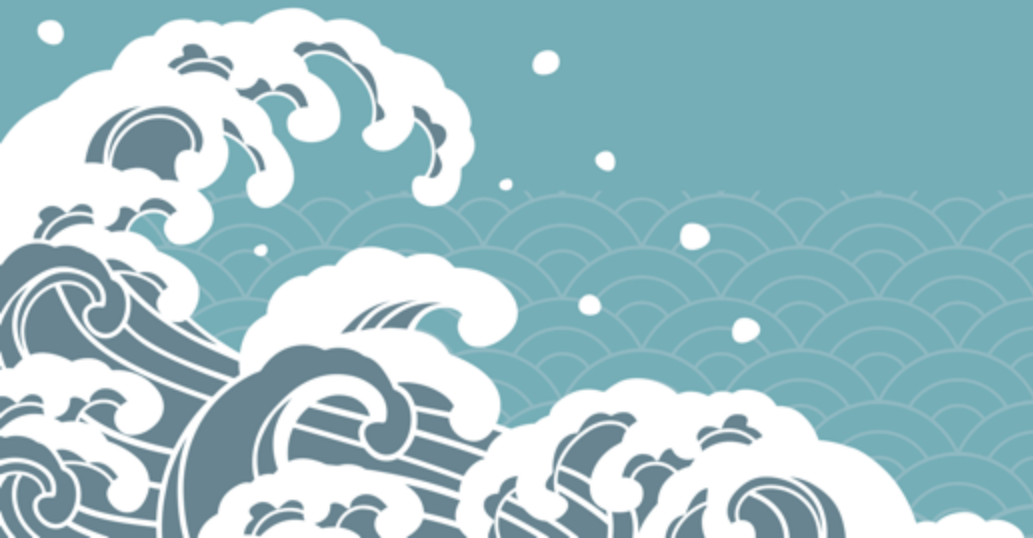
basho

# From NoSQL to Mo'SQL

Gordon Guthrie



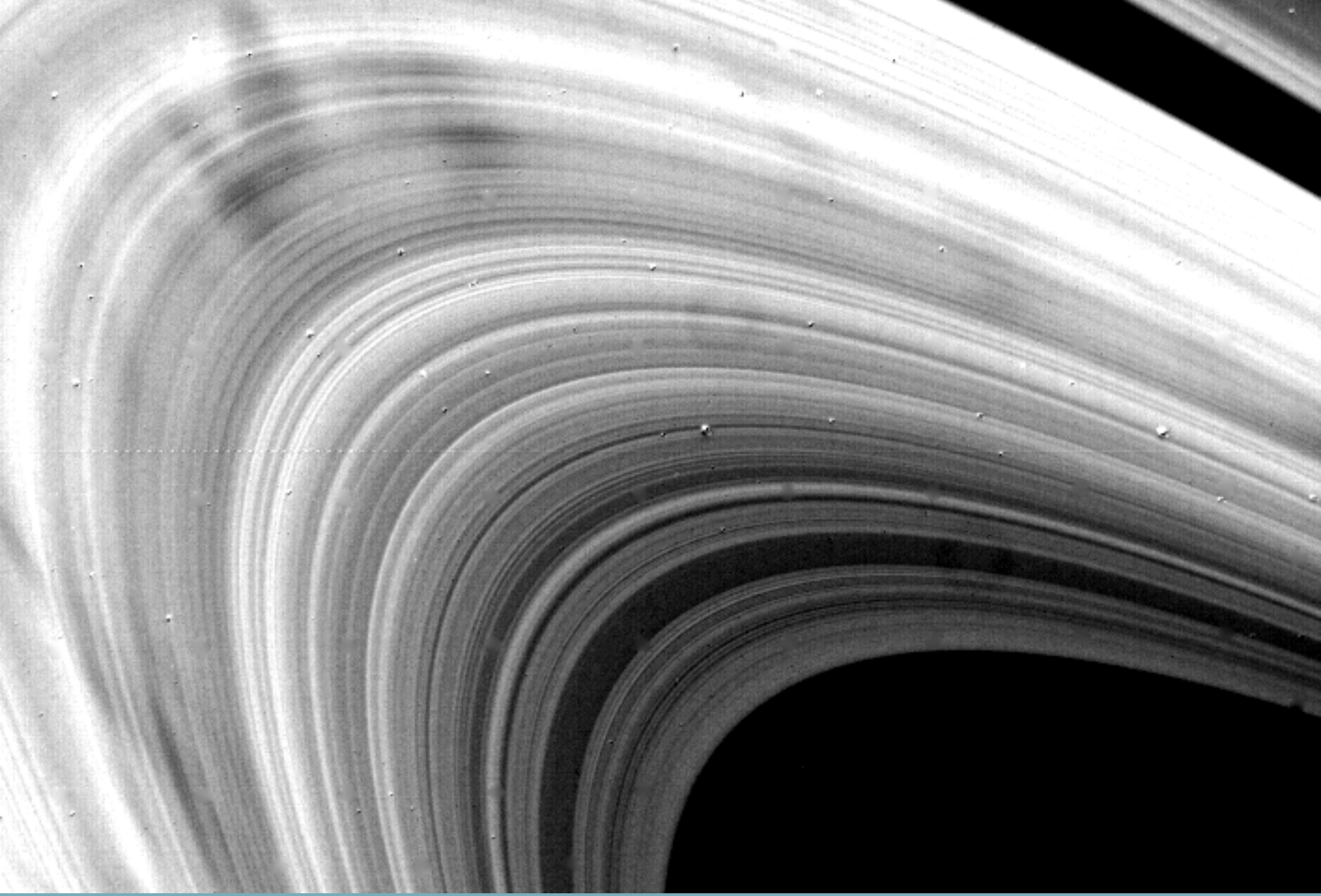
# Lots of people have worked on Riak TS

Andrei Zavada
Andy Till
Bill Soudan
Brett Hazen
Brian McClain
Bryce Kerley
Derek Somogyi
Erik Johnson
Erik Leitch
Heather McKelvey
John Daily
Lauren Rother
Paul Hagan
Pavel Hardak
Seema Jethani

# SQL and NoSQL?

## a match made in hell?


select key, value from bucket where key='ModelT';



