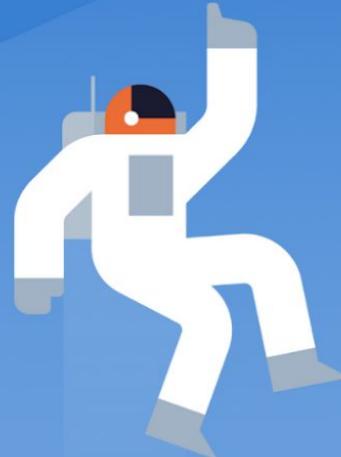




Introduction to NoSQL Databases



LEVEL
UP
with the

DataStax
Developers

Your presenters



Cedrick Lunven

Director of Developer Advocacy

Apache Cassandra™ expert

Open Source Developer

Java Geek

 @clun

  @clunven

FF4J



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



Aleks Volochnev

Developer Advocate at DataStax

- Apache Cassandra™ expert
- Experienced developer and educator
- Certified cloud architect



Cedrick Lunven

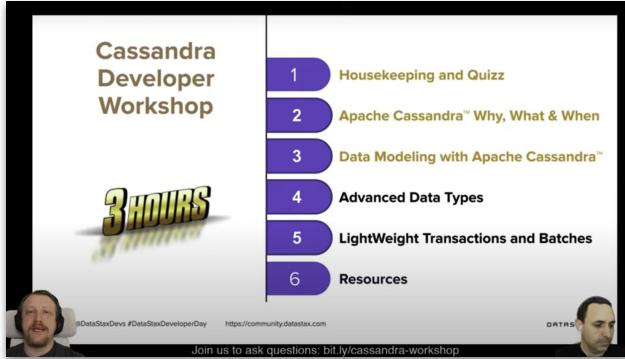
Director of Developer Advocacy at DataStax

- Apache Cassandra™ expert
- Kubernetes rookie
- Java Geek



Housekeeping

Livestream: youtube.com/DataStaxDevs



YouTube

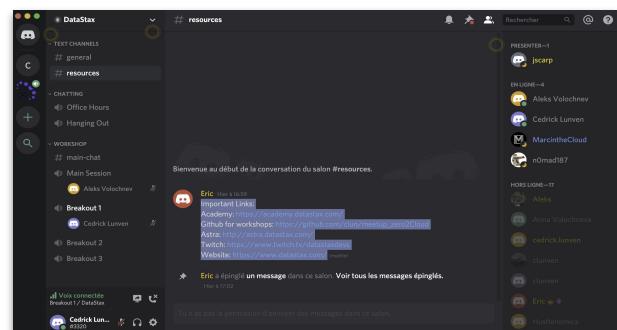


Twitch

Runtime: dtsx.io/workshop

DataStax
Astra

Questions: bit.ly/cassandra-workshop



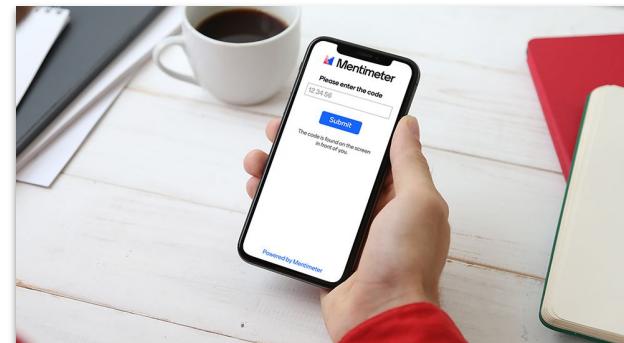
Discord



YouTube



Quizz: menti.com



Mentimeter



Achievement Unlocked!

dtsx.io/badges



K8ssandra Workshop

Awarded to **Sylwester Lachiewicz** · slachiewicz@gmail.com
Issued on **Mar 5, 2021**

Upgrade Complete! This badge is to certify successful completion of the DataStax K8ssandra Workshop: "Running Apache Cassandra on Kubernetes".

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To earn this badge, individuals must complete the following steps during the **K8ssandra Workshop**:

- Attend the lecture
- Complete the practical steps by doing all required exercises

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DataStax Developers

TAGS
kubernetes
cassandra



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Tom Rota
Joel Reis
Francesco Abbate

Sylwester Lachiewicz
Ankit Bhavsar
Jasbir Singh

AND MANY OTHERS!

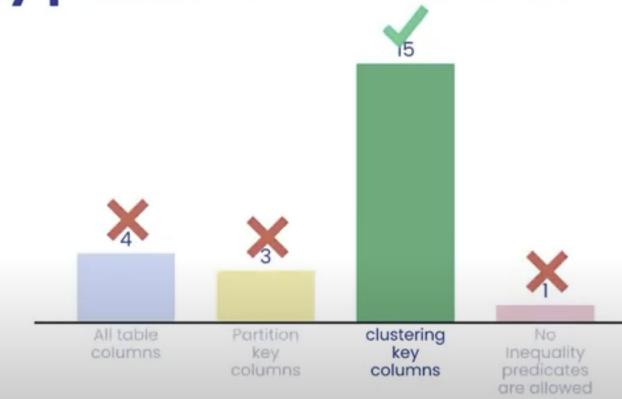
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Leaderboard

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

Hands-on exercise material



Get your instance here:

- <http://dtsx.io/workshop>



Repository:

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



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objectives of NoSQL

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Tabular
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Databases



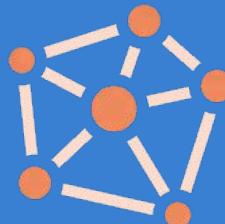
04



Key/values
Databases

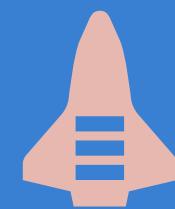
05

Graph
Databases



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Games
TakeAways



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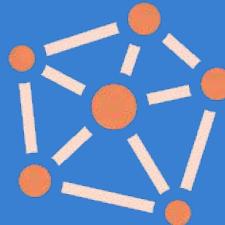
04



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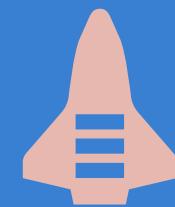
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TakeAways



Get Ready = Hands-on #1



DataStax

Astra

Get your instance here:

- <http://dtsx.io/workshop>

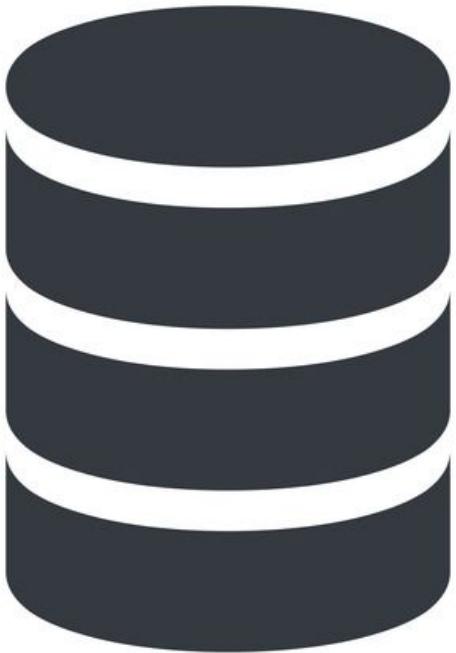


GitHub

Repository:

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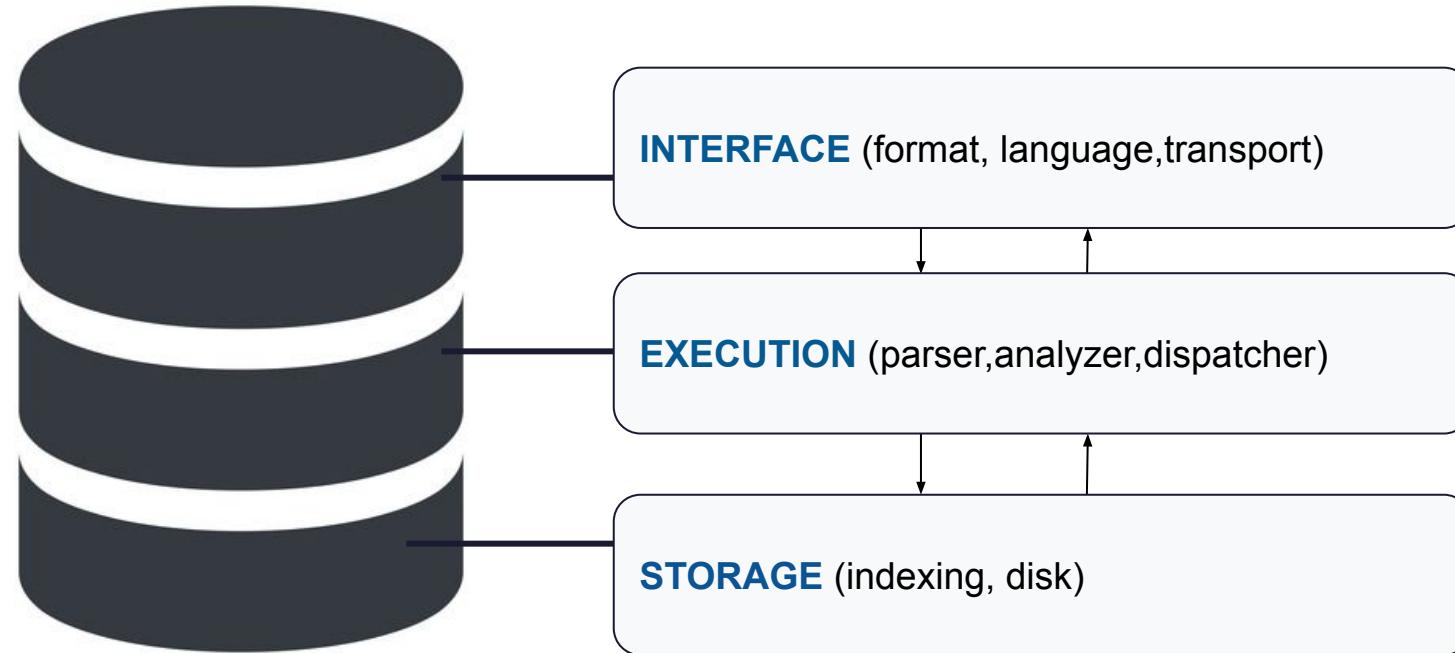
Databases



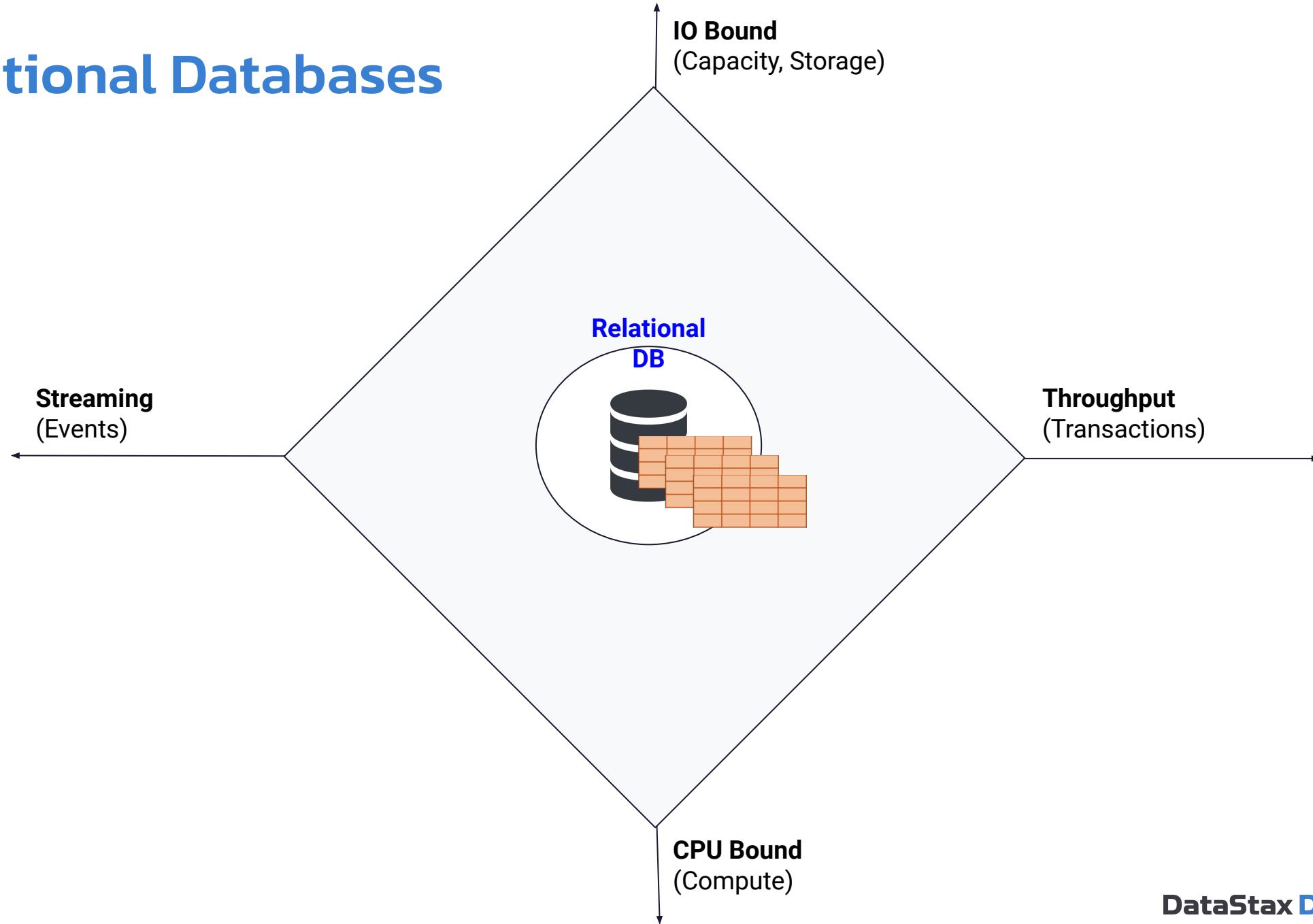
**Software to save
stuffs
and
retrieve them later
with queries**

“That's all Folks!”

