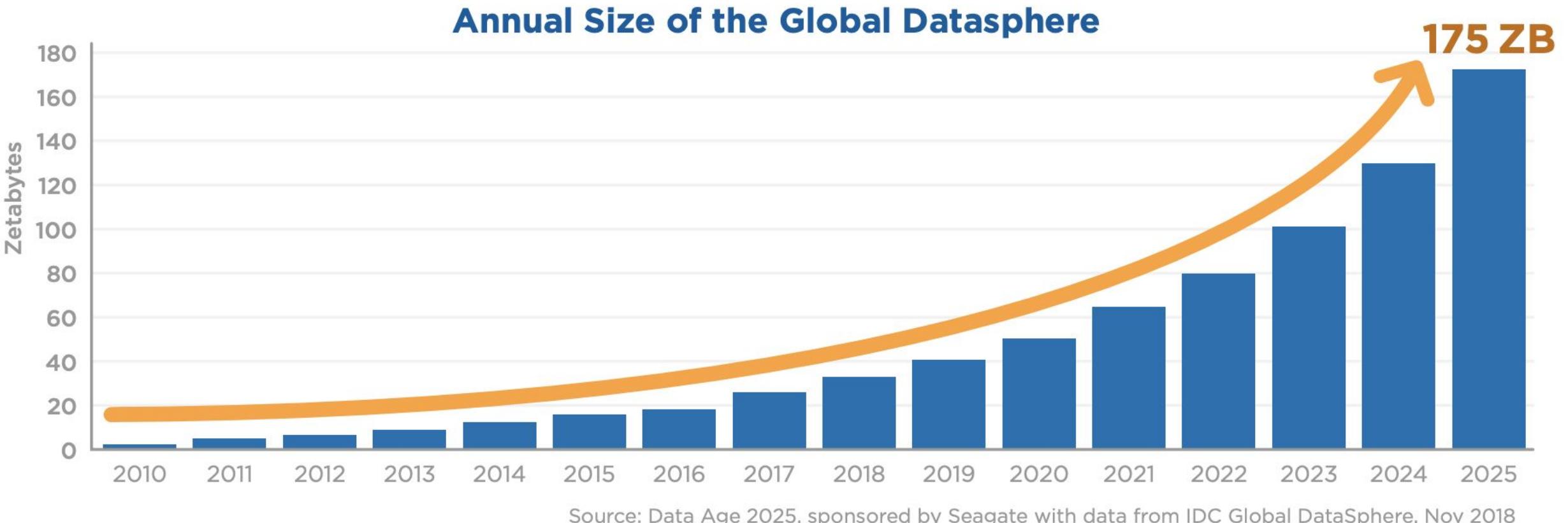
Relational Database Management Systems  
weren't ready to cope with the new  
performance requirements.

# 3V: Variety

Relational Database Management Systems weren't ready to cope with the requirements of data types and data relations.

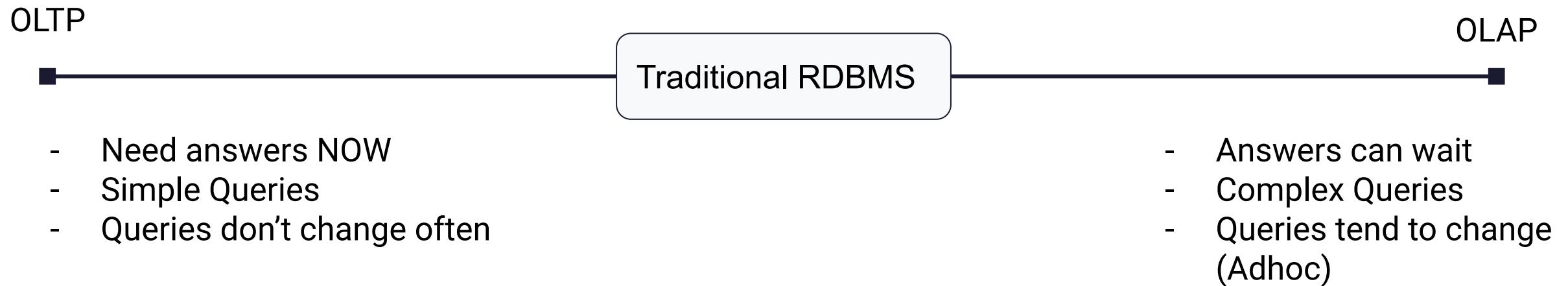
- Schemaless
- Relation as an entity
- Etc.