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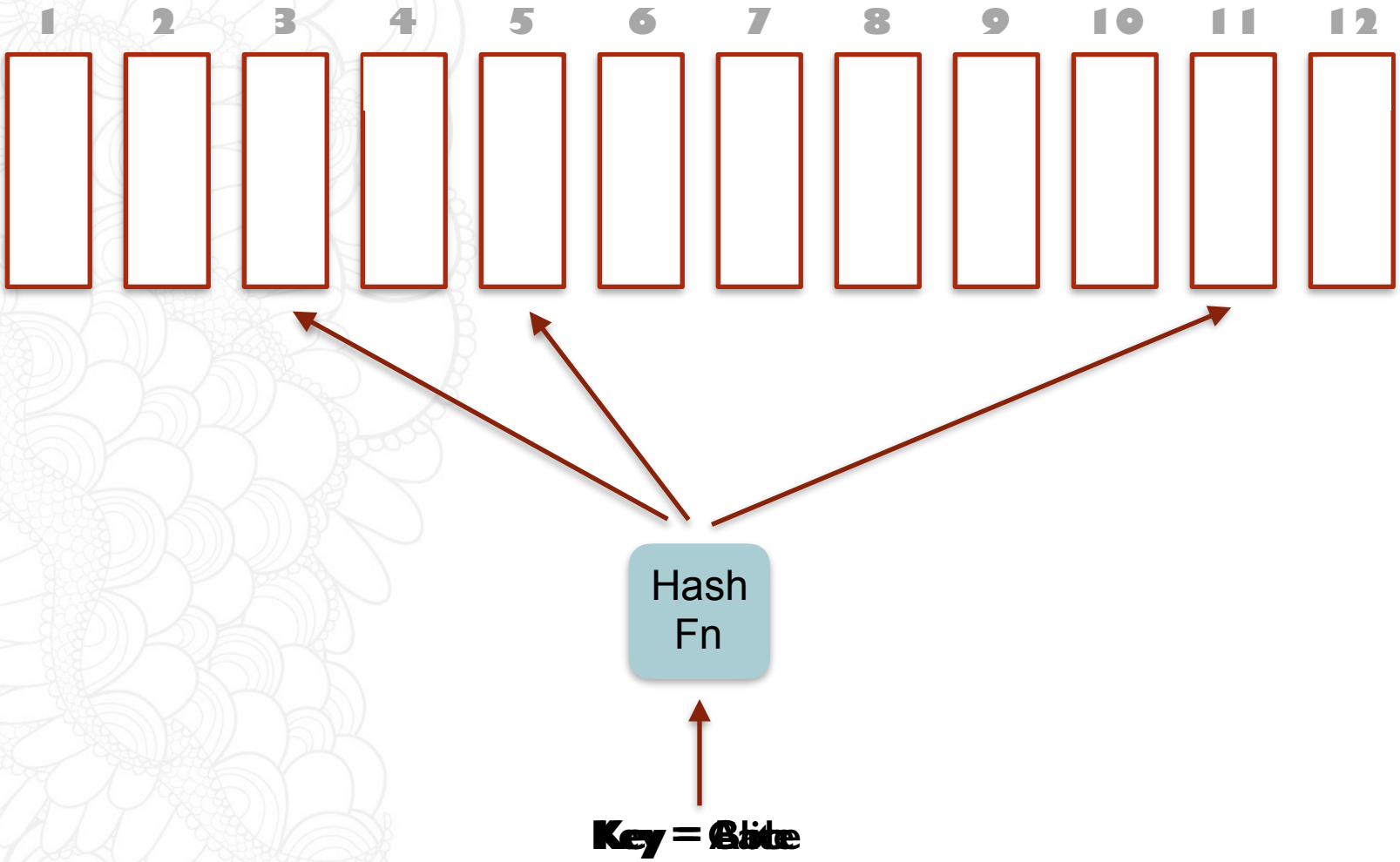
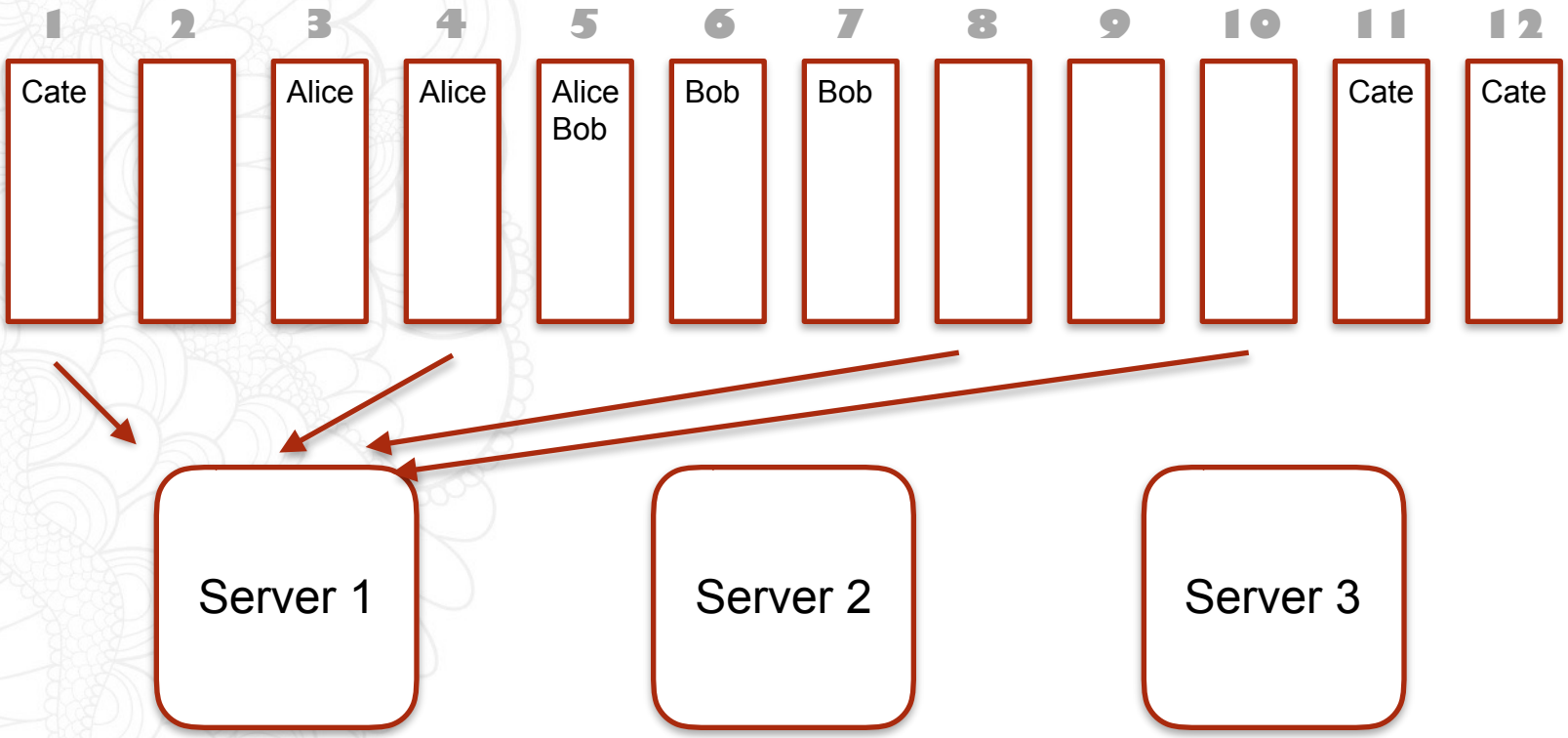