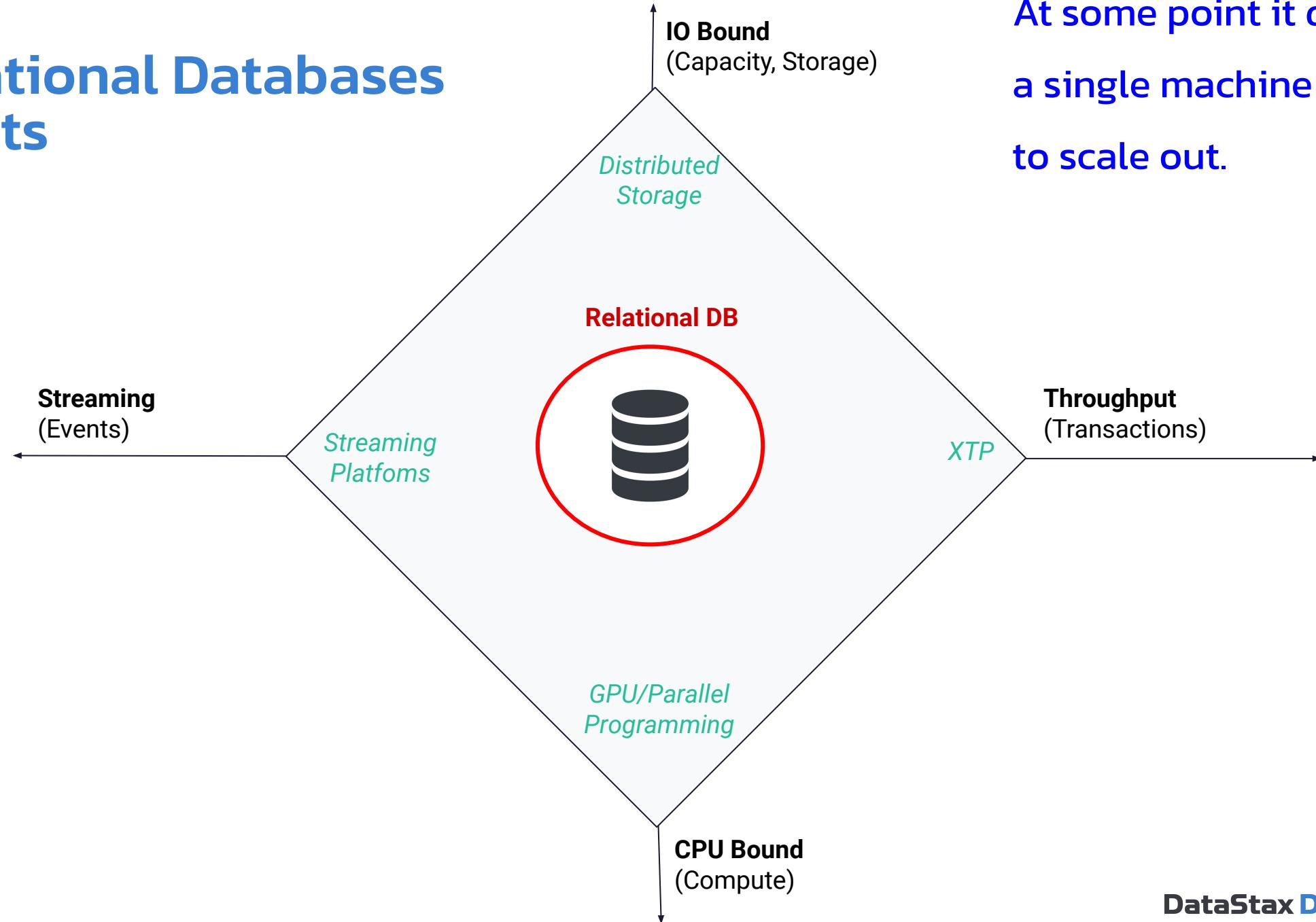
Databases



Relational Databases



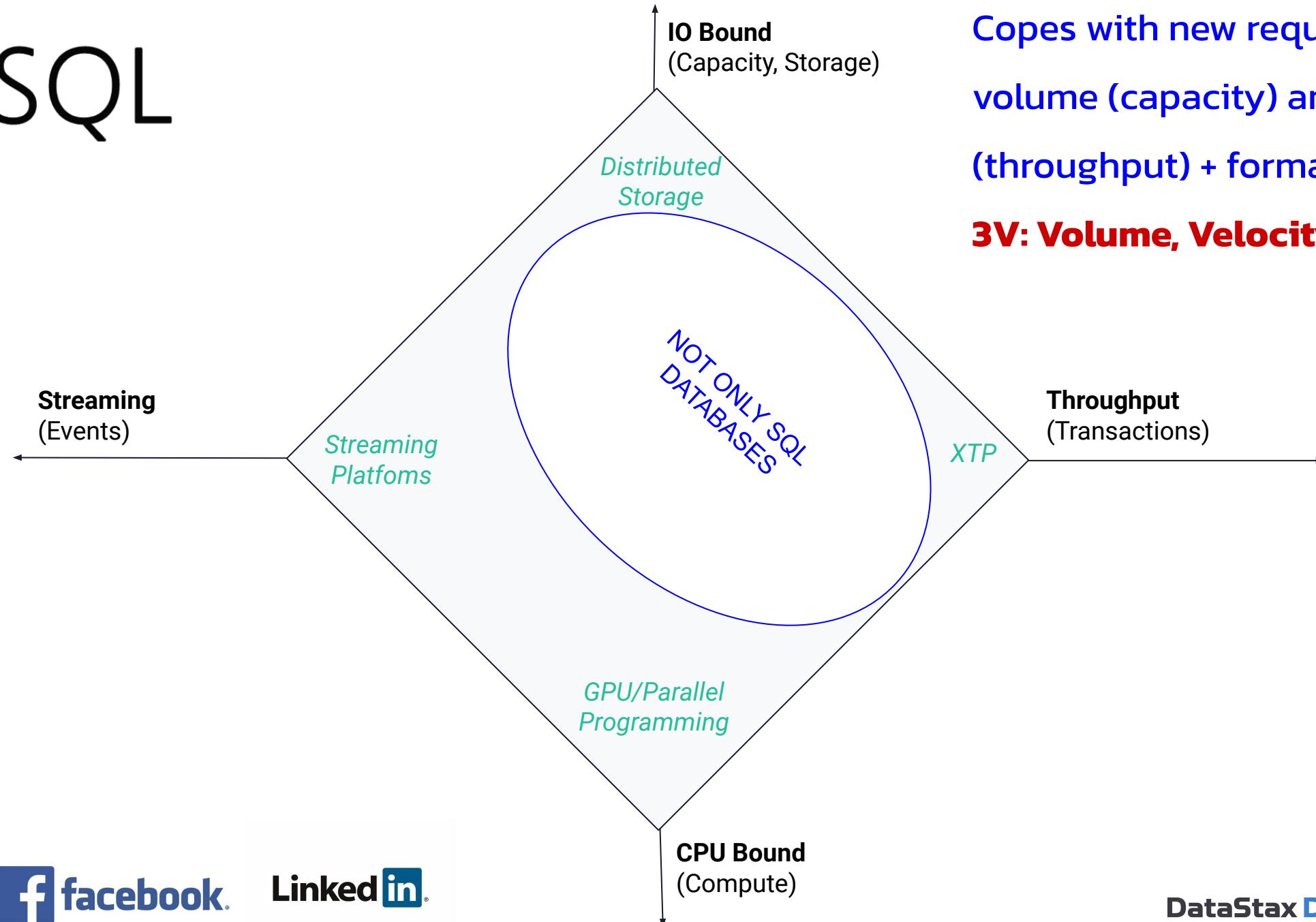
Relational Databases Limits



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



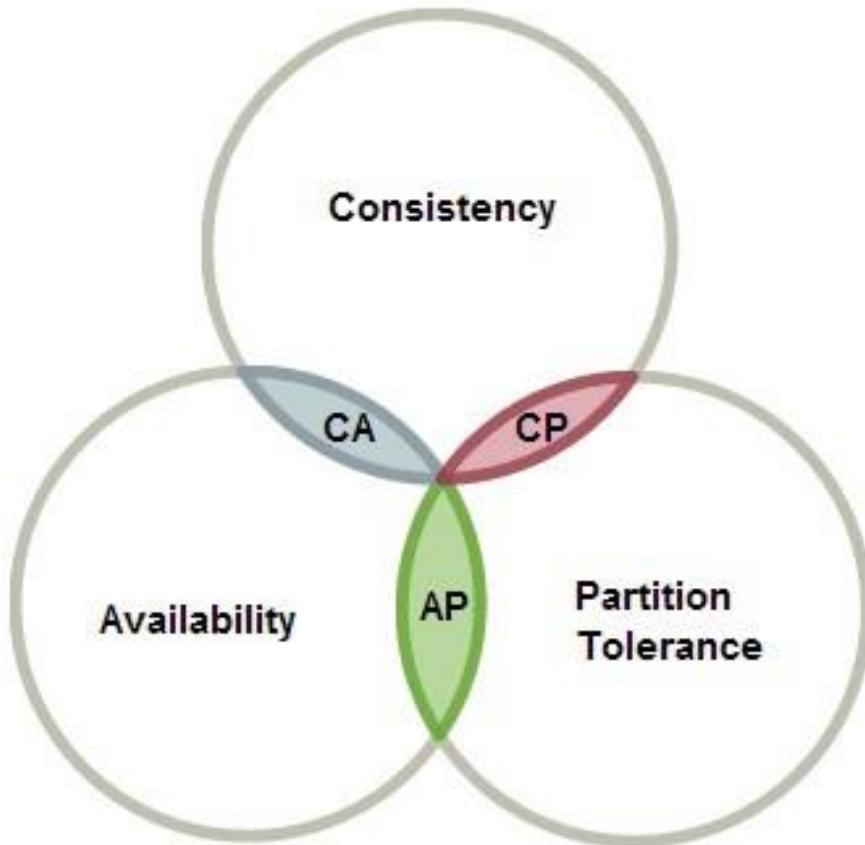
Not Only SQL



Copes with new requirements in volume (capacity) and velocity (throughput) + format (variety)

3V: Volume, Velocity, Variety

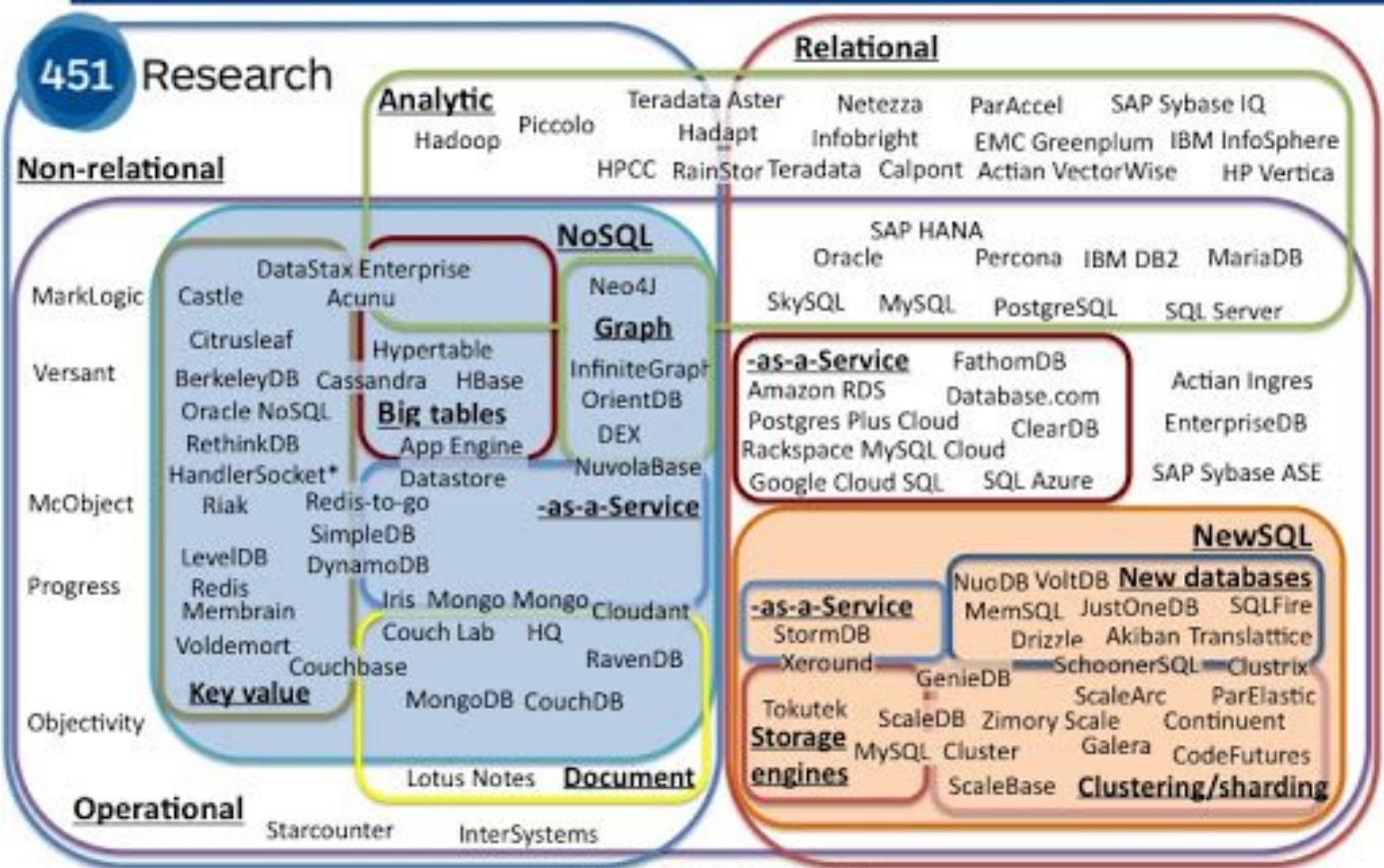
Introduction to the C.A.P Theorem (Eric Brewer)