# Requirements changed



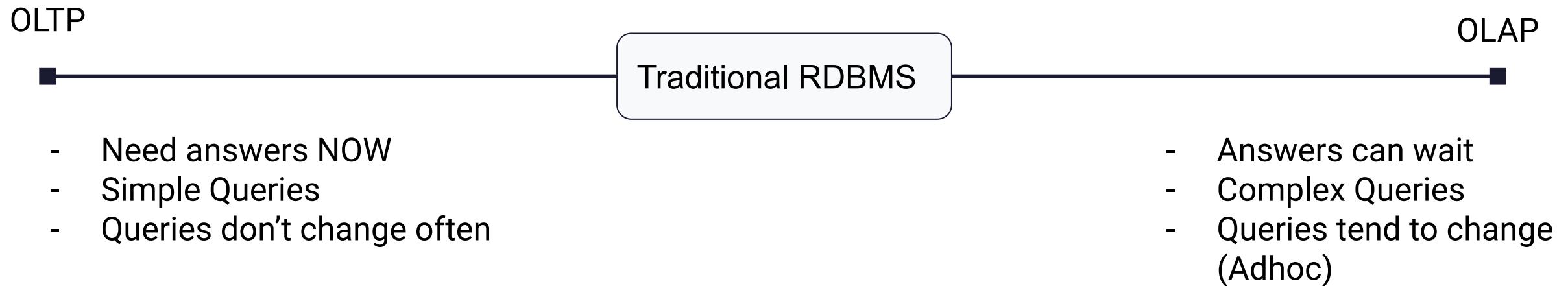
# OLTP / OLAP

- OnLine Transaction Processing
- OnLine Analytical Processing

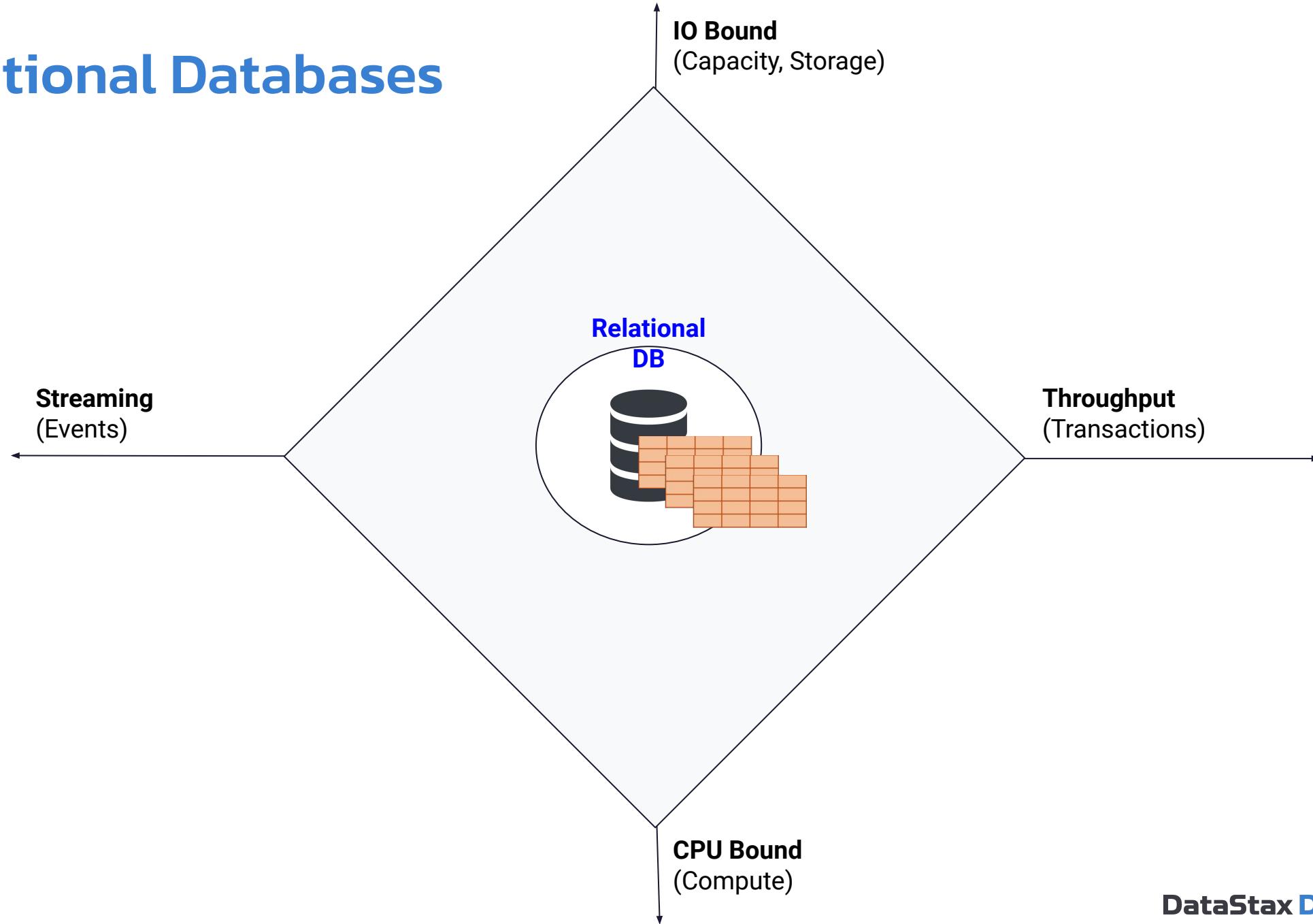


# OLTP / OLAP

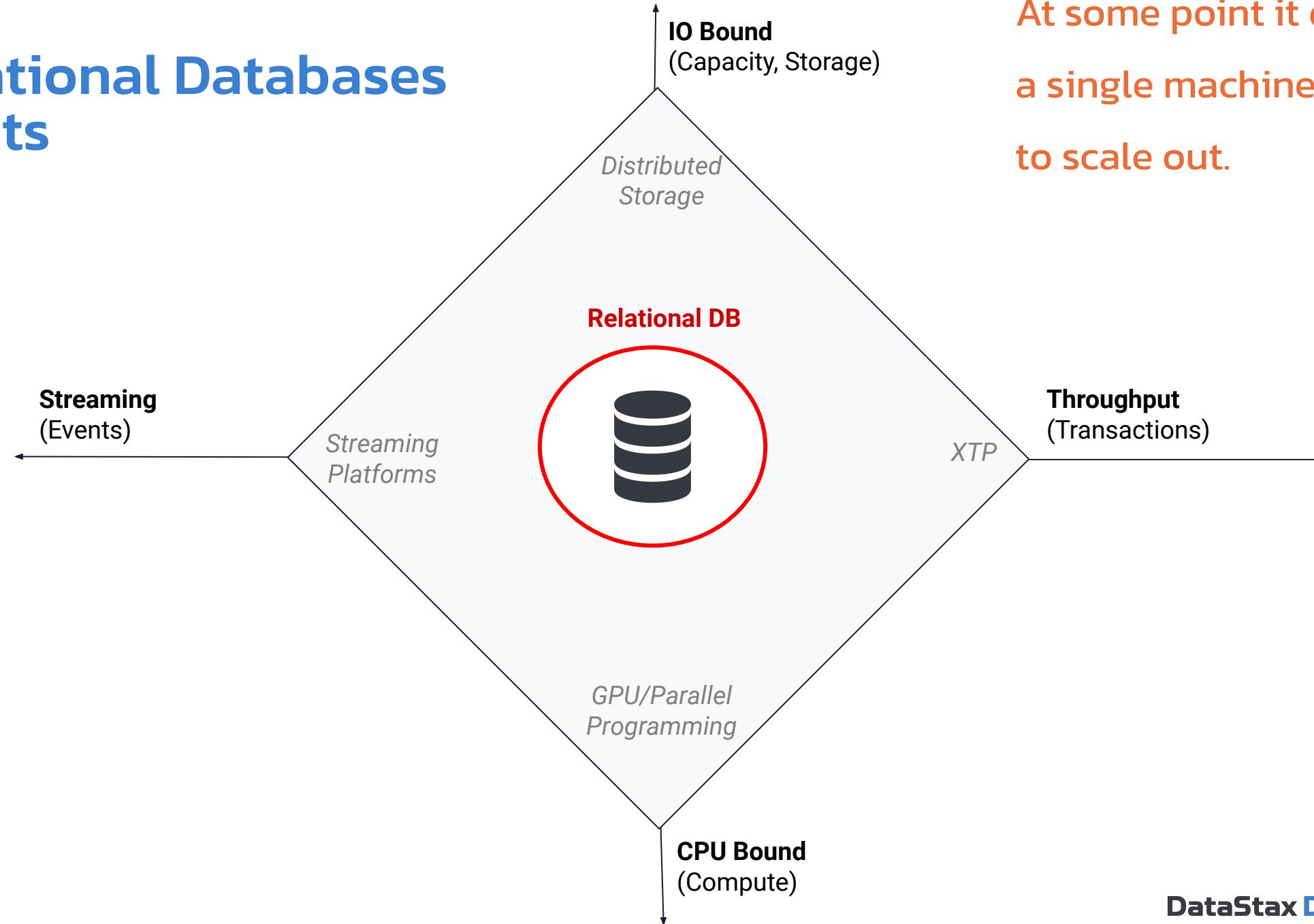
- OnLine Transaction Processing
- OnLine Analytical Processing



# Relational Databases



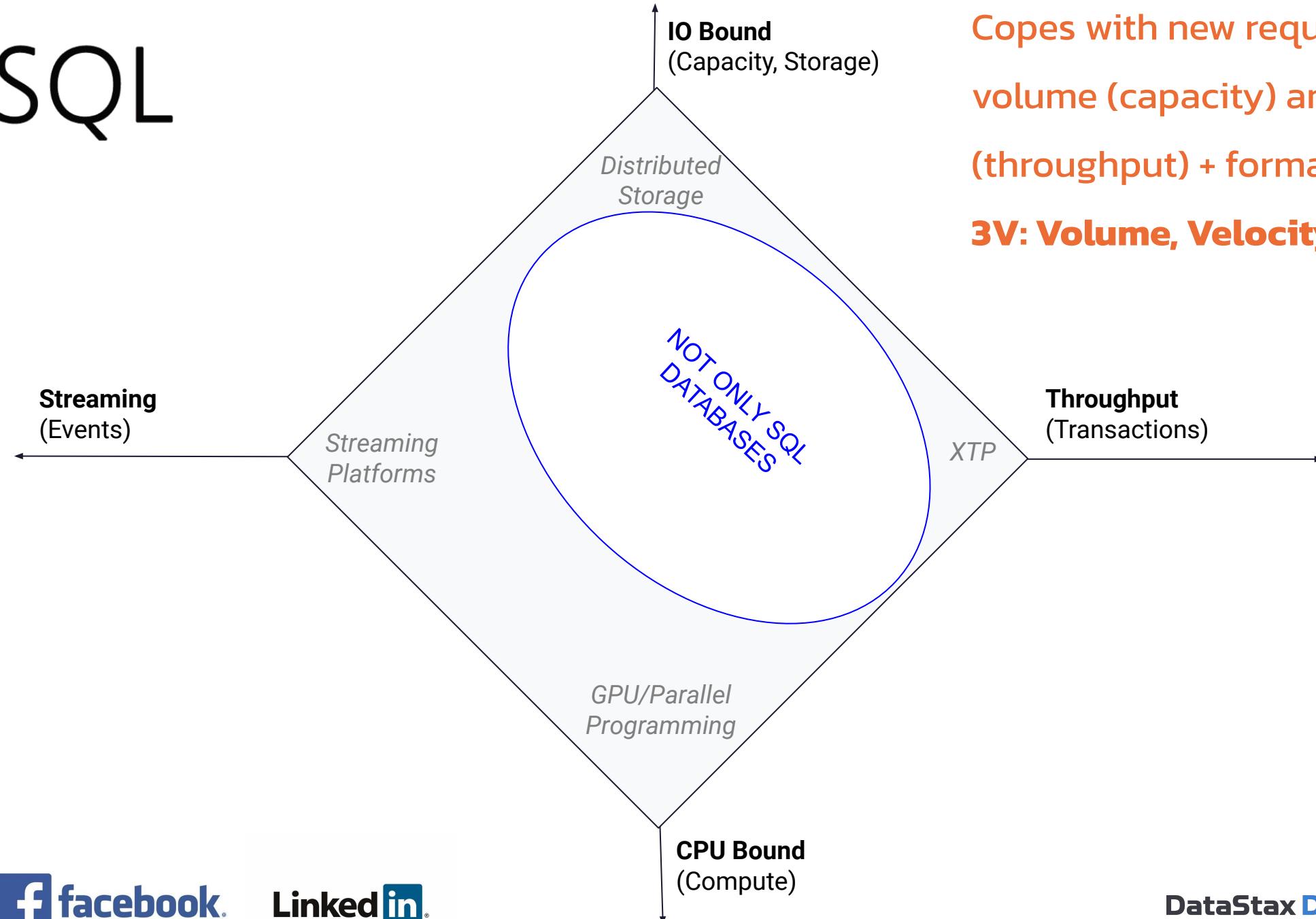
# Relational Databases Limits



At some point it does not fit  
a single machine you need  
to scale out.