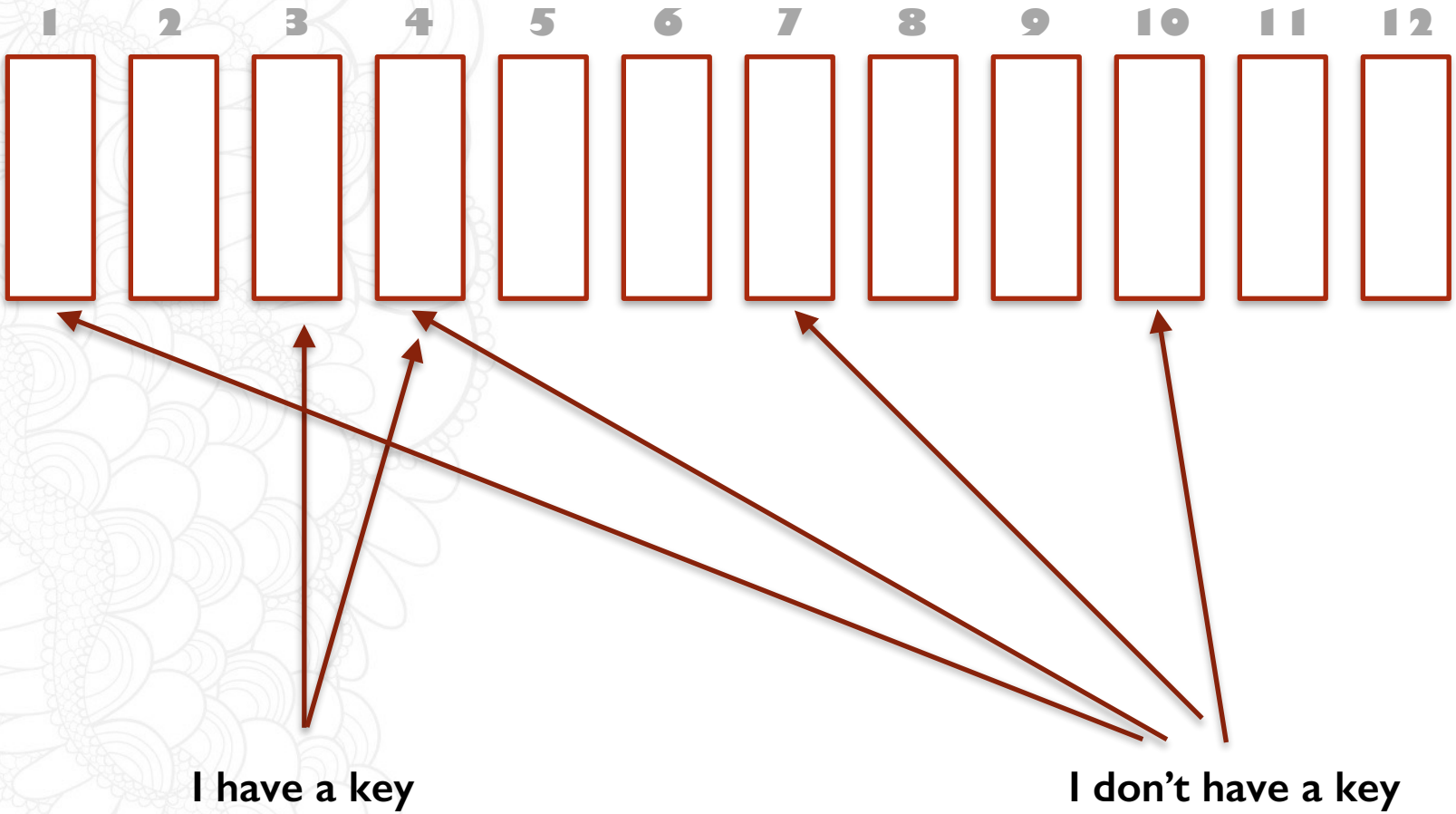
# The ring itself is a pain right up yer bahooky in slides