**NoSQL are
Distributed Systems**

**Clouds like
Distributed Systems**

The evolving database landscape



Main NoSQL Databases Types

Column Oriented
Tabular



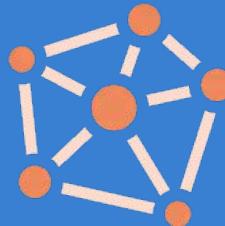
Document



Key/value



Graph



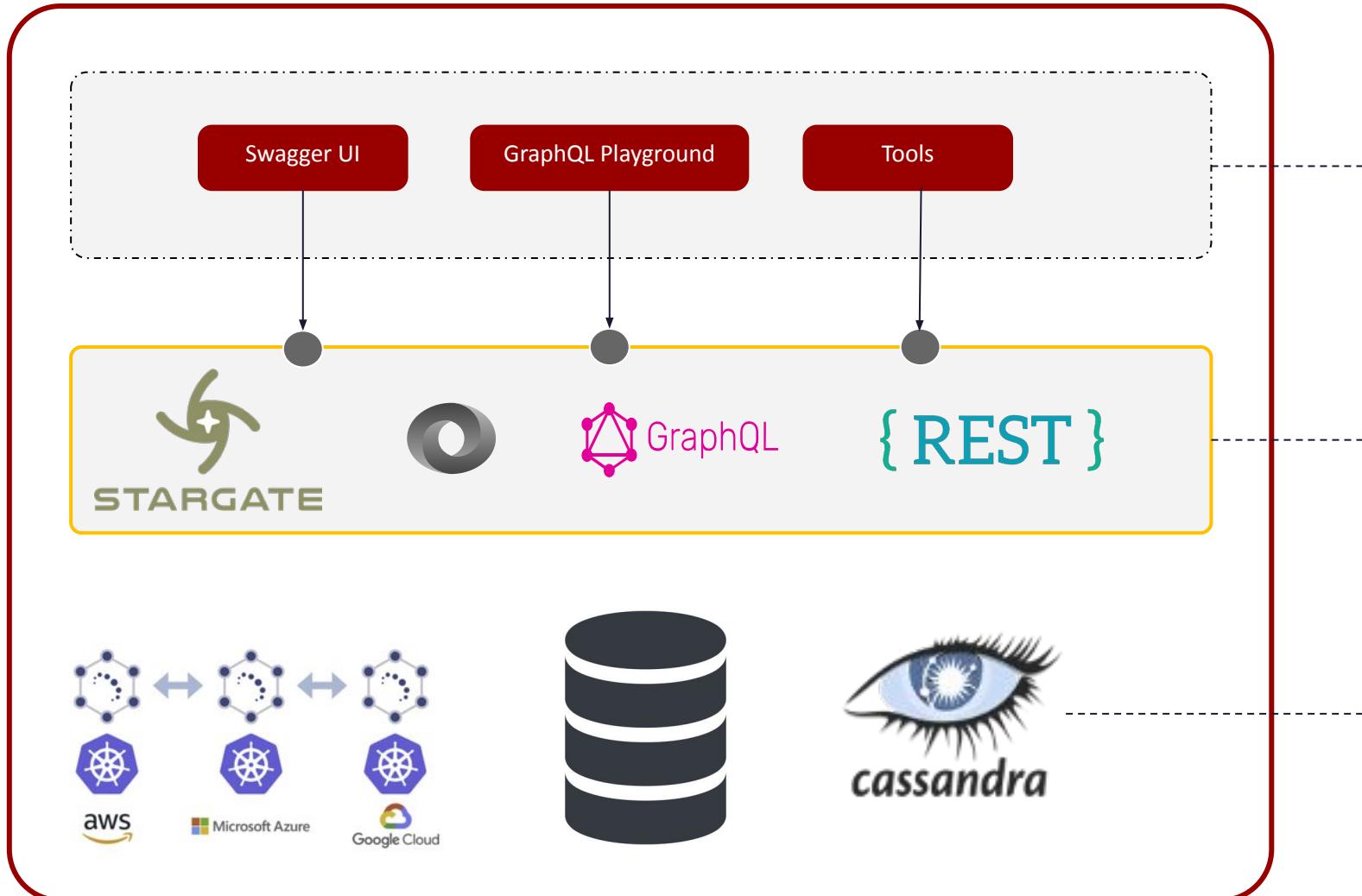
DataStax

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



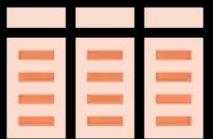
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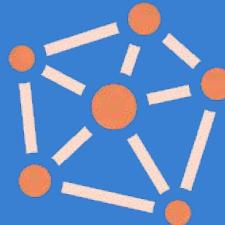
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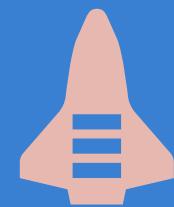
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Tabular or Column Type



Model: Stored Tables sharded on keys to distribute on nodes

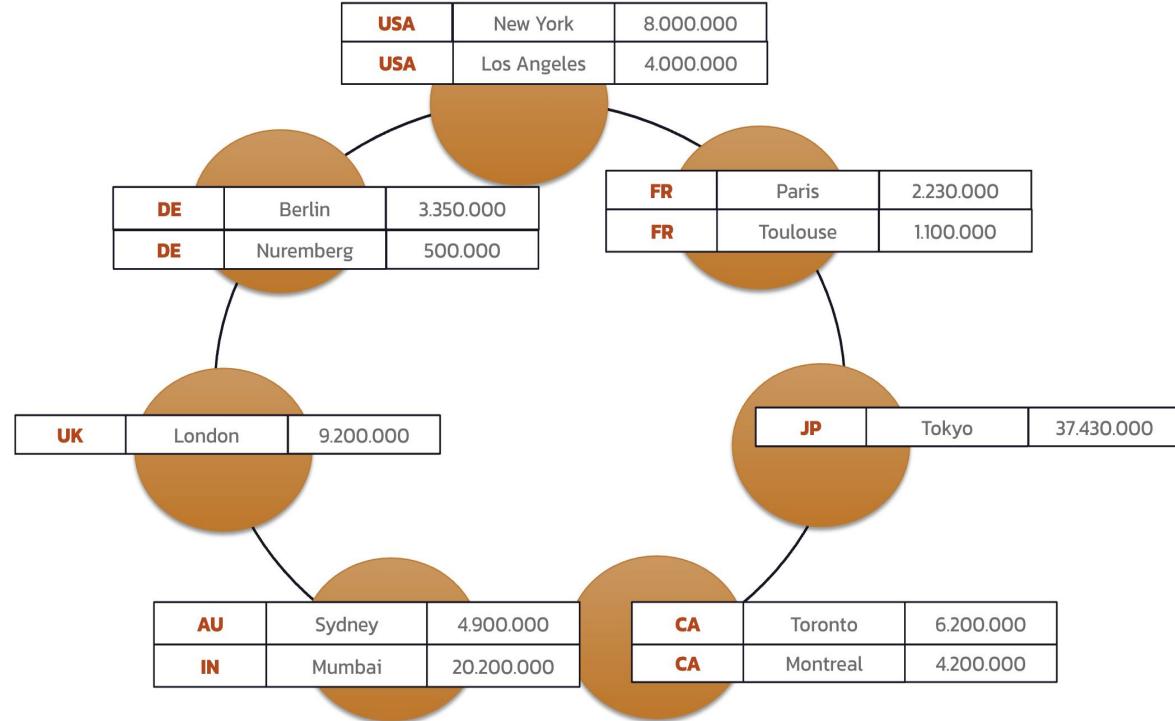
- Tables like relational (with a Schema)
- Important role of the key that distribute data and needed
- Data is stored sorted on disk

Query

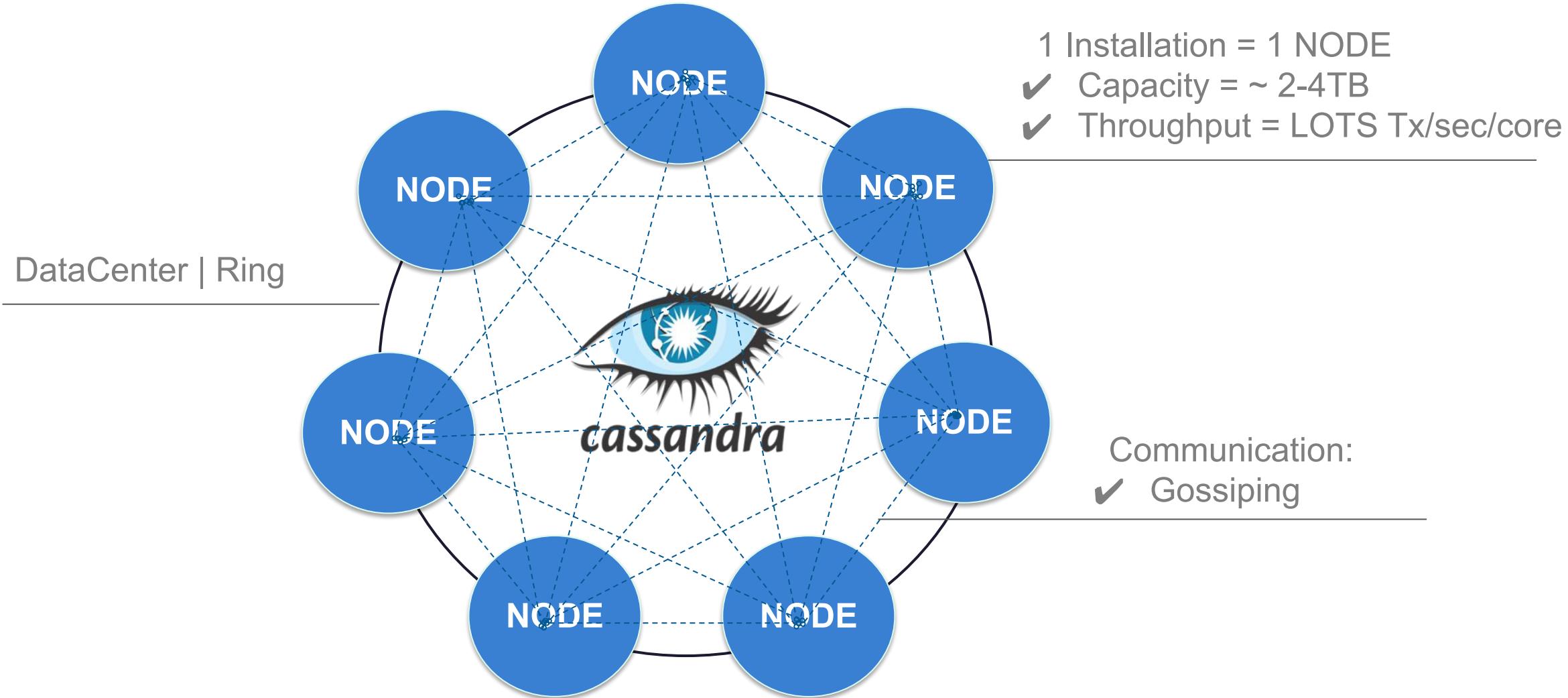
- Request with the partition key
- Secondary Indices are possible
- Select one or more columns for the record
- No joins but denormalization