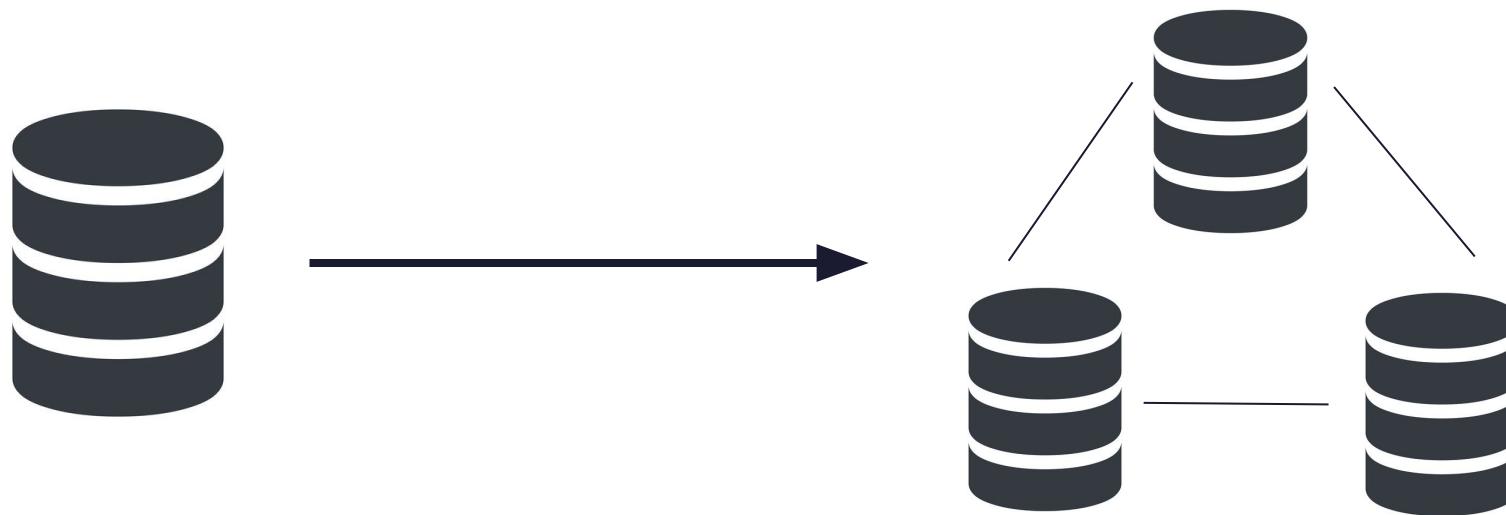
# Not Only SQL



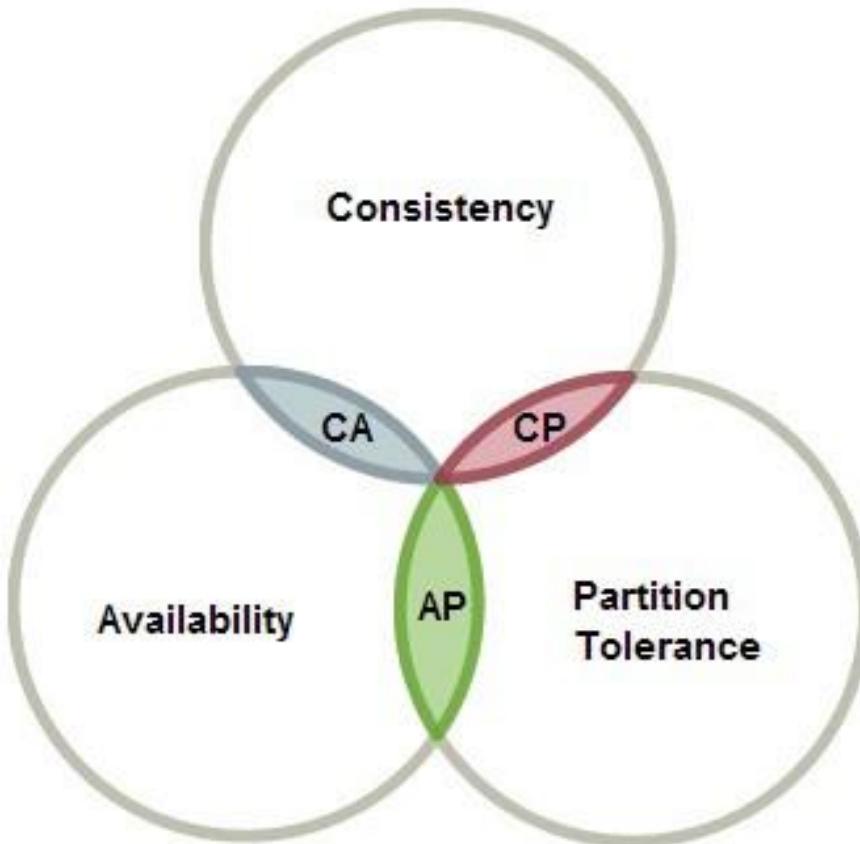
# Can single-host system handle it?

In short - no.