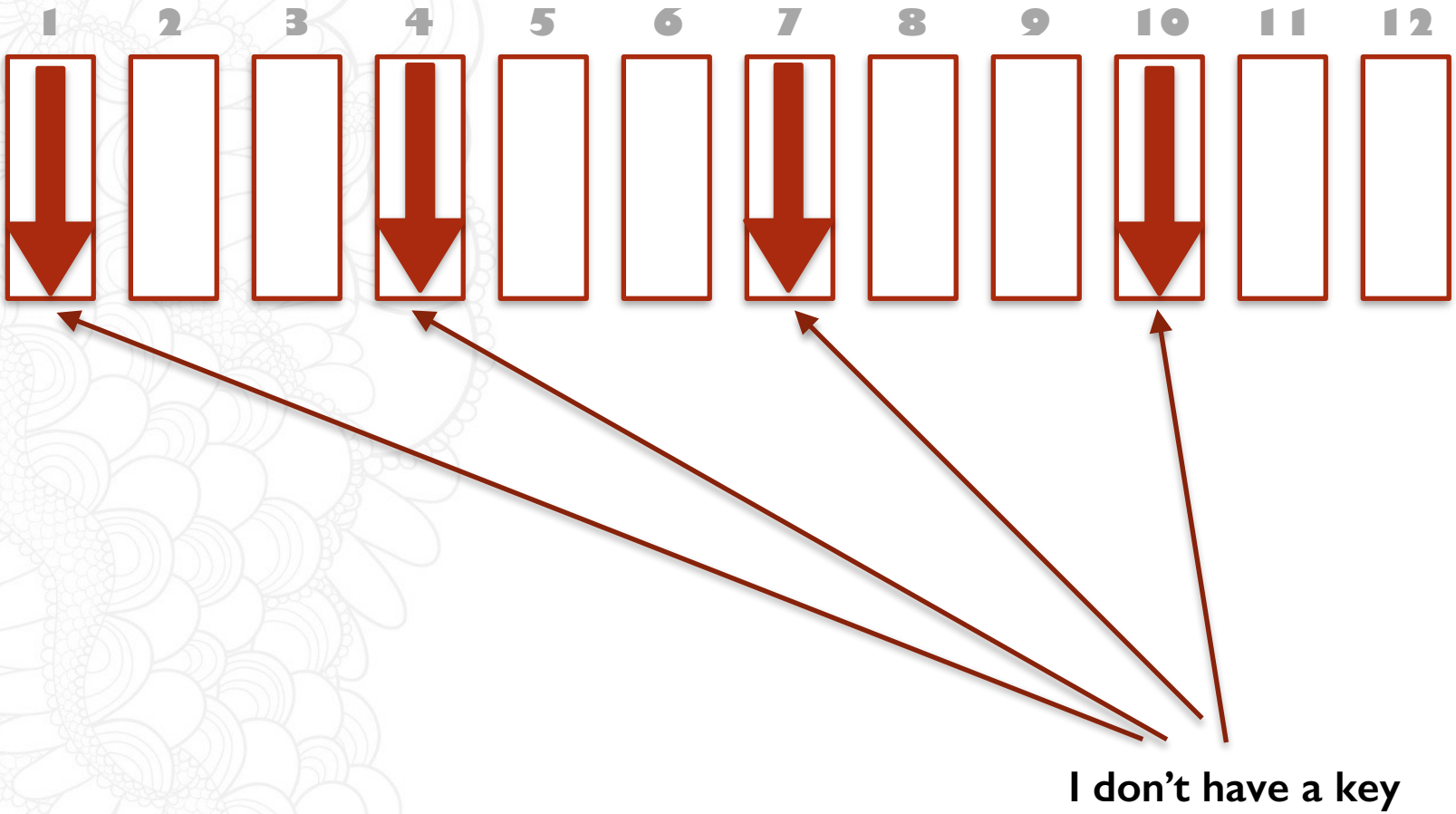
# The ring is logical on physical nodes



# This give you two query modes



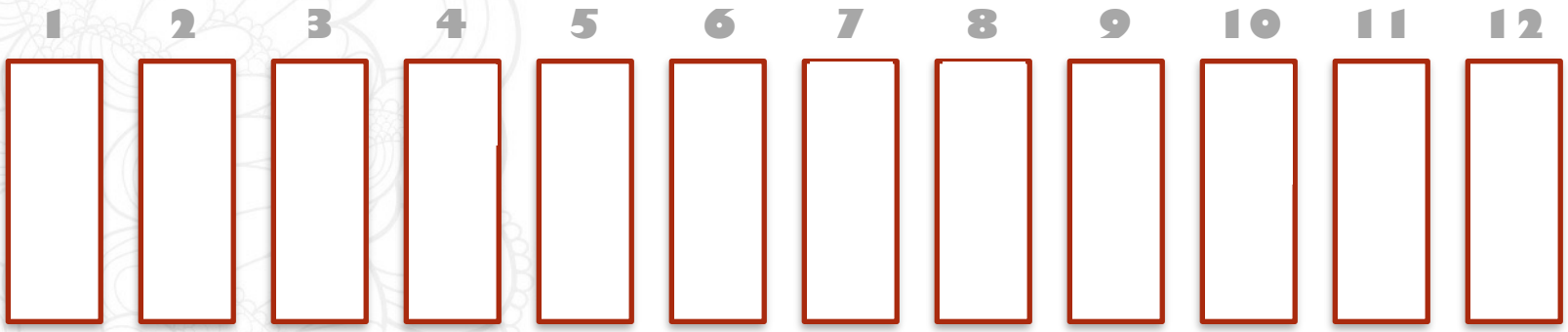
# And its not just about the travelling



## In summary

- You can talk to **2 servers** if you have a key
- You must talk to **all servers** if you don't

# Lets see how TS works




Hash Fn

Key = (Alice, quantum(Time, 10, 's'))

# Different access patterns

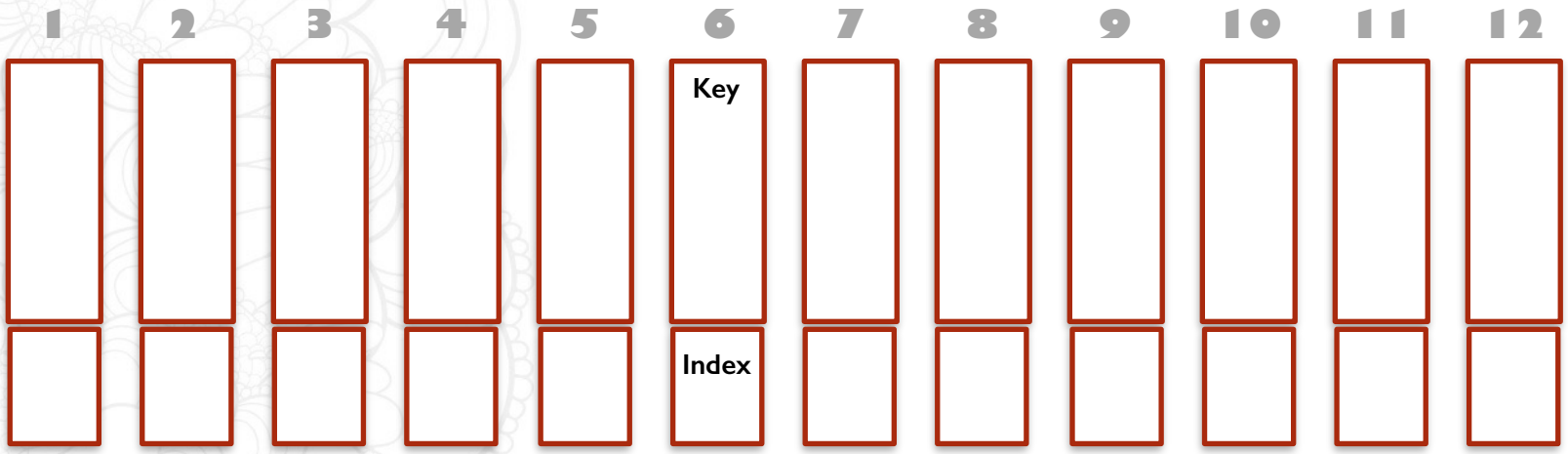
- You can talk to **2 servers** if you want to query the data across 1 quantum
- Add another 2 for 2 quanta
- eventually must talk to **all servers**