Use Cases

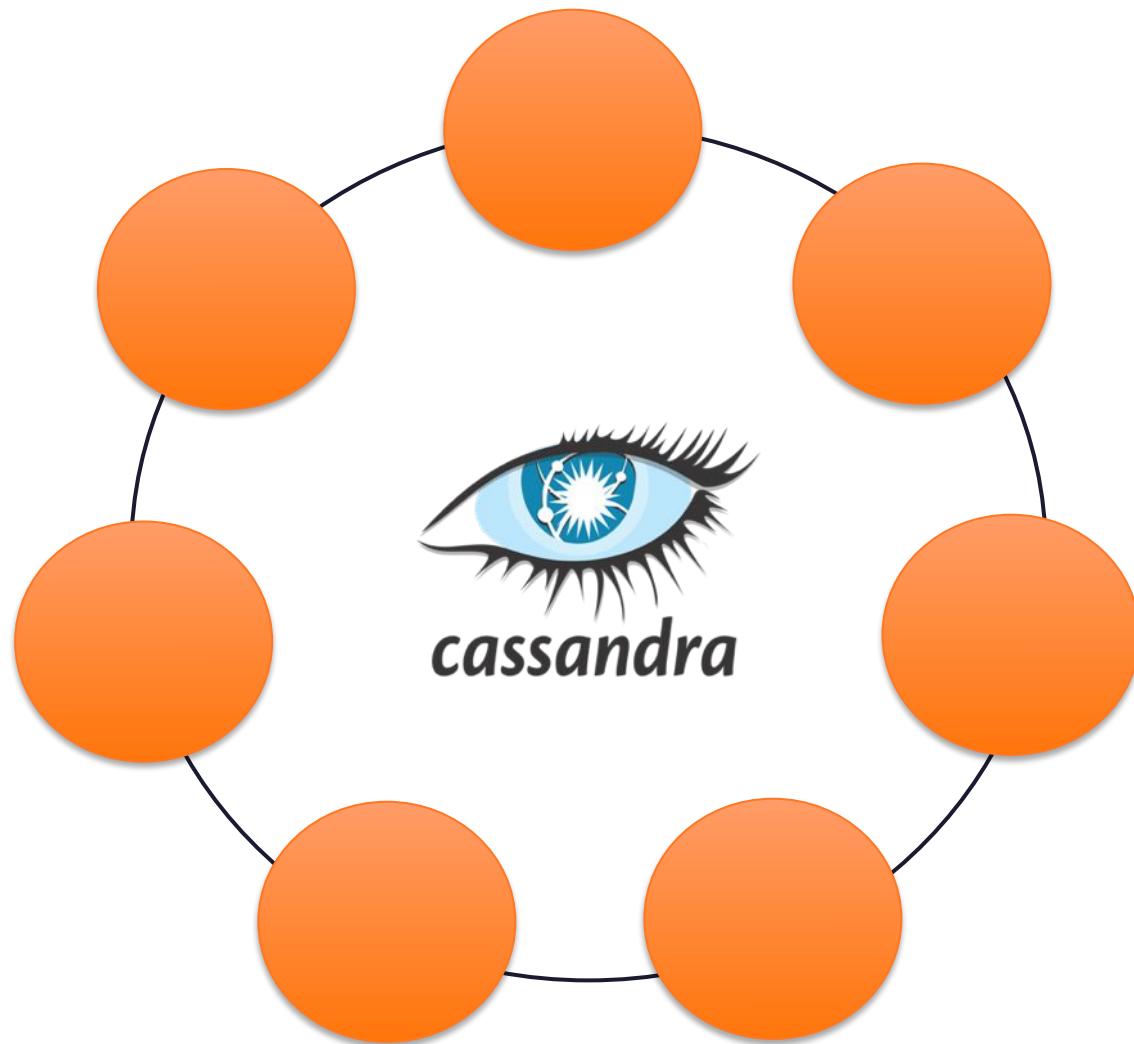
- CF CASSANDRA AFTER THAT



Apache Cassandra™ = NoSQL Distributed Database



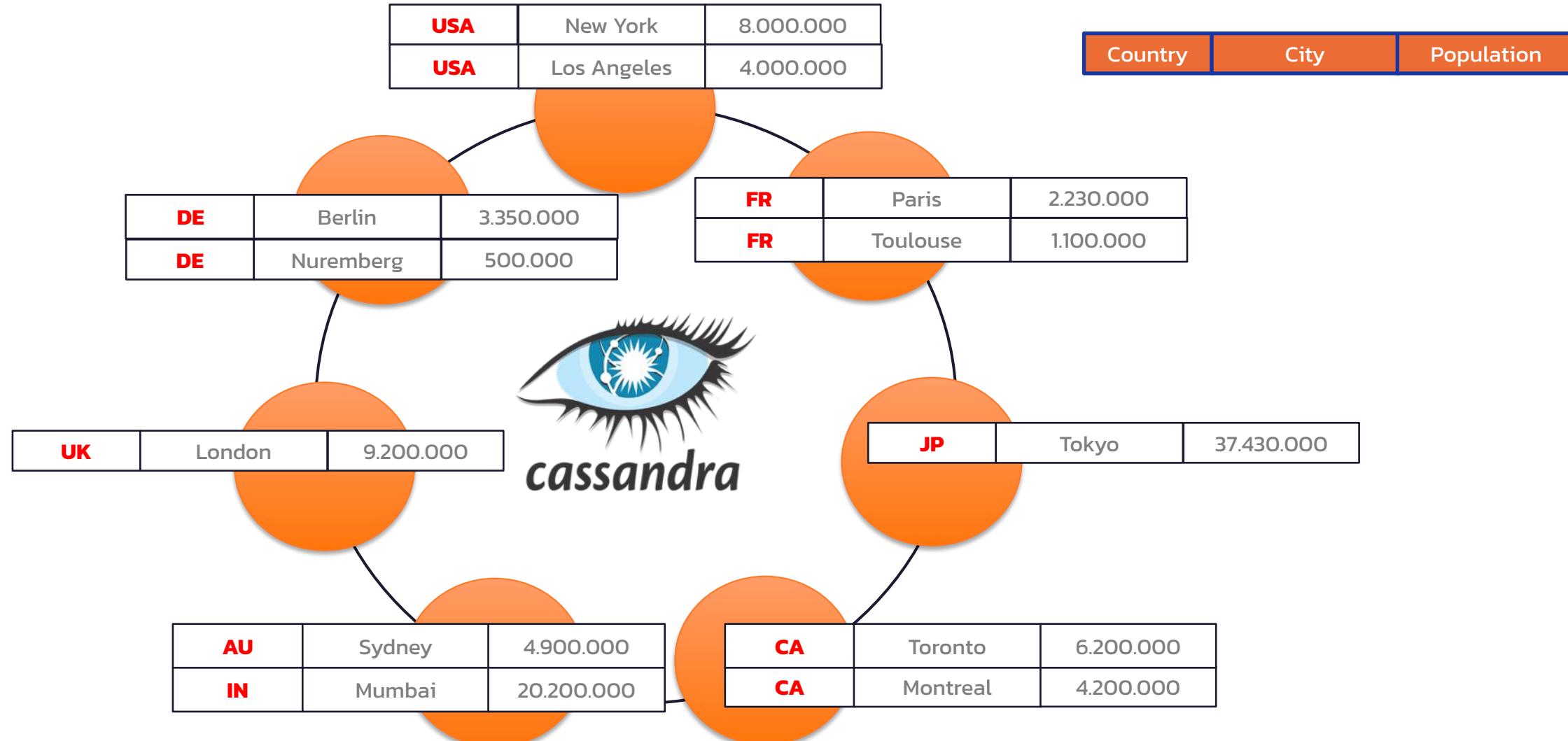
Data is Distributed



Country	City	Population
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

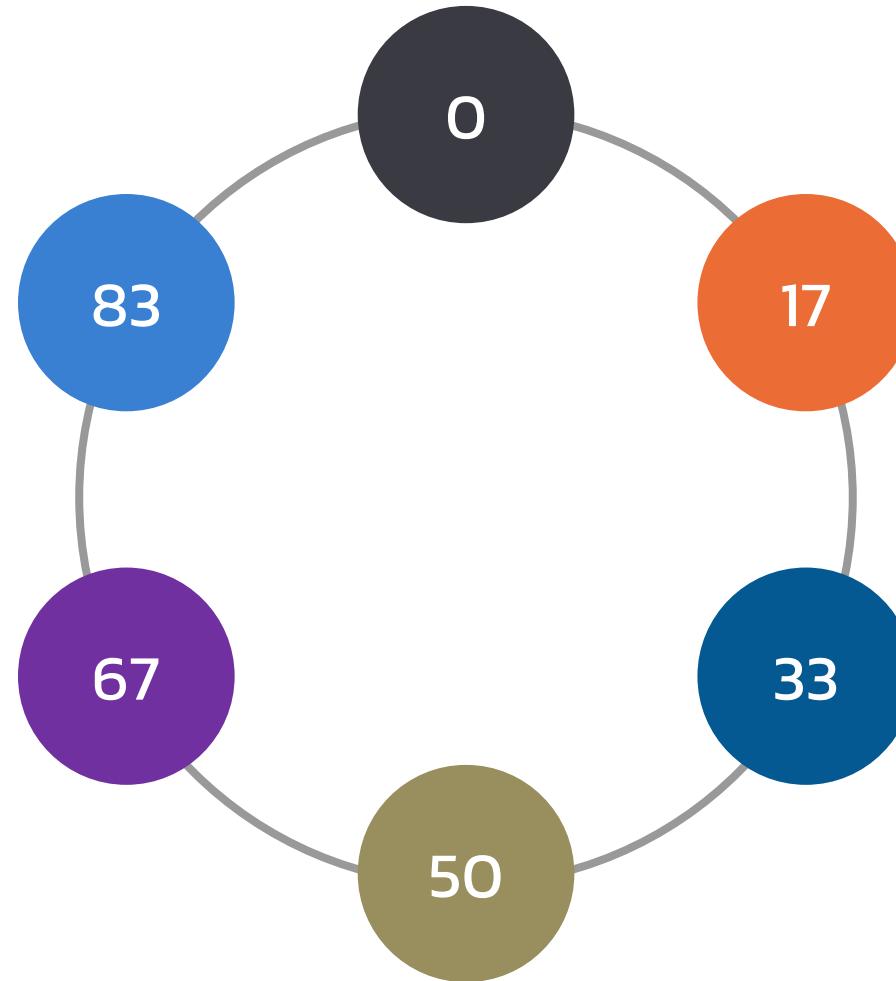
Data is Distributed



Data is Replicated

RF = ?