# New databases are distributed by design



# Introduction to the C.A.P. Theorem (Eric Brewer)

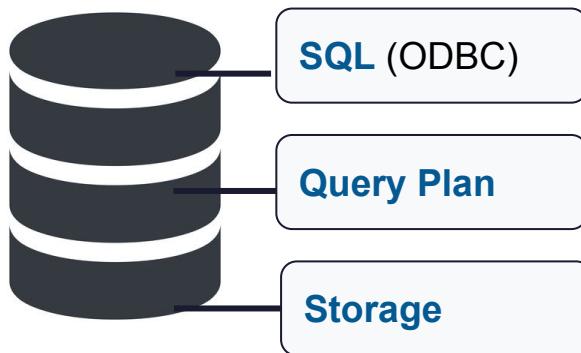


**NoSQL are  
Distributed Systems**

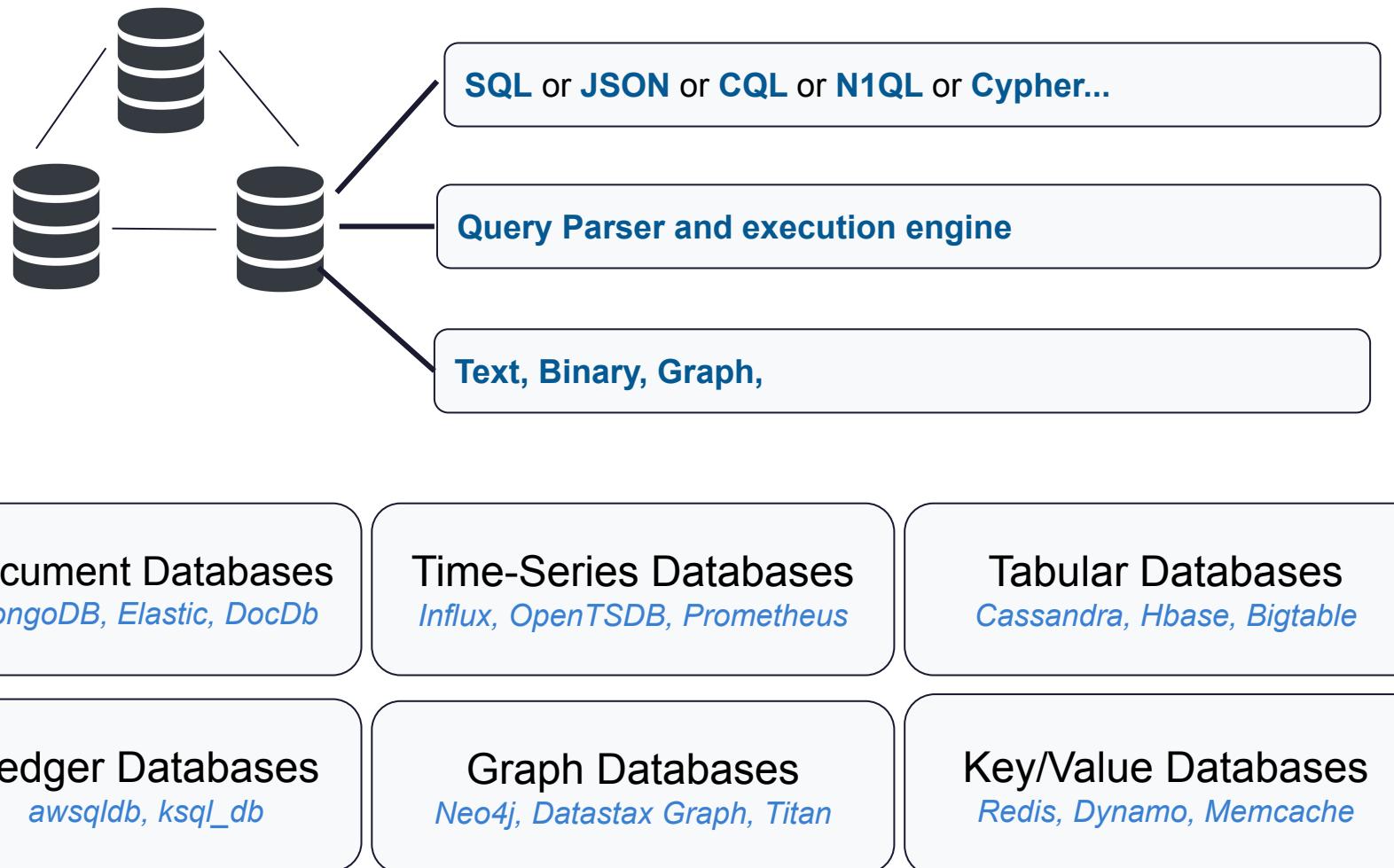
**Clouds like  
Distributed Systems**

# What exactly is NoSQL?

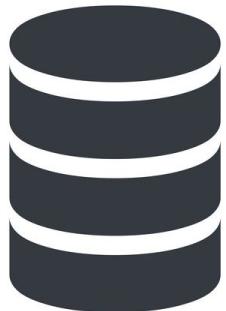
# Relational Databases



# Not Only SQL



# Relational Databases



Any database that supports SQL and based on the relational model of data

# Not Only SQL

## Time-Series Databases

*Influx, OpenTSDB, Prometheus*

## Document Databases

*MongoDB, Elastic, DocDb*

## Tabular Databases

*Cassandra, Hbase, Bigtable*

## Ledger Databases

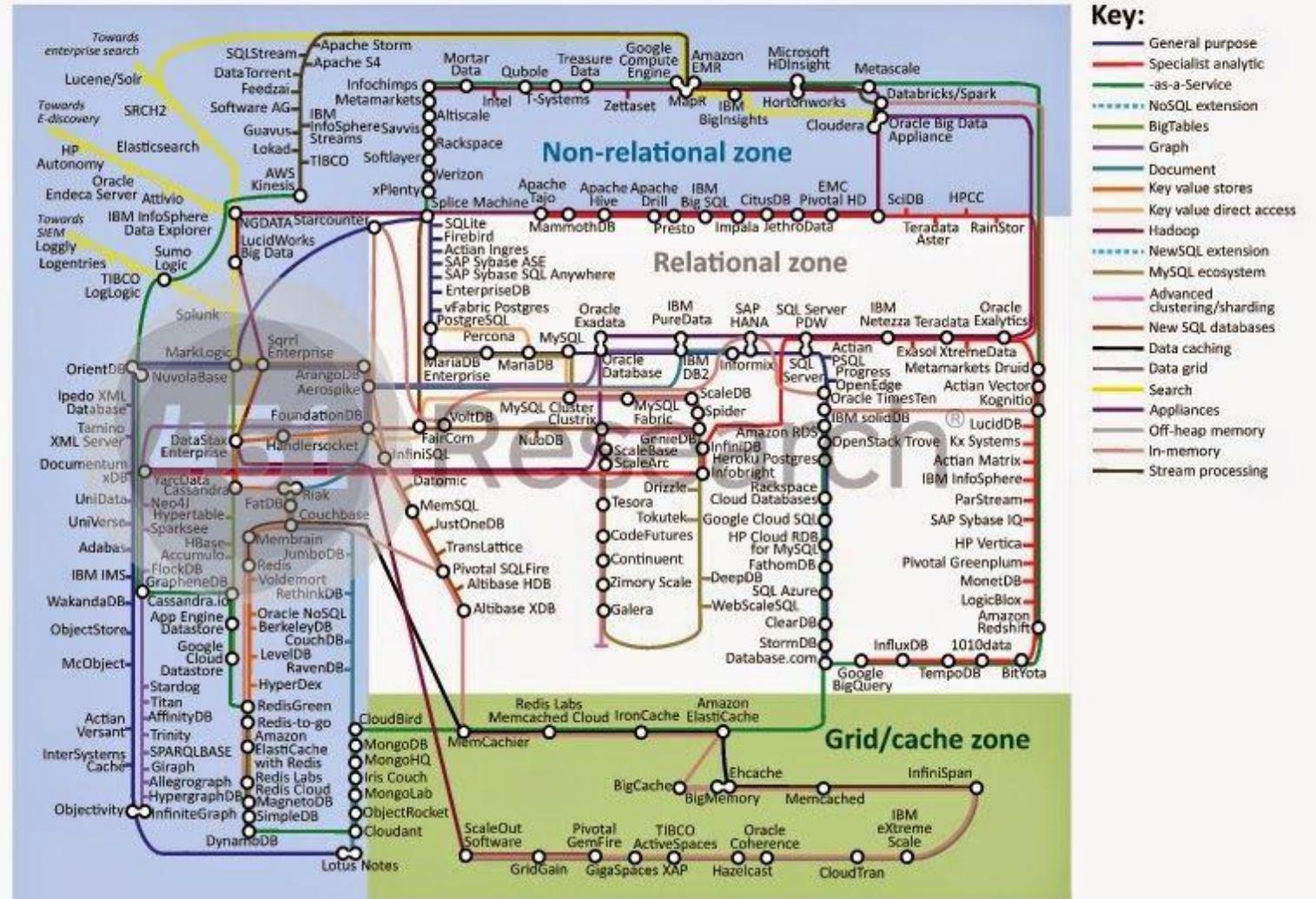
*Amazon QLDB, ksql\_db*

## Graph Databases

*Neo4j, Datastax Graph, Titan*

## Key/Value Databases

*Redis, Dynamo, Memcache*



**NoSQL is all the variety of  
purpose-built databases.**

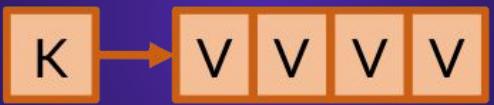
**Because there is no silver bullet.**

# QUICK CHECK!

**Write YES to the YouTube chat if you think all NoSQL databases are schemaless!**

# Main NoSQL Databases Types

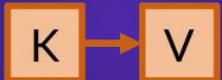
Column Oriented  
Tabular



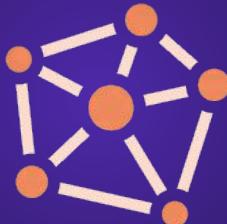
Document



Key/value