## There are trade-offs

- You can make the quanta **bigger** which means less trips to read more data
- **but** your write pattern gets lumpier with higher risk of hot spots

# Can we improve that?

# We have 2i indices




To get a list of keys that match an index you visit 1/3 of nodes +1 and make an index read

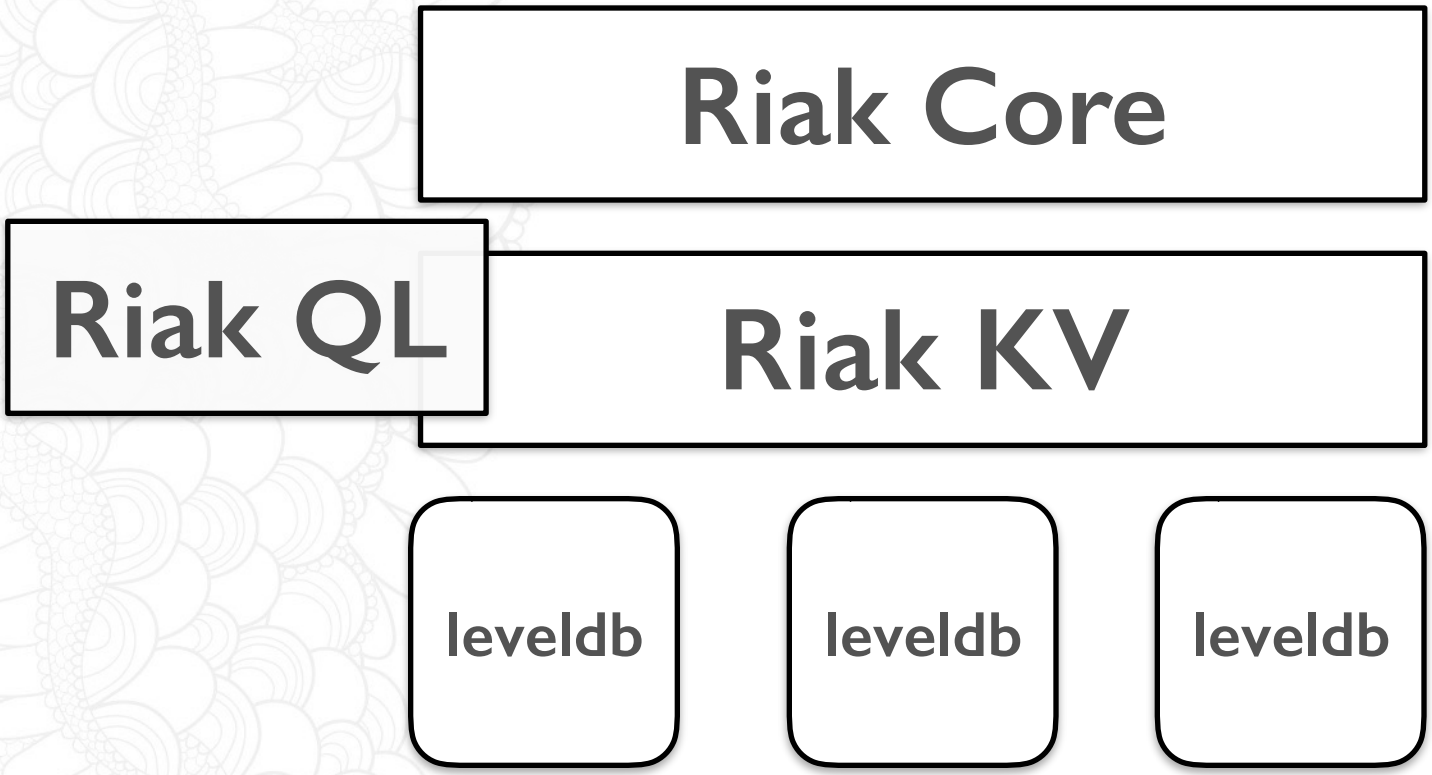
# You've seen the movie


# The SQL

# Why SQL

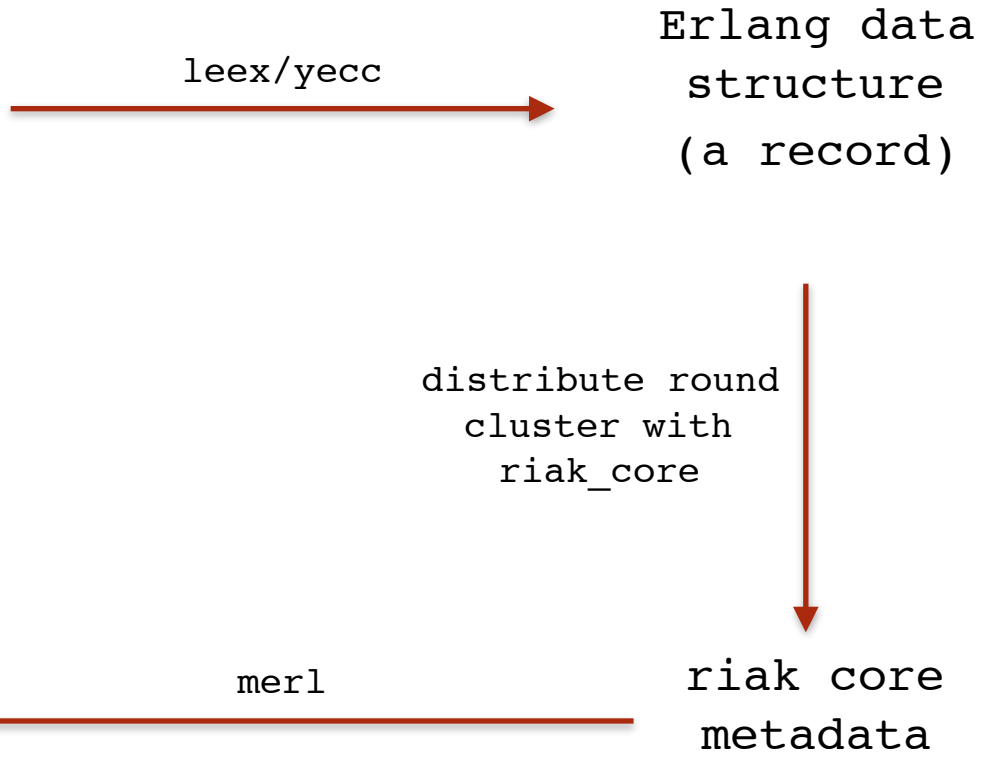
- Everybody knows it/low barrier to entry
- Good tooling
- Its a declarative language, but extendable