Replication Factor
means the number
of nodes used to
store each partition

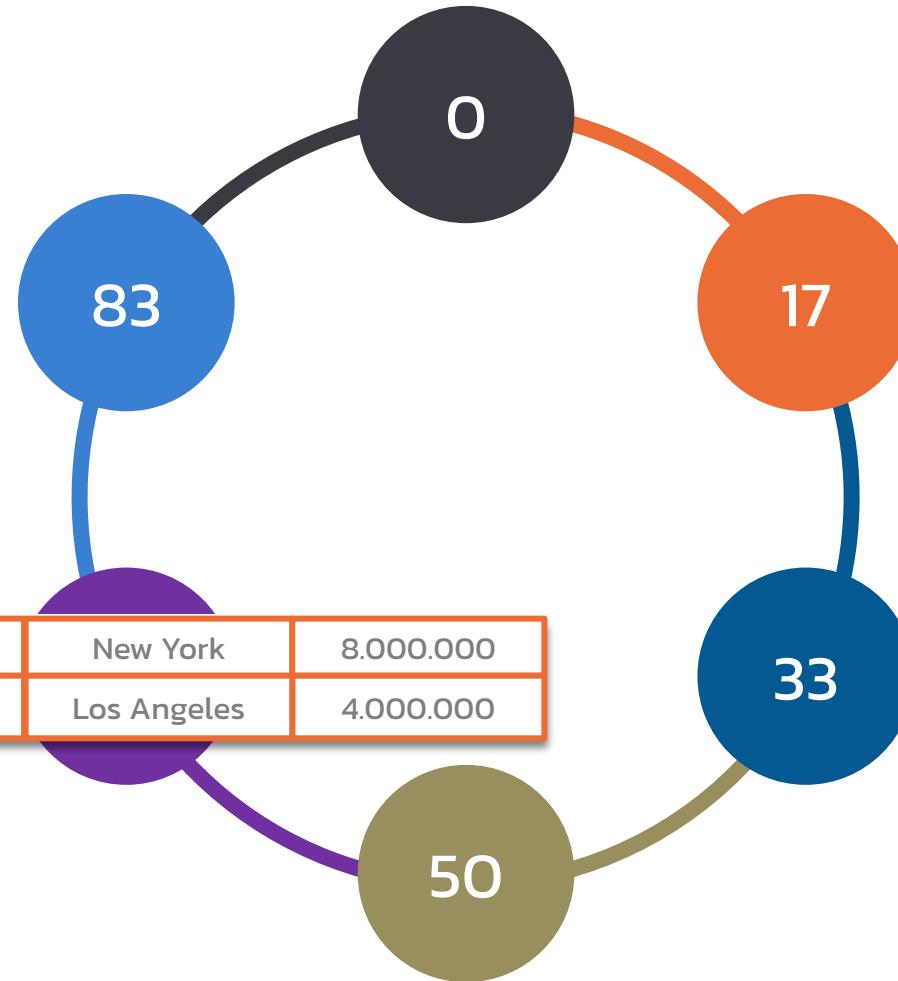


Data is Replicated

RF = 1

Replication Factor 1
means that every
partition is stored
on 1 node

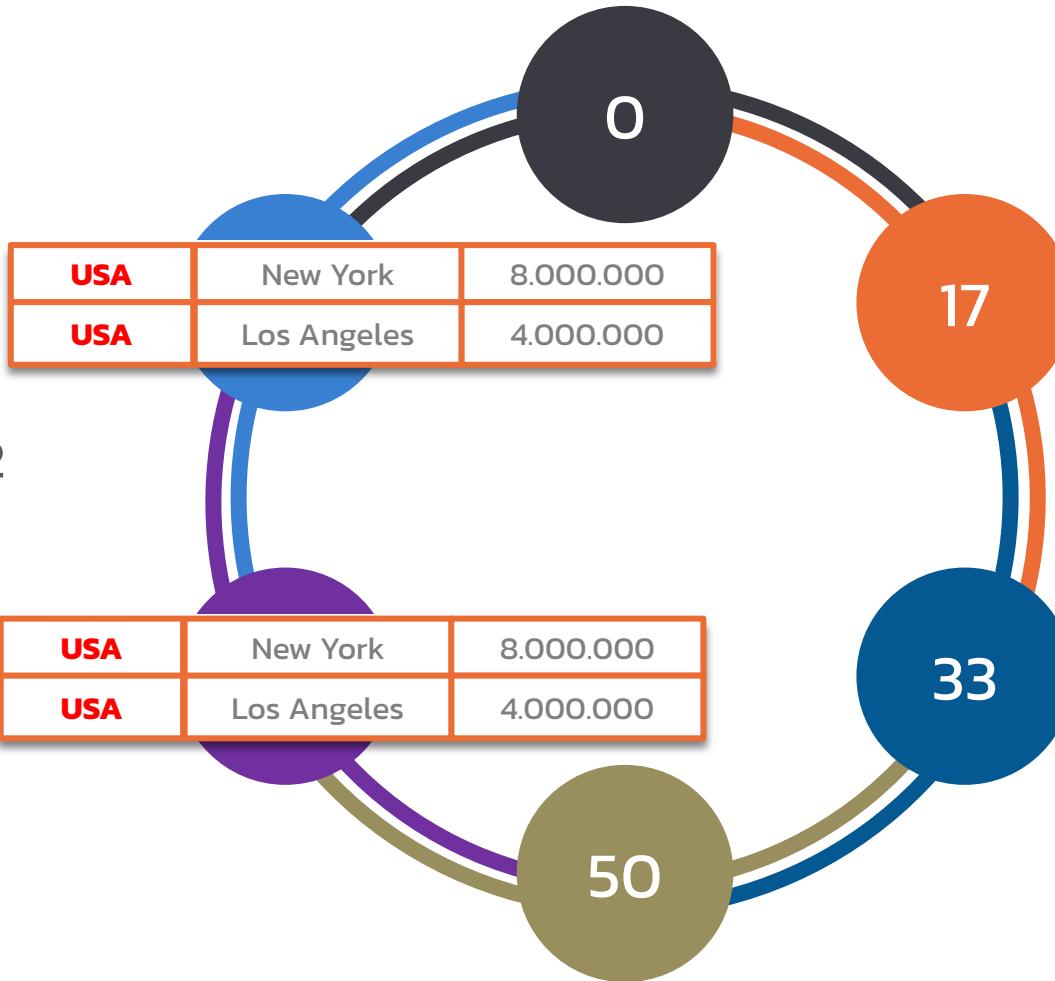
USA	New York	8.000.000
USA	Los Angeles	4.000.000



Data is Replicated

RF = 2

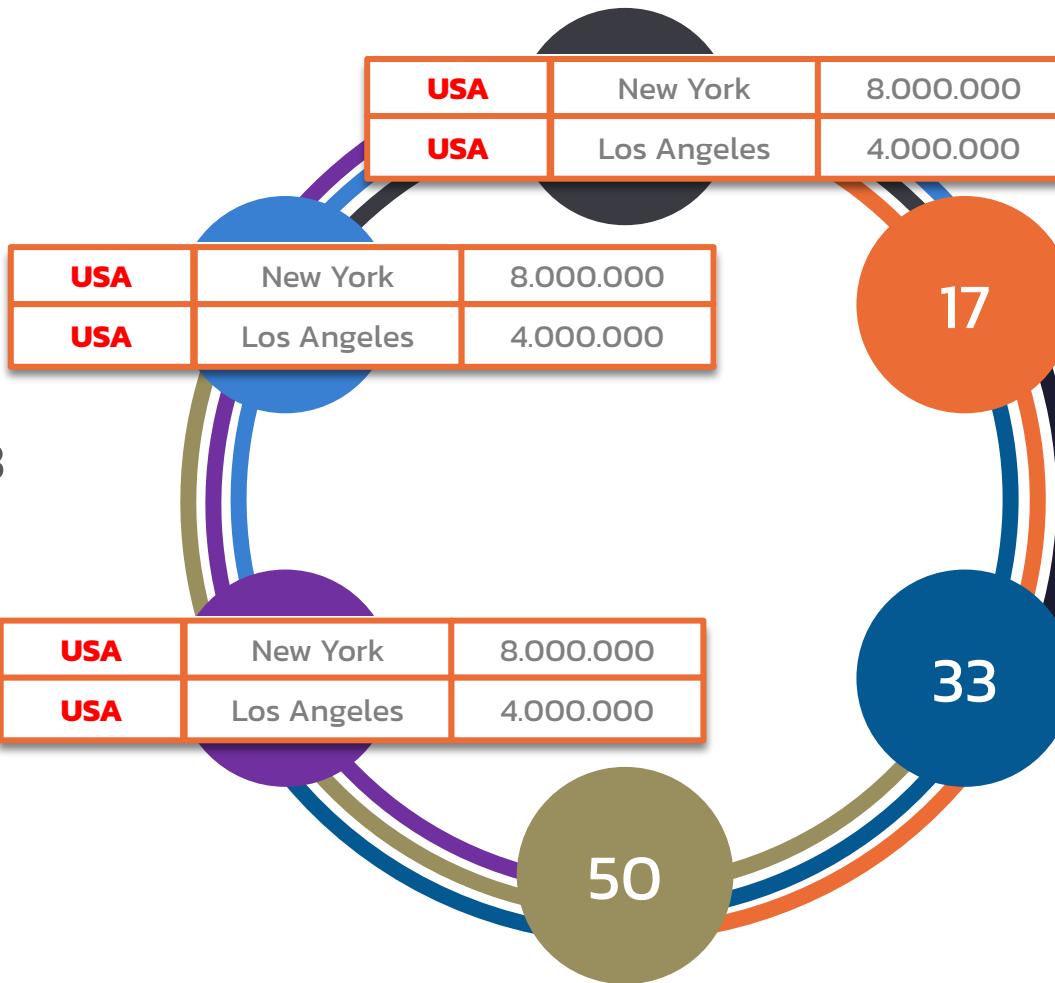
Replication Factor 2
means that every
partition is stored
on 2 nodes