Graph



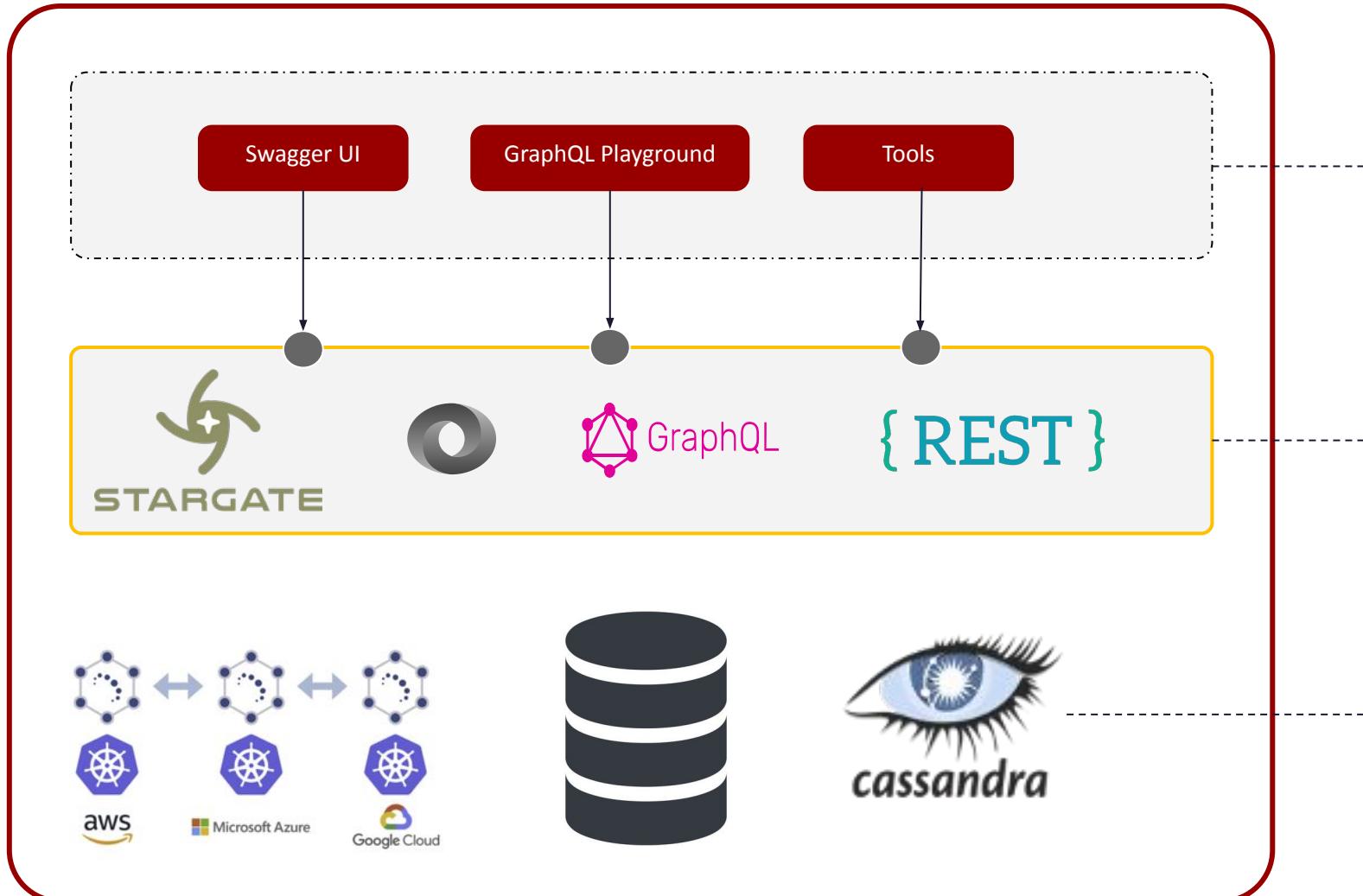
DataStax

# Astra DB



**\$25/month credit**

Launch a database in the cloud  
with a few clicks, no credit card  
required.



## User Interface

Web based  
Developer Tools

**OSS Stargate.io**  
A data gateway to allow  
multiple usages



**OSS Apache Cassandra**  
A Column oriented NoSQL  
Database



# Get Ready = Hands-on #1



## Astra DB

Get your instance here:

- [astra.dev/12-8](https://astra.dev/12-8)



## GitHub

Repository:

- [github.com/datastaxdevs/  
workshop-introduction-to-nosql](https://github.com/datastaxdevs/workshop-introduction-to-nosql)



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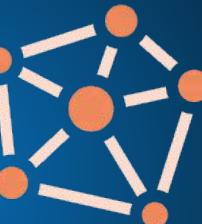
**04**



Key/values  
Databases

**05**

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Databases



**06**

Games  
TakeAways



# Tabular or Column Type

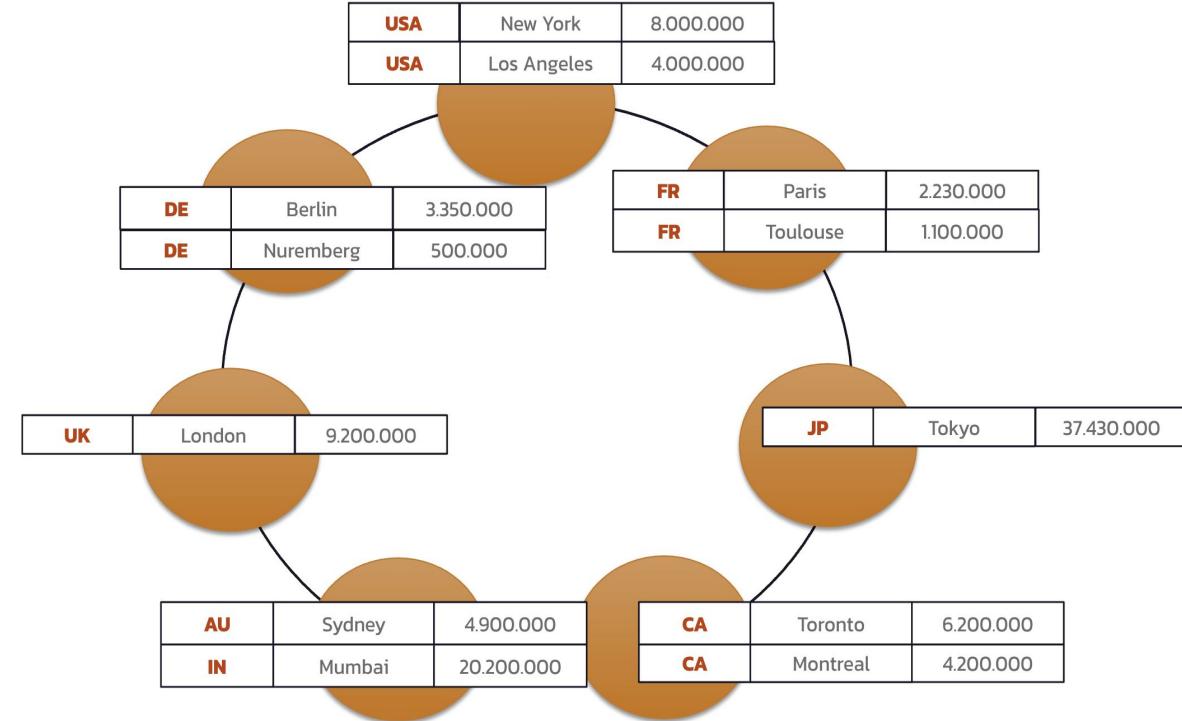


**Model:** Stored Tables sharded on keys to distribute on nodes

- Tables like relational (with a Schema)
- Distributes data based on a key
- Data is stored sorted on disk

## Query

- Request with the partition key
- Secondary Indices are possible
- Select one or more columns for the record
- No joins but denormalization