# High level architecture

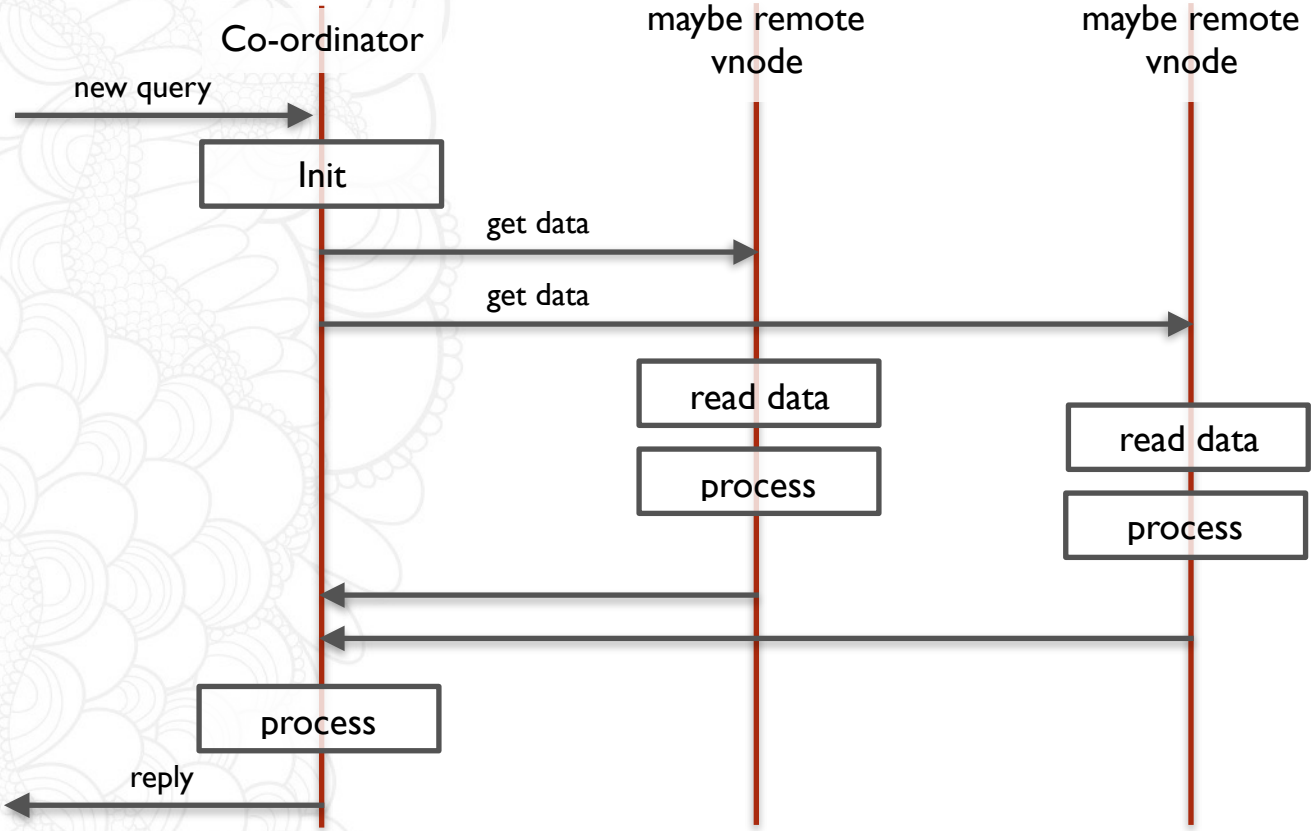


# KV stores are know-nothing wrt values

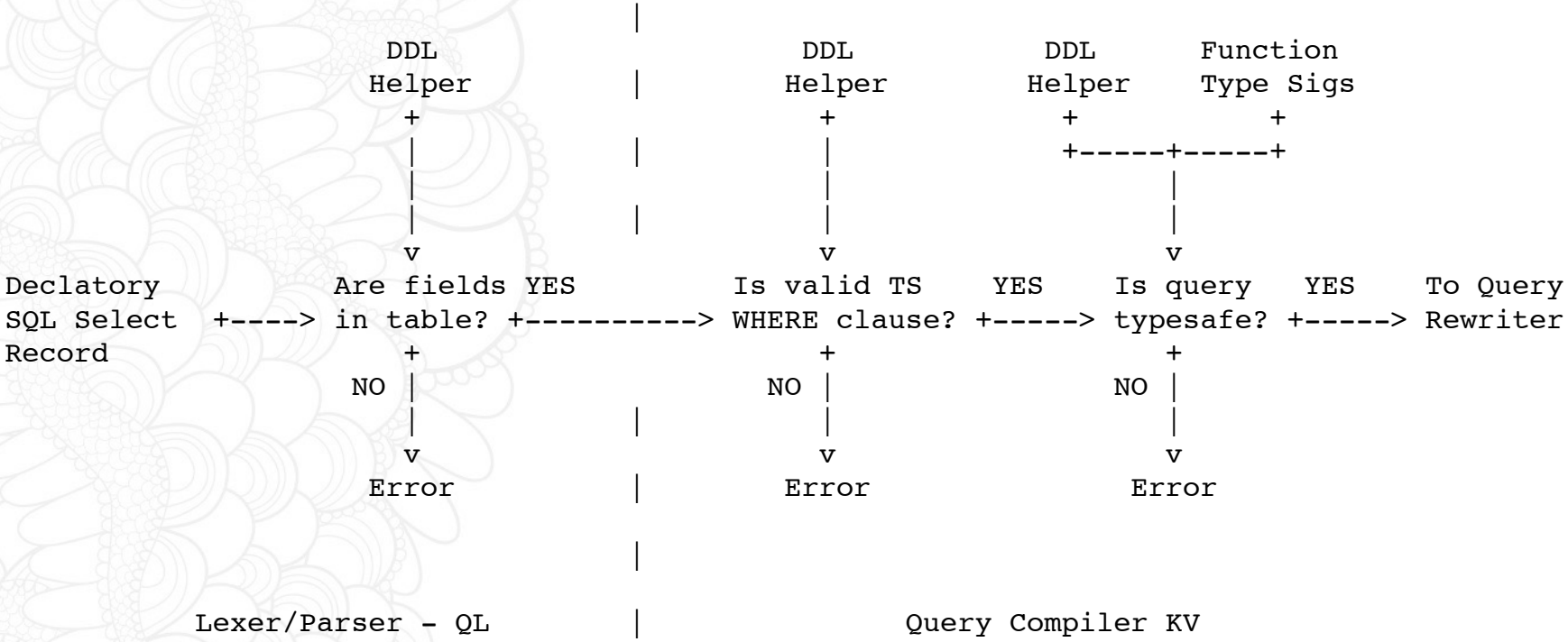
```
CREATE TABLE GeoCheckin
(
   id            SINT64    NOT NULL,
   time          TIMESTAMP NOT NULL,
   region        VARCHAR   NOT NULL,
   state         VARCHAR   NOT NULL,
   weather       VARCHAR   NOT NULL,
   temperature   DOUBLE,
   PRIMARY KEY (
     (id, QUANTUM(time, 15, 'm')),
      id, time
   )
)
```