Data is Replicated

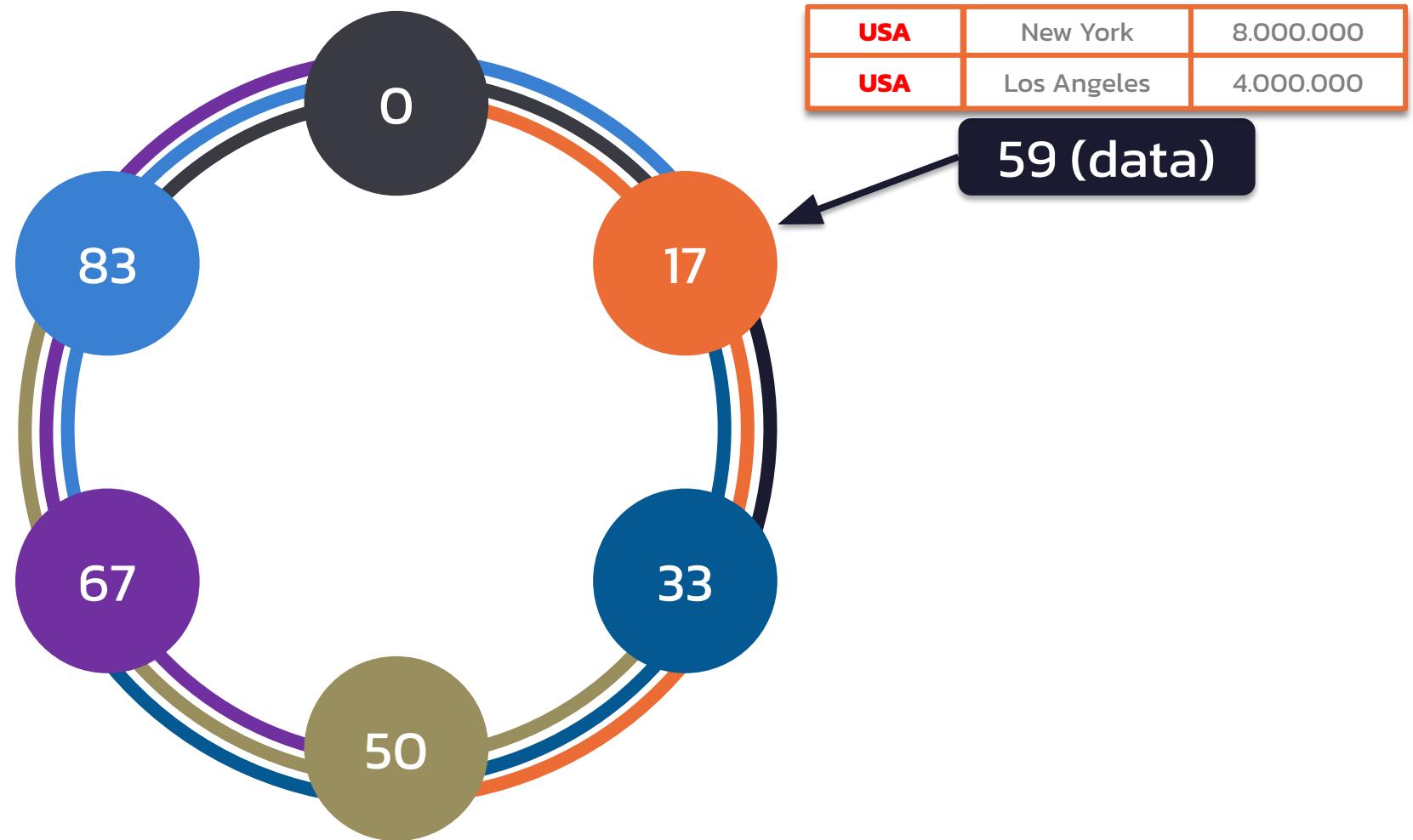
RF = 3

Replication Factor 3
means that every
partition is stored
on 3 nodes



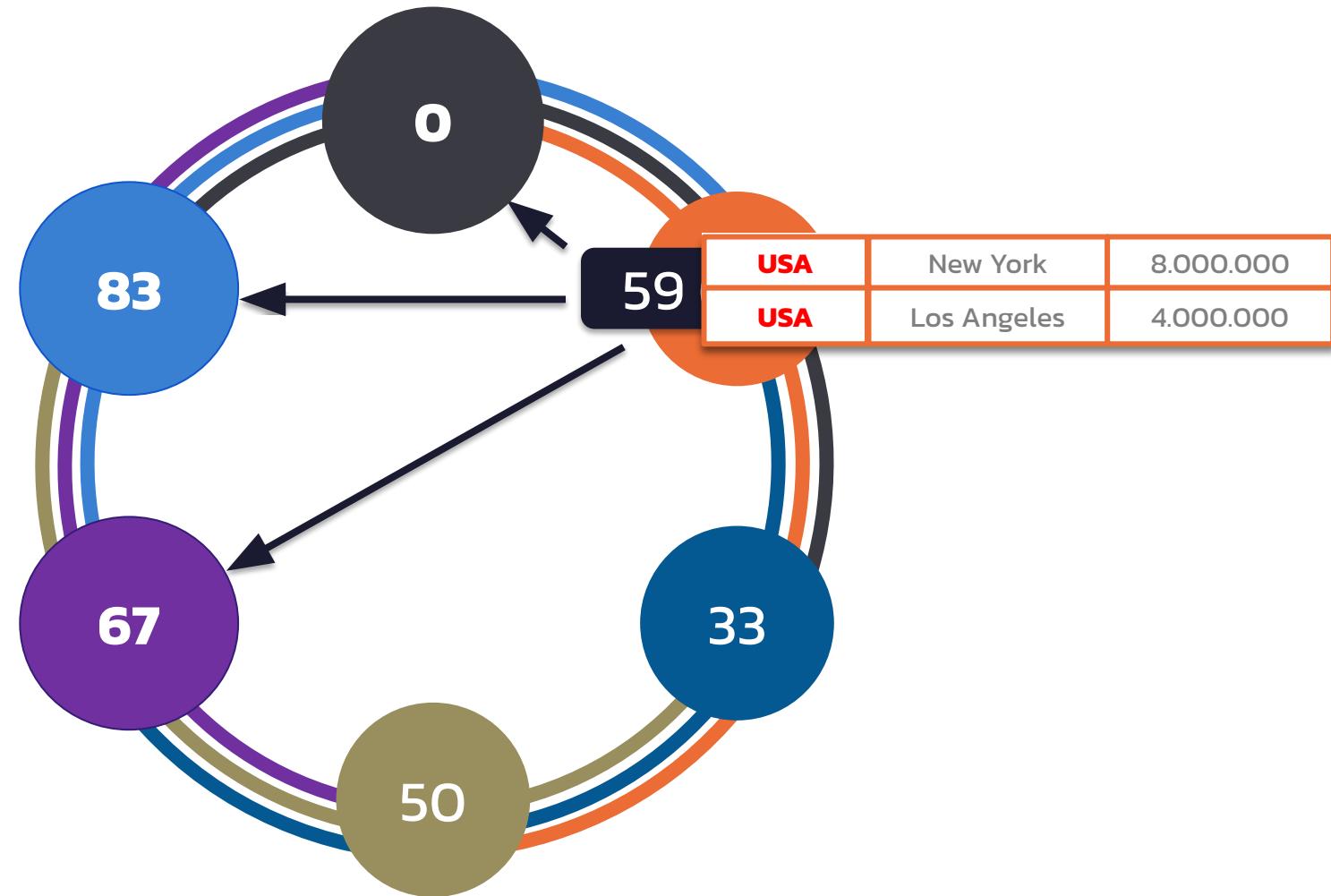
Replication within the Ring

RF = 3



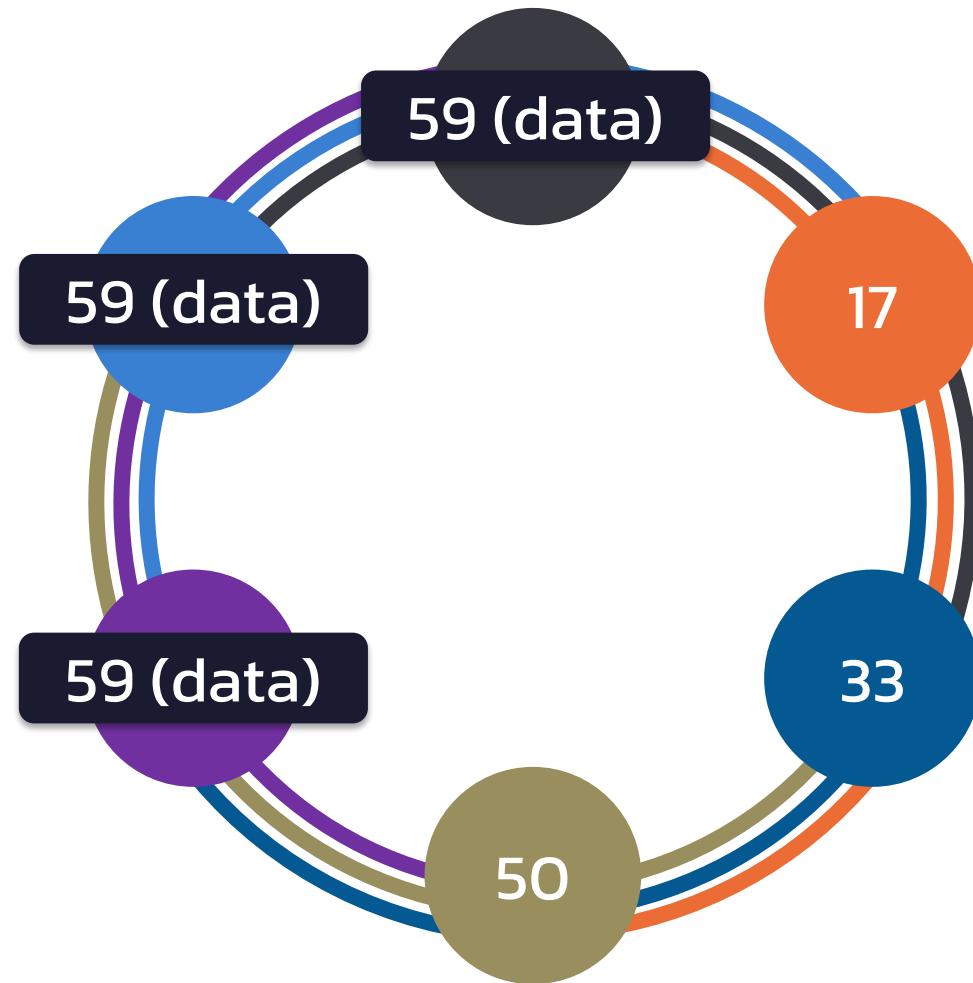
Replication within the Ring

RF = 3



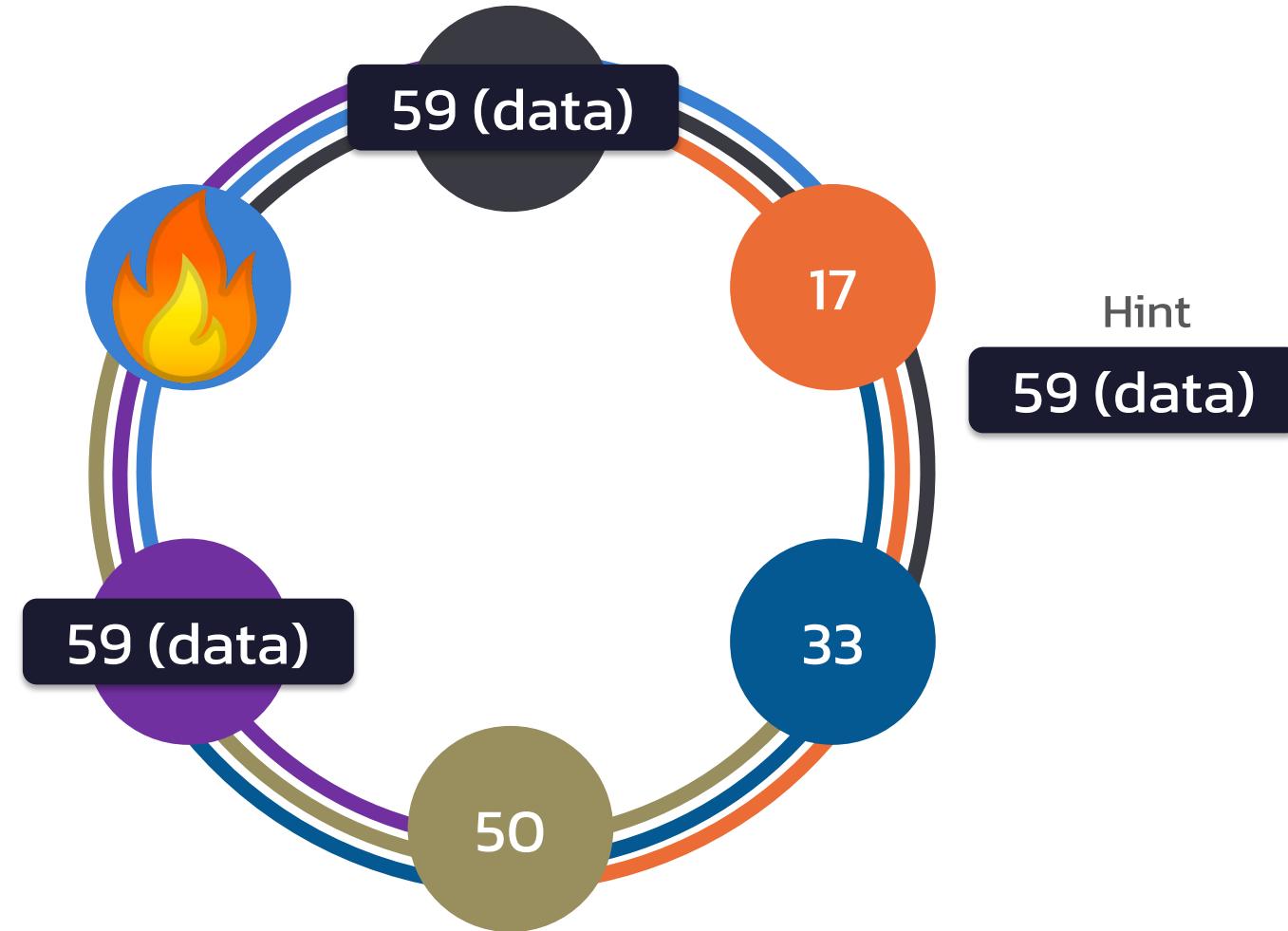
Replication within the Ring

RF = 3



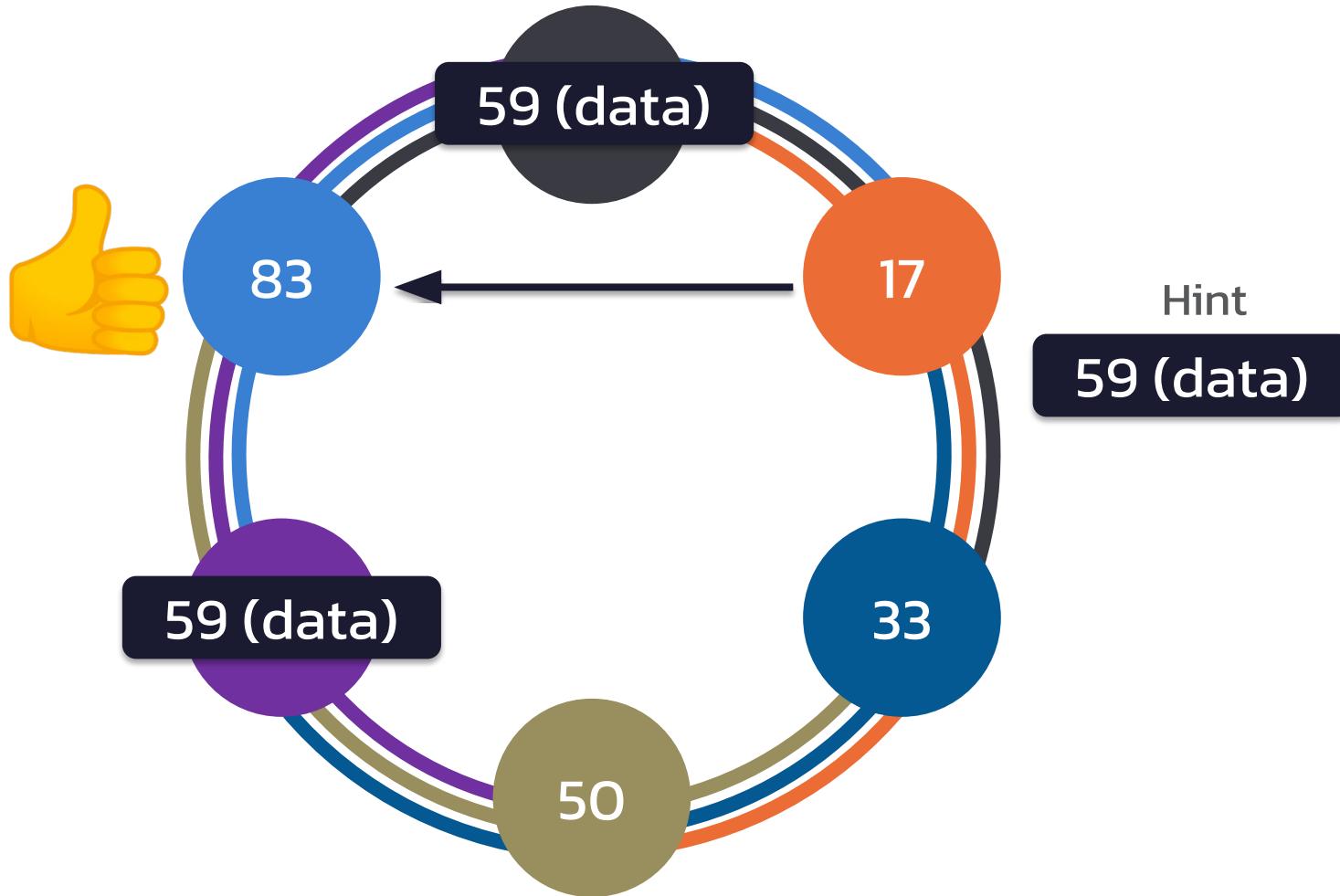
Node Failure

RF = 3



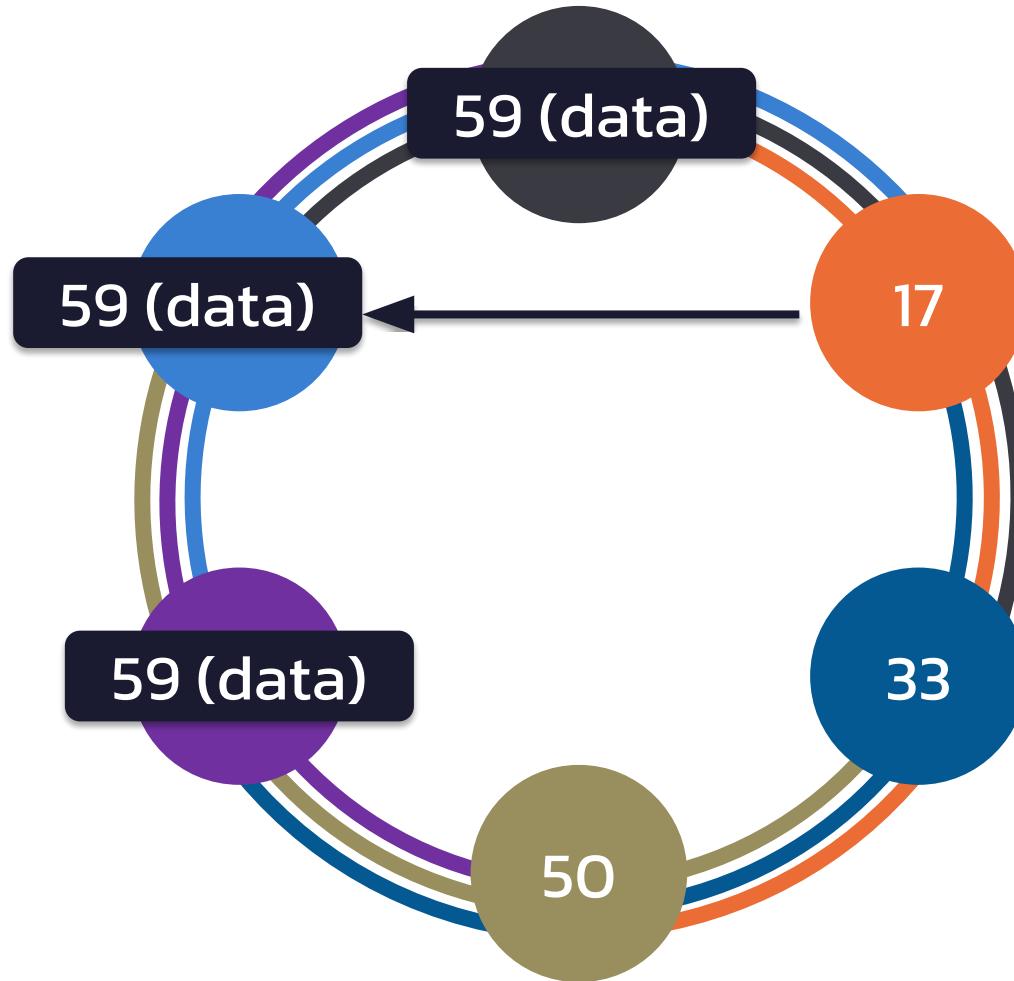
Node Failure Recovered

RF = 3



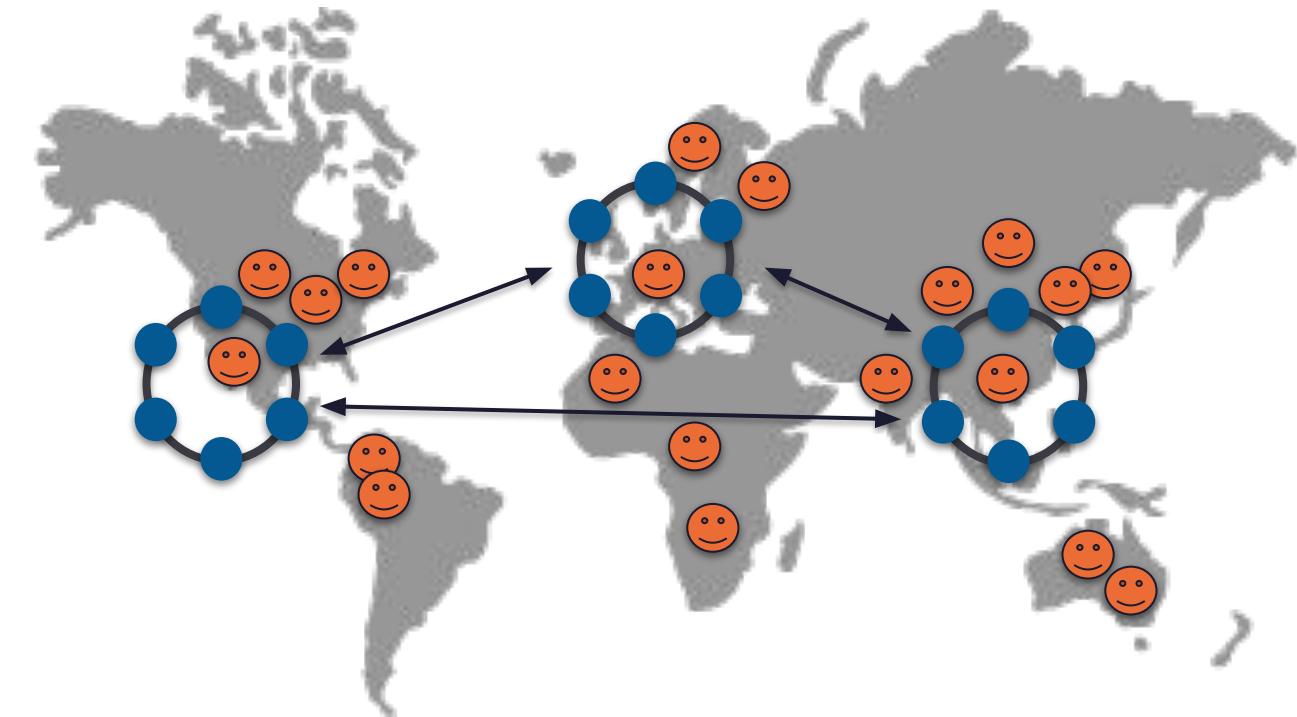
Node Failure Recovered

RF = 3

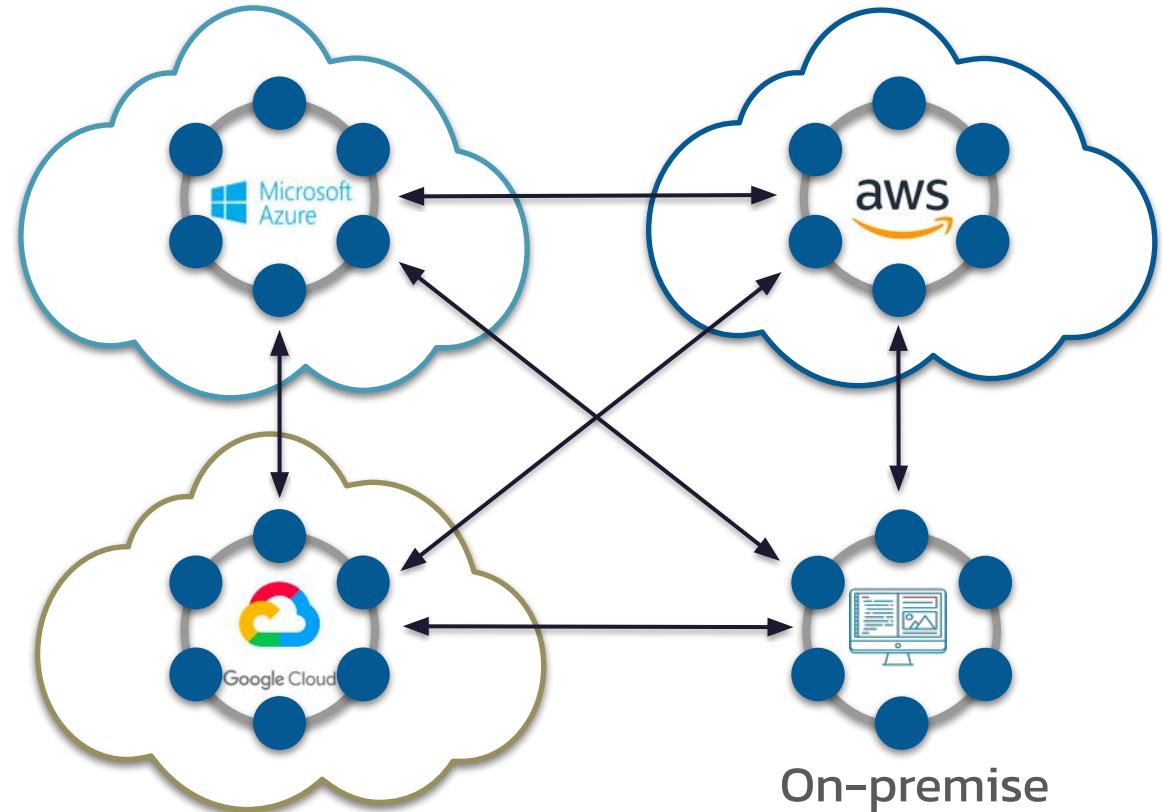


Data Distributed Everywhere

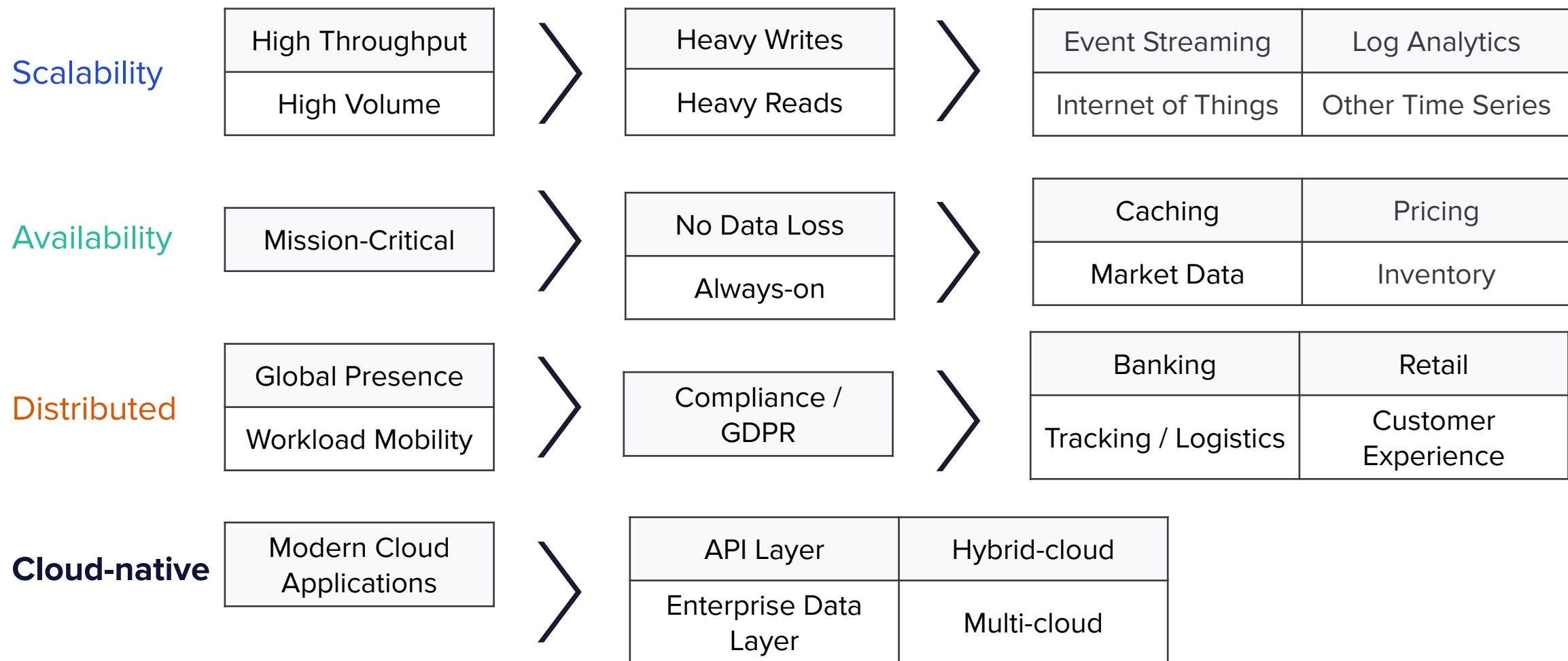
Geographic Distribution



Hybrid-Cloud and Multi-Cloud



Understanding Use Cases



HandsOn #2 Tabular Databases



DataStax

Astra

Get your instance here:

- <http://dtsx.io/workshop>



GitHub

Repository:

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

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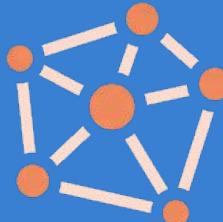
04



Key/values
Databases

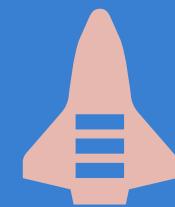
05

Graph
Databases



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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

Document Shredding