DataStax  
**Astra DB**

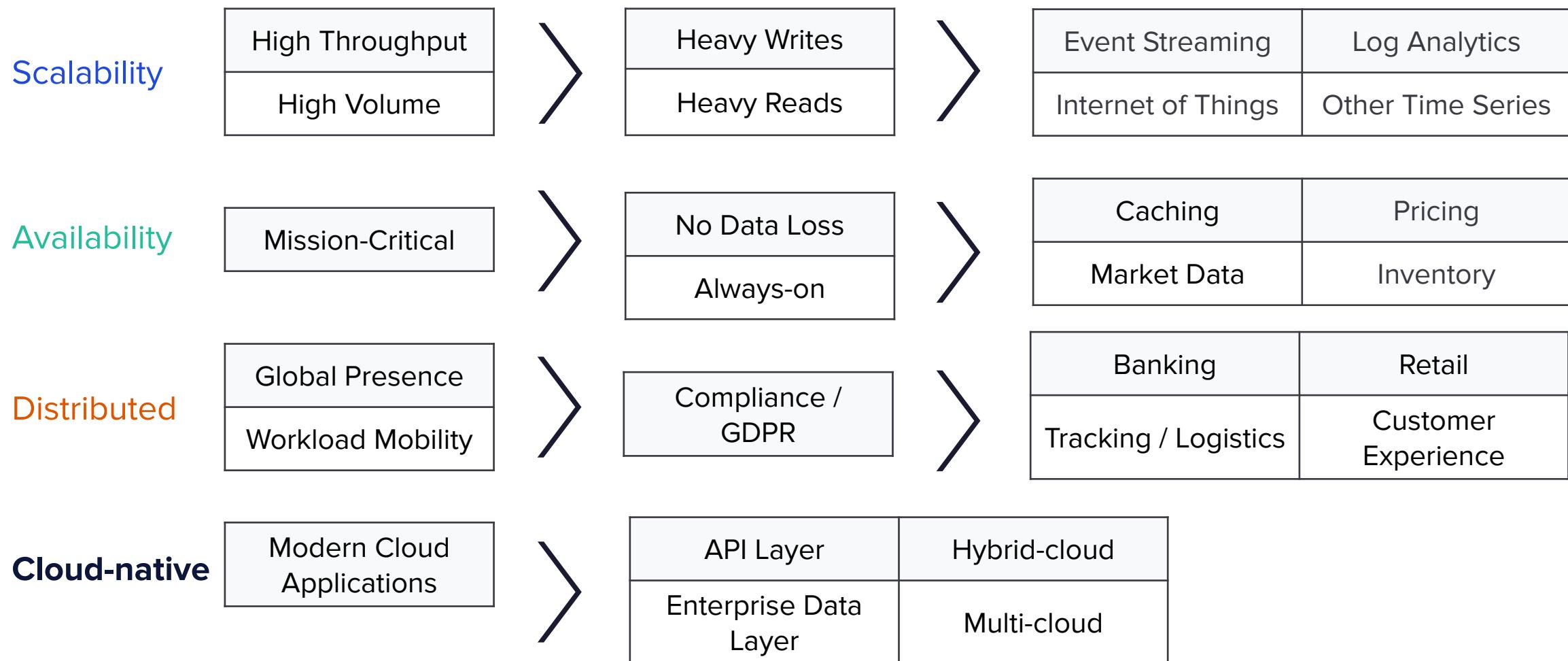
Google Cloud Bigtable \*

Amazon Keyspaces  
for Apache Cassandra

APACHE  
**HBASE**

DataStax Developers

# Understanding Use Cases



# HandsOn #2 Tabular Databases



## Astra DB

Get your instance here:

- [astra.dev/12-8](https://astra.dev/12-8)



GitHub

Repository:

- [github.com/datastaxdevs/  
workshop-introduction-to-nosql](https://github.com/datastaxdevs/workshop-introduction-to-nosql)



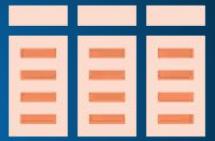
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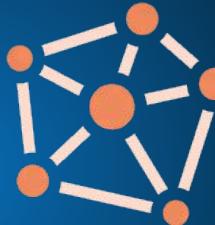
**04**



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# Document-Oriented Database

## Model: Structured Objects identified by a key

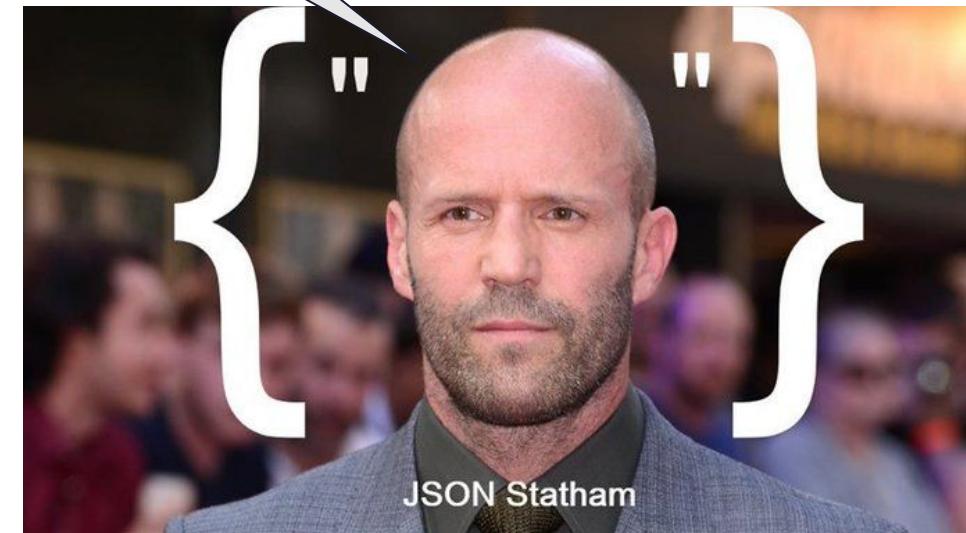
- Documents are structured data but with no schema
- Multiple format but mostly JSON
- Group of documents of same nature as “collections”

## Queries

- Request by the key
- Request on other fields tag/path in the document

## Use Cases

- Mainly reads, less writes
- Document storage with a structure but no schema
- Used in FrontEnd development matching the JSON used



mongoDB



Couchbase



elastic

# Document Shredding

```
create table <name> (
    key text,
    p0 text,
    ... p[N] text,
    bool_value boolean,
    txt_value text, d
    bl_value double, leaf text
)
```

50

# Document Shredding

```
{"a": { "b": 1 }, "c": 2}
```

The document would be “shredded” into rows looking like this:

key	p0	p1	dbl_value	
x	a	b	1	51
x	c	null	2	

# Document Shredding

For data with an array, such as:

```
{"a": { "b": 1 }, "c": [{"d": 2}]}
```

there would be two rows, like so:

key	p0	p1	p2	dbl_value	
x	a	b	null	1	<a href="#">52</a>
x	c	[0]	d	2	

# HandsOn #3 Documents DB



## Astra DB

Get your instance here:

- [astra.dev/12-8](https://astra.dev/12-8)



GitHub

Repository:

- [github.com/datastaxdevs/  
workshop-introduction-to-nosql](https://github.com/datastaxdevs/workshop-introduction-to-nosql)



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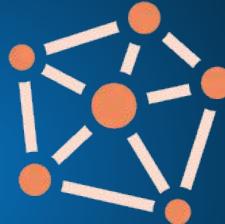
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Key/values  
Databases



**05**

Graph  
Databases

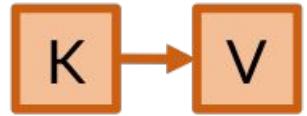


**06**

Games  
TakeAways



# Key Value Database



**Model:** Like a distributed HashTable

- One key, one value
- Keys are hashed into buckets (partitions)
- Similar to tabular but with a single value

**Queries**

- GET/PUT/DELETE/UPDATE direct CRUD only
- Value can be a single valued lists

**Use Cases**

- Distributed Cache !
- User cache Data, User Sessions
- data Deduplications

Key	Value
K1	AAA,BBB,CCC
K2	AAA,BBB
K3	AAA,DDD
K4	AAA,2,01/01/2015
K5	3,ZZZ,5623



# HandsOn #4 Key-Value DB



## Astra DB

**Get your instance here:**

- <https://astra.dev/11-3>



## GitHub

**Repository:**

- <https://github.com/datastaxdevs/workshop-introduction-to-nosql>



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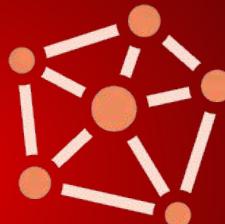
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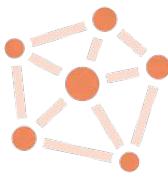


**06**

Games  
TakeAways



# Graph Database



## Model: Store Vertices and Edges data structured

- Data is represented as a Graph (Vertices & Edges)
- Dedicated to highly connected dataset (lot of “Joins”)
- Discovering simple and complex relationships between objects.