# The query system is distributed

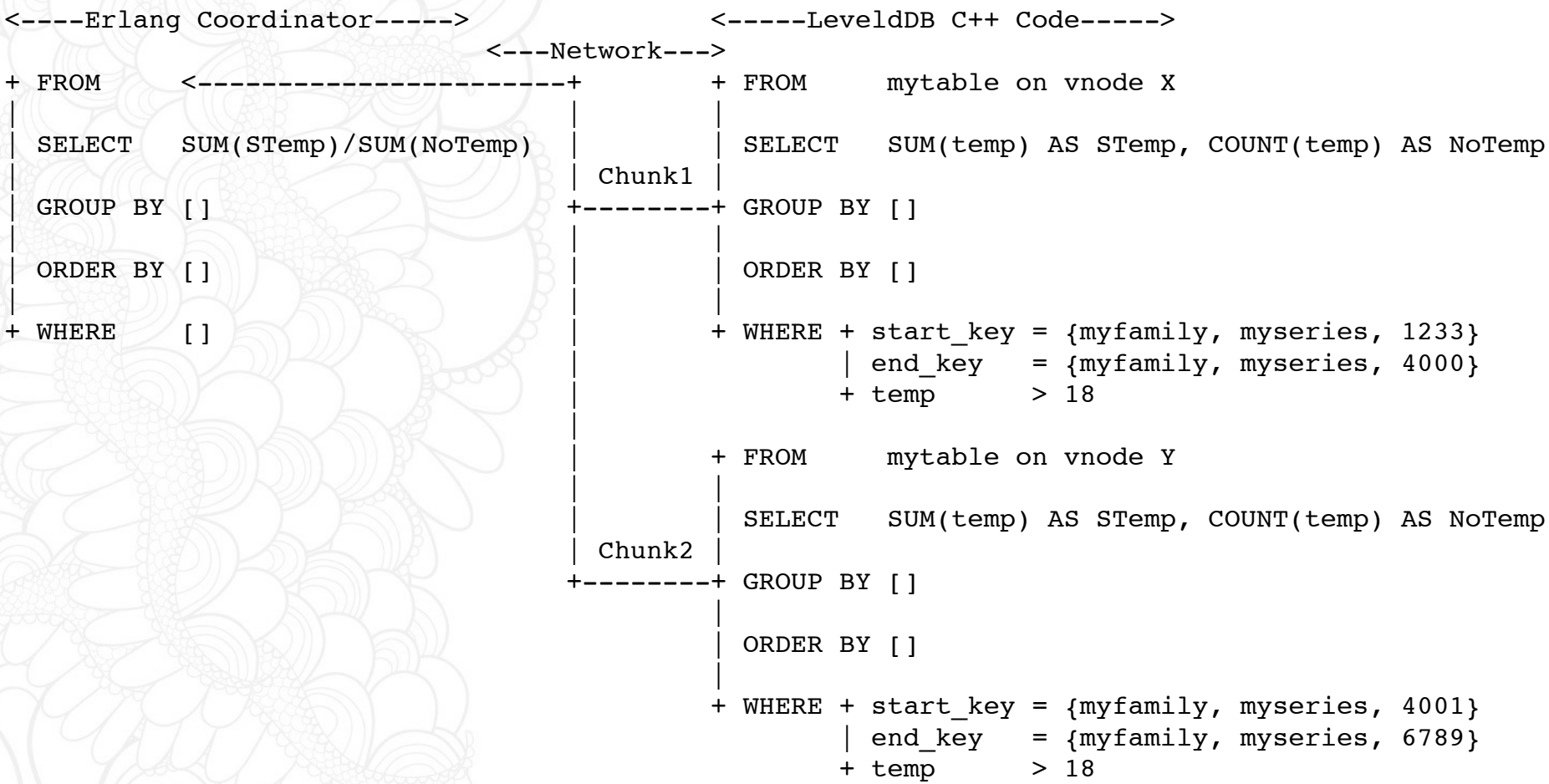


# Quite complex query validation process



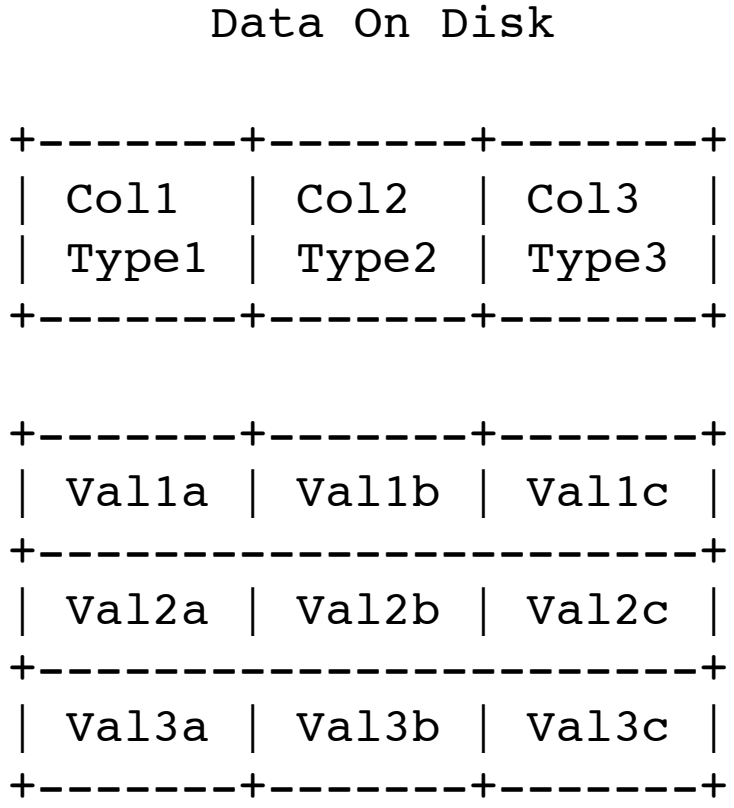
# Unroll all the SQL

```