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

41

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	<small>42</small>
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	43
x	c	[0]	d	2	

HandsOn #3 Documents DB



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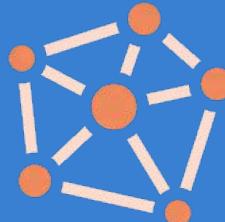
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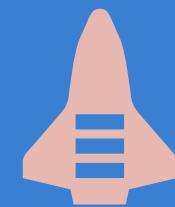
05

Graph
Databases

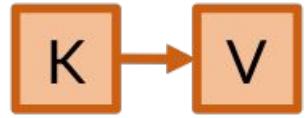


06

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



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GitHub

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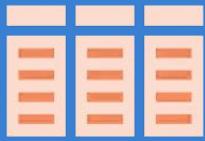
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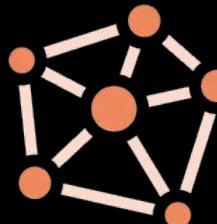
04



Key/values
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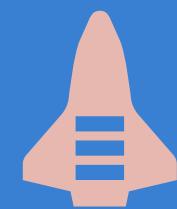
05

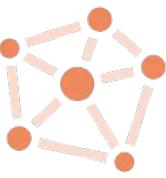
Graph
Databases



06

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Graph Database Database

Model: Store Vertices and Edges data structured

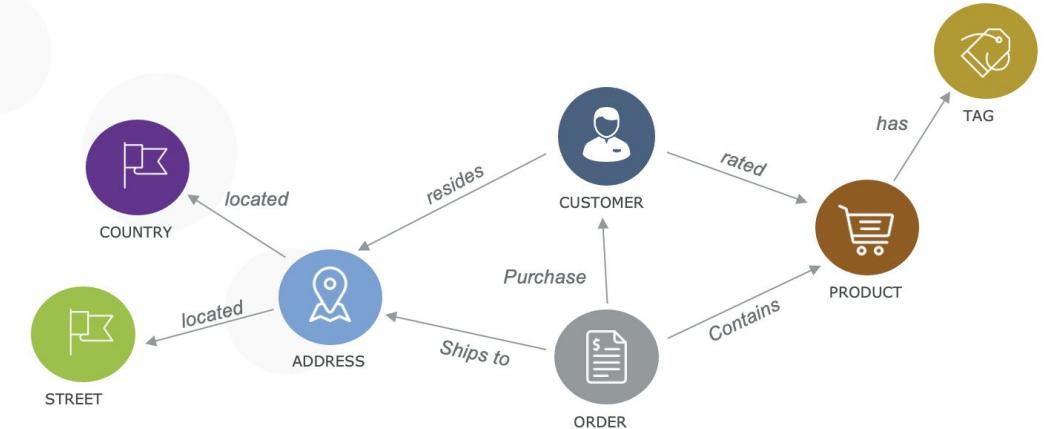
- Data is represented as a Graph (Vertices & Edges)
- Dedicated to highly connected dataset (lot of “Joins”)
- Discovering simple and complex relationships between objects.