## Queries

- Find data based on filters on attributes for both nodes and edges
- Traversal following edges (cf gremlin)

## Use Cases

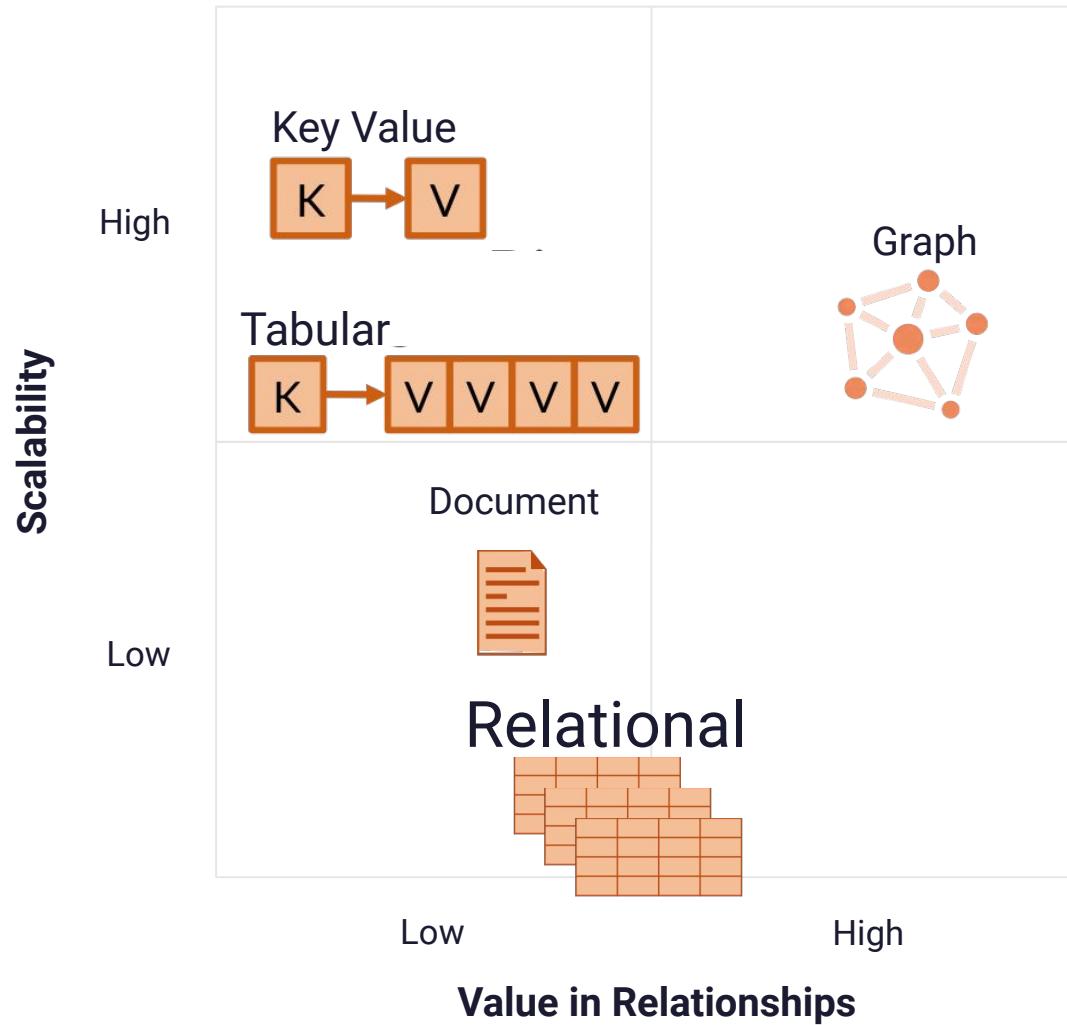
- Social Network, Customer 360
- Internet of Things
- Personalization and recommendation
- Health Care, Path finding, Security, Fraud Detection



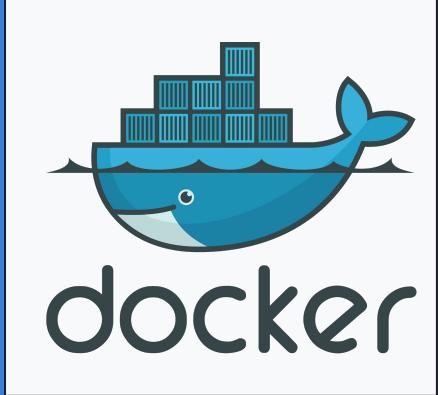
```
// What are the names of projects that were created by two friends?  
g.V().match(  
    as("a").out("knows").as("b"),  
    as("a").out("created").as("c"),  
    as("b").out("created").as("c"),  
    as("c").in("created").count().is(2)).  
    select("c").by("name")
```



# Positioning graphs Scalability and flexibility



# HandsOn #5 Graph Databases



**Docker and Compose**



**GitHub**

**Repository:**

- [github.com/datastaxdevs/  
workshop-introduction-to-nosql](https://github.com/datastaxdevs/workshop-introduction-to-nosql)



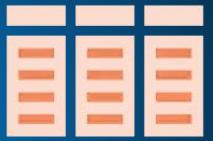
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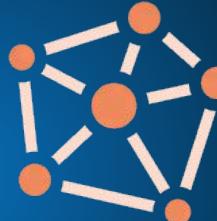
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TakeAways



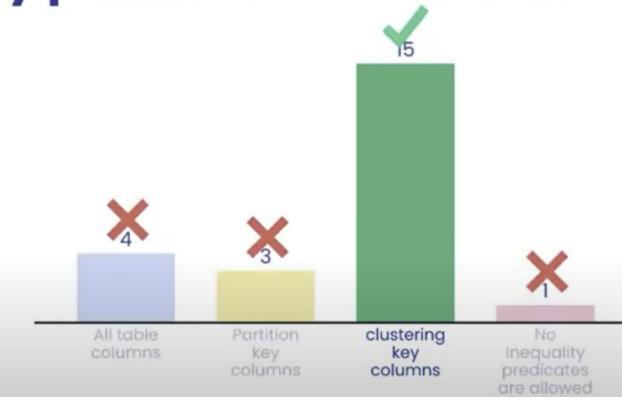
# PLAY WITH US !



menti.com

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

Inequality predicates are allowed on ...



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

Leaderboard

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

DataStax

# SWAG WINNERS



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

To claim your prize, please send an email to:

[jack.fryer@datastax.com](mailto:jack.fryer@datastax.com)

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

# A Badge when completing homework *(certifies attendance + workshop completion)*

Intro to NoSQL Homework

cedrick.lunven@datastax.com [Switch account](#)  Draft restored

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

\* Required

Email \*

cedrick.lunven@datastax.com

Full Name \*

Your full name (to be displayed on the badge)

Cedrick Lunven





# HOMEWORK

## #1 Hands-on [REQUIRED]

- [dtsx.io/nosql-ws-hw](https://dtsx.io/nosql-ws-hw)

## #2 Hands-on part Graph [OPTIONAL]

- Install docker, play with notebooks and show us screenshots.
- Go to [datastax.com/dev](https://datastax.com/dev) and use the [datastax.com/try-it-out](https://datastax.com/try-it-out)

All needed info in github repo

[github.com/datastaxdevs/](https://github.com/datastaxdevs/)

[workshop-introduction-to-nosql](https://github.com/datastaxdevs/workshop-introduction-to-nosql)



**Get your badge!**  
(and brag on LinkedIn)



The screenshot shows the DataStax website's 'Learn How to Succeed with Apache Cassandra™' page. At the top, there's a banner for 'LEVEL UP'. Below it, a section titled 'Learn How to Succeed with Apache Cassandra™' with a sub-section 'What is Cloud Native?'. A red box highlights the 'Try It Out' card, which contains a sub-card for 'What is Cloud Native?' with a 'Learn About Cloud Native' button. Other cards visible include 'Try It Out' and 'What is Cassandra?'.

**Did you know DataStax  
sponsors your education  
and certification?**

Get your voucher and become a certified NoSQL developer FOR FREE!