SELECT AVG(temp) FROM mytimeseries WHERE family = 'myfamily' AND series = 'myseries'
AND timestamp > 1233 AND timestamp < 6789 AND temp > 18;
```

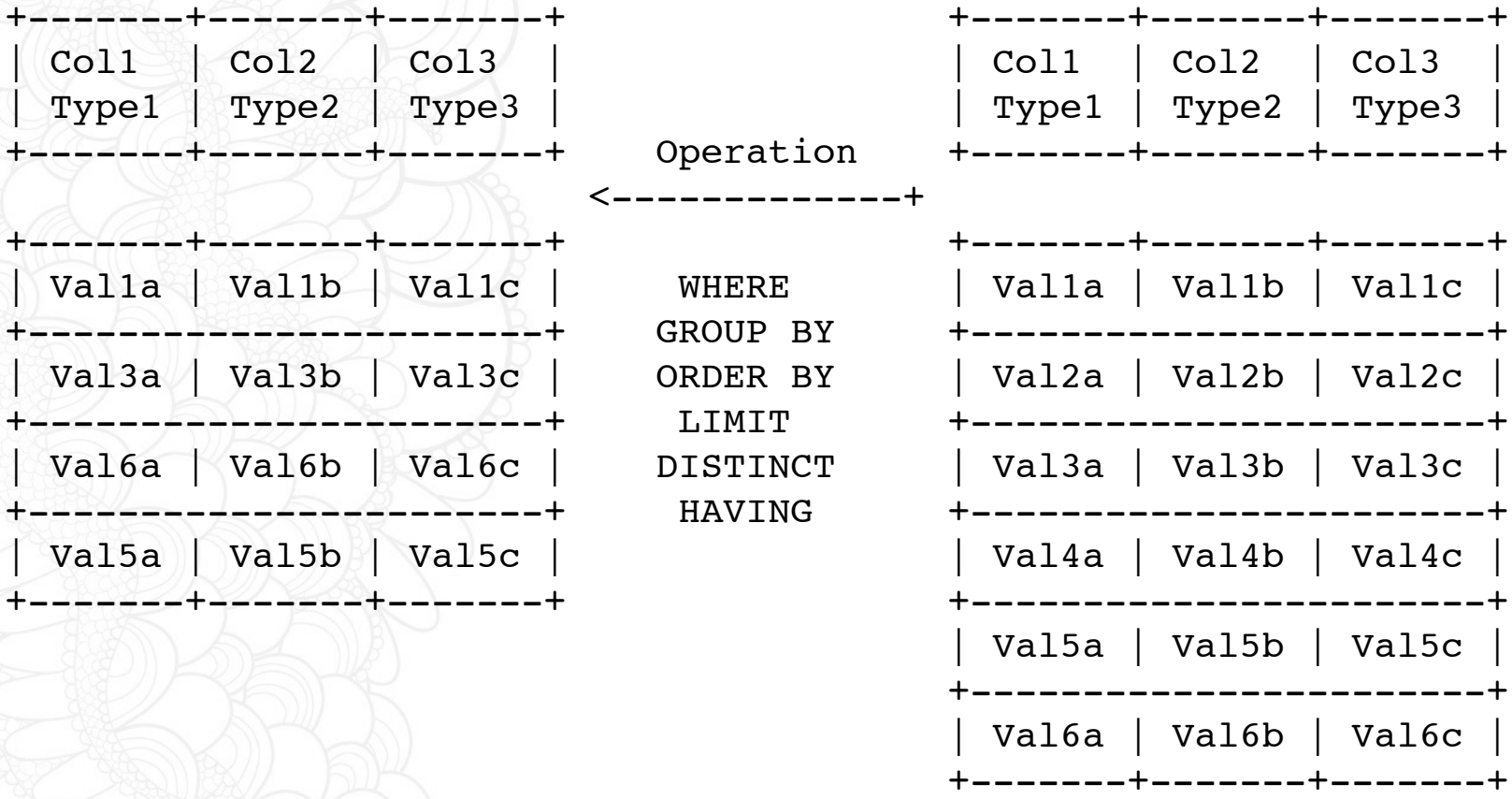


# Query rewriting in a nutshell