Queries

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

Use Cases

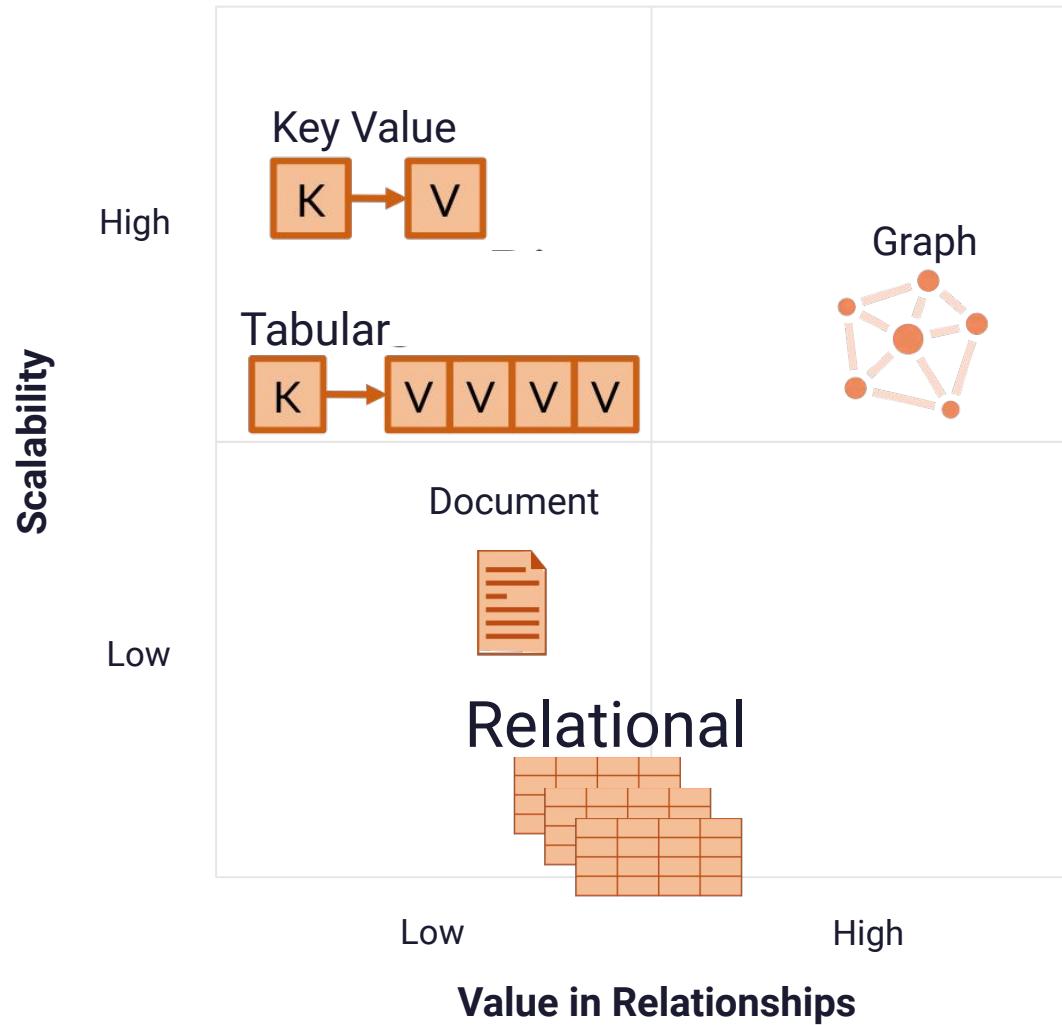
- Social Network, Customer 360
- Internet of Things
- Personalization and recommendation
- Health Care, Path finding, Security



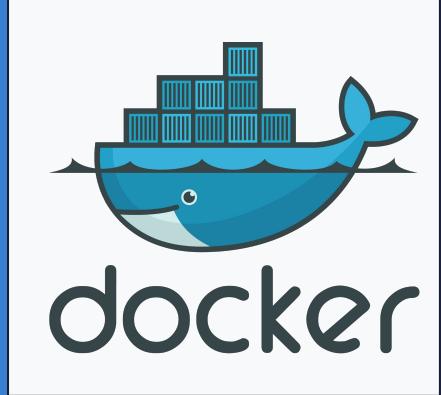
```
// What are the names of projects that were created by two friends?  
g.V().match(  
    as("a").out("knows").as("b"),  
    as("a").out("created").as("c"),  
    as("b").out("created").as("c"),  
    as("c").in("created").count().is(2)).  
    select("c").by("name")
```



Positioning graphs Scalability and flexibility



HandsOn #5 Graph Databases



Docker and Compose



GitHub

Repository:

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



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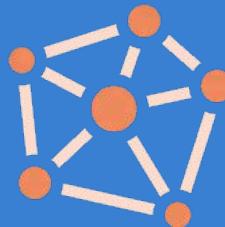
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Databases



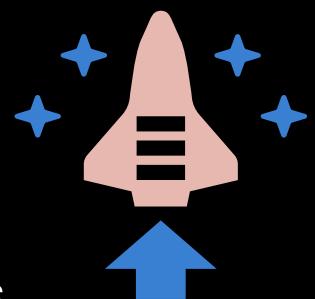
05

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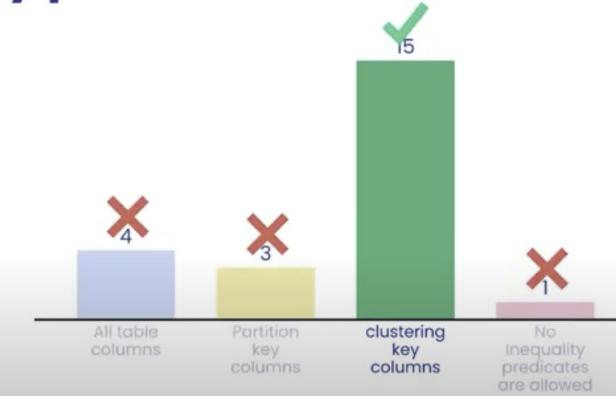
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Go to www.menti.com and use the code 3491 9972

Inequality predicates are allowed on ...



Go to 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	
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	Puggie	



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Classic courses available at DataStax Academy

ASK/SHARE

Join community.datastax.com
Ask/answer community user questions – share your expertise

CONNECT

Follow us [@DataStaxDevs](#)
We are on Youtube – Twitter – Twitch!

MATERIALS

Slides and exercises for this workshop are available at
<https://github.com/DataStax-Academy/workshop-crud-with-python-and-node>

Homework (datastax.com/dev)

[Complete hands-on #5]

- Install docker, play with the notebooks and show us some screenshots.

[Try another content] – <https://www.datastax.com/try-it-out>

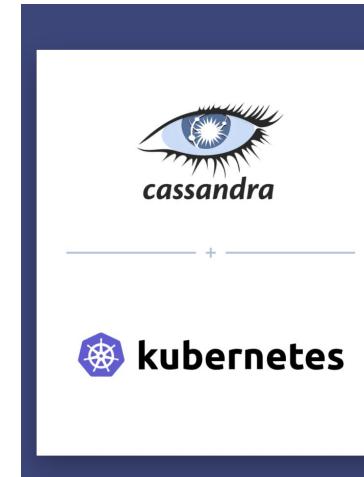
- Go to datastax/dev and use the try-it-out



The screenshot shows the DataStax Developers homepage. At the top right is a cartoon owl holding a pencil and a notepad. Below the owl, the word "HOMEWORK" is written in large, outlined letters. The main navigation bar includes links for "Products", "Success", "Learn", and "Try For Free". A search icon is also present. The page title "DataStax" is at the top left. Below the title, there's a section titled "DATASTAX FOR DEVELOPERS" with a sub-section titled "Learn How to Succeed with Apache Cassandra™". A brief description follows, along with a "Video: Level up with DataStax Developers!" button. The central part of the page is a grid of three cards. The first card, "Try It Out", is highlighted with a red border. The other two cards are "What is Cloud Native?" and "What is Cassandra?". Each card has a corresponding "Learn About" button.

Certifications

<https://www.datastax.com/dev/certifications>



COMING SOON! Apache Cassandra Operations in Kubernetes Certification

As teams work to containerize and deploy applications using Kubernetes, there's increasing interest in running Cassandra in Kubernetes alongside applications as well. We're developing a new certification program to help teams level up their skills to run Cassandra successfully in cloud-native deployments. The Apache Cassandra Operations in Kubernetes Certification will cover: running Cassandra in Docker containers, understanding how Cassandra maps to Kubernetes, and how to deploy and run Cassandra on Kubernetes using Kubernetes operators and other monitoring and management tools.

Sound interesting? Sign up to get notified about this program.

[SIGN UP NOW](#)

Vouchers (145\$ each), valid 3 months, with 2 attempts will be given to people who apply and register to the 3 episodes.

Weekly Workshops

<https://www.datastax.com/workshops>

The image shows a composite view of the DataStax Developers YouTube channel and its website.

YouTube Channel: The left side displays the official DataStax Developers YouTube channel page. It features a large banner with the text "LEVEL UP with the DataStax Developers". Below the banner, there's a "DataStax Developers" profile picture, the channel name, and 8,1 k abonnés. The main video grid shows various workshop recordings, each with a thumbnail, title, and duration. For example, one video titled "Building Microservices with Cassandra + Spring" has a duration of 2:23:56 and 1,1k vues. Another video titled "Advanced Data Modeling in Apache Cassandra™" has a duration of 2:41:51 and 1,3k vues.

Website: The right side shows the DataStax Developers website. At the top, there's a "SUBSCRIBE" button and a call-to-action "for weekly content on building". Below this, a section titled "Upcoming Live Events" lists four workshops:

- Apache Cassandra™ Certification Preparation**: Multiple Dates | NoSQL | Beginner. Includes a "Register Now" button.
- Build Microservices with Apache Cassandra™!**: Feb 17 or Feb 18 | NoSQL | Beginner. Includes a "Register Now" button.
- Certification Exam Preparation Workshop**: MULTIPLE DATES. Includes a "Register Now" button.
- Cloud-Native Workshop: Build Spring Microservices with Apache Cassandra™**: MULTIPLE DATES. Includes a "Register Now" button.
- Learn how to build a Serverless Game!**: Feb 24 or Feb 25 | Game Development | Beginner. Includes a "START" button and a "Register Now" button.
- Build Microservices with Cassandra & Quarkus**: March 11 | Microservices | Beginner. Includes a "Register Now" button.

Join our 10k Discord Community

The Fellowship of the RINGS

<https://bit.ly/cassandra-workshop>

A screenshot of the Fellowship of the (Cassandra) Discord server's main chat room. The left sidebar shows various channels: server-conduct, upcoming-events, useful-resources, moderator-only, WORKSHOPS (main-chat-room, Breakout room 1, Breakout room 2, Breakout room 3, Hidden Channel), and TOPICS (grafana-cassandra-data... and docker-training). The main channel has a dark theme with a message from Jack Fryer about a new workshop alert. A large embed from Eventbrite for a 'Cloud-Native Workshop: Connecting Cassandra and Kubernetes!' is displayed, showing a banner for Apache Cassandra™ meets Kubernetes! on March 3 or 4, 2018. Cedrick Lunven is also mentioned in the channel. On the right side, there are lists for PRESENTER—3 (Aleks Volochnev, David Jones-Gilardi, jscarp), HELPER—1 (John Sanda), and EN LIGNE—227, which includes many names like Abhiprada, Absurdism, hiya, Adalberto, aditya_dhunna, adnaneCord, Adrigunz, Aemilius Gaurav, Aemilius gaurav, Aguvas, ajscilingo, and akashTaxvisor.

DataStax Developers

Thank you!



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Thank you!



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