# Claim your **FREE** Certification Voucher



Vouchers (normally 145\$ each exam)

- valid for 3 months
- valid for 2 attempts

[datastax.com/dev/certifications](http://datastax.com/dev/certifications)

Claim using the link:  
[dtsx.io/workshop-voucher](https://dtsx.io/workshop-voucher)



# LEARNING PATHS at the [academy.datastax.com](https://academy.datastax.com)



# Weekly Workshops

[datastax.com/workshops](https://datastax.com/workshops)

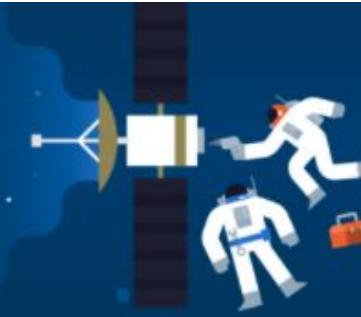


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## Cloud Native Workshops

Level Up with the DataStax Developers



### Upcoming Live Events

LIVE hands-on workshop //

#### Introduction to Apache Cassandra™

August 11 or 12 8:30pm IST | 5pm CET | 11am ET

LEVEL UP Developers

MULTIPLE DATES

#NoSQL Workshop - Introduction to Apache Cassandra™

[Register Now](#)

LIVE hands-on workshop //

#### Analyzing Apache Cassandra™ Data with GPUs

with special guests NVIDIA

LEVEL UP Developers

August 16 8:30pm IST | 5pm CET | 11am ET

MON AUG 16 2021

Workshop: Analyzing Cassandra Data with GPUs

[Register Now](#)

LIVE Cassandra Meetup Français

#### Quoi de neuf avec Apache Cassandra™ et DataStax

LEVEL UP Developers

September 10 4:30pm CEST

FRI SEP 10 2021

MEETUP: Quoi de neuf avec Apache Cassandra™ et DataStax

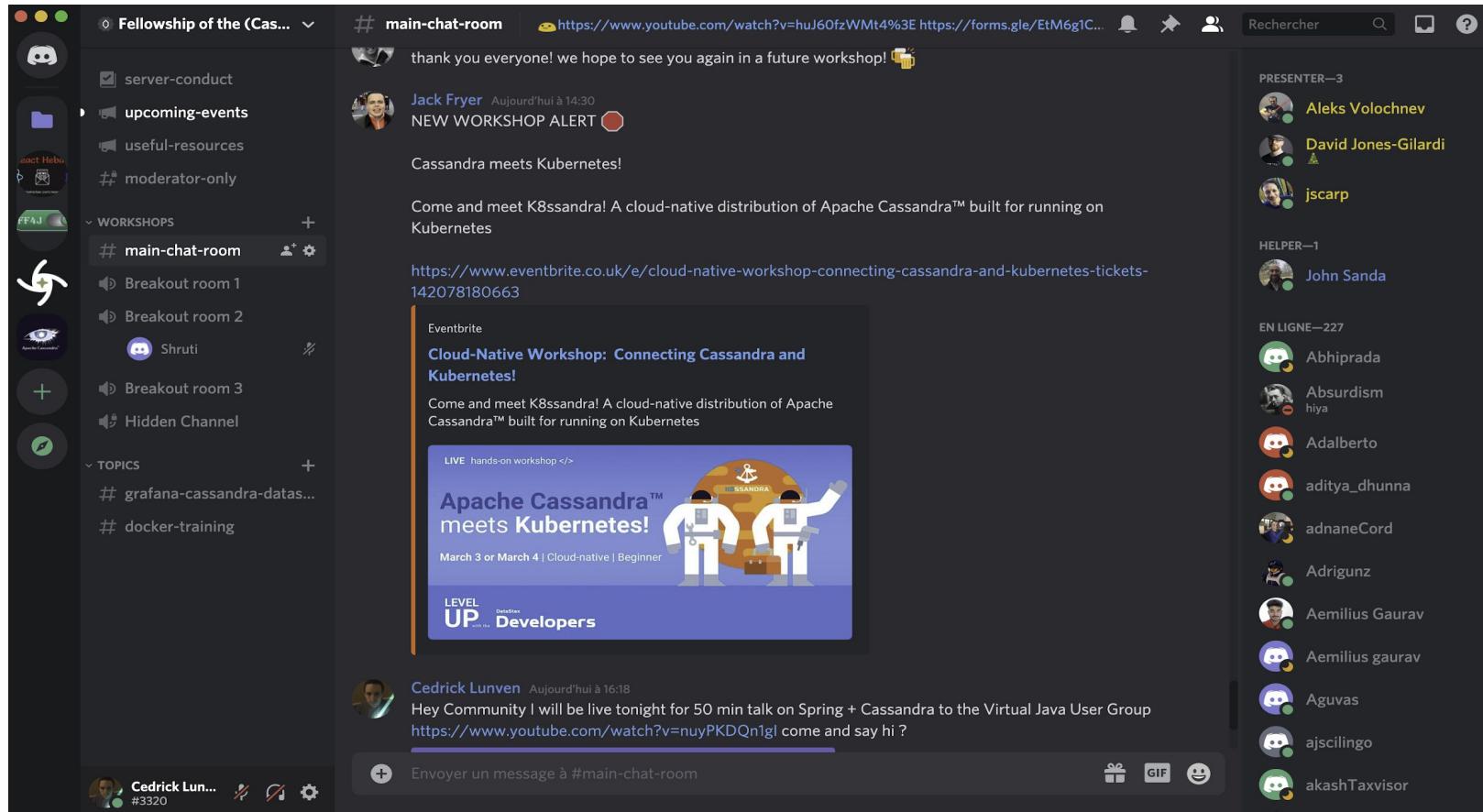
[Register Now](#)

DataStax Developers

# Join our 16k Discord Community

## DataStax Developers

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





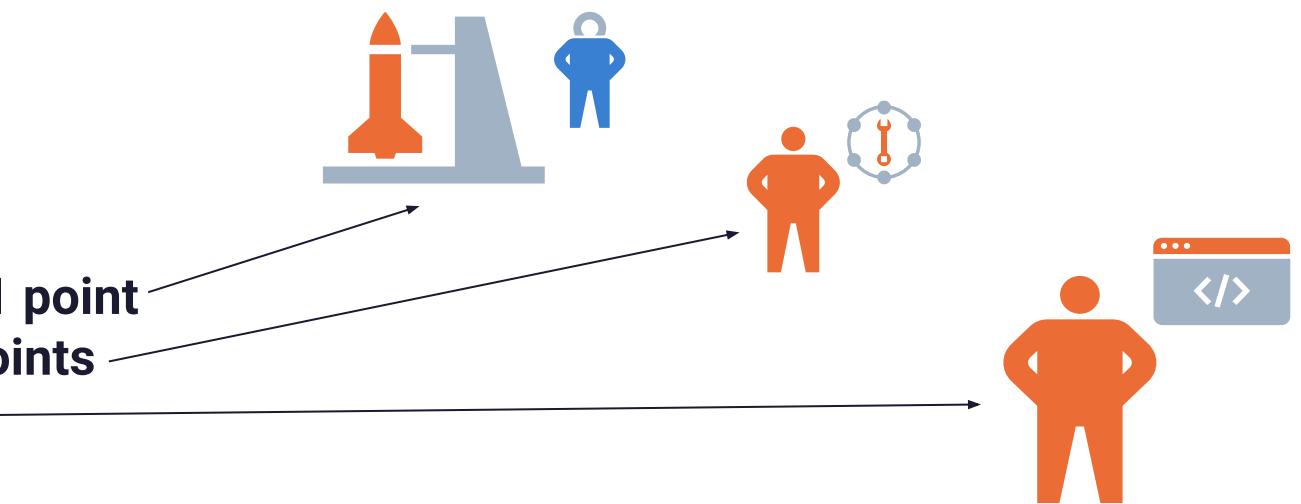
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[dtsx.io/staxgiving](http://dtsx.io/staxgiving)

500\$ + 250\$ + 250\$ AMAZON gift cards to win

#### CONDITIONS

- **#engage-with-us** : Tasks that will earn you 1 point
- **#work-with-us**: Tasks that will earn you 5 points
- **#build** : Tasks that will earn you 10 points.



**DUE DATE** THANKSGIVING DAY => 25/11

Winners randomly chosen **LIVE** on 12/8

# DataStax Developers

Thank you!



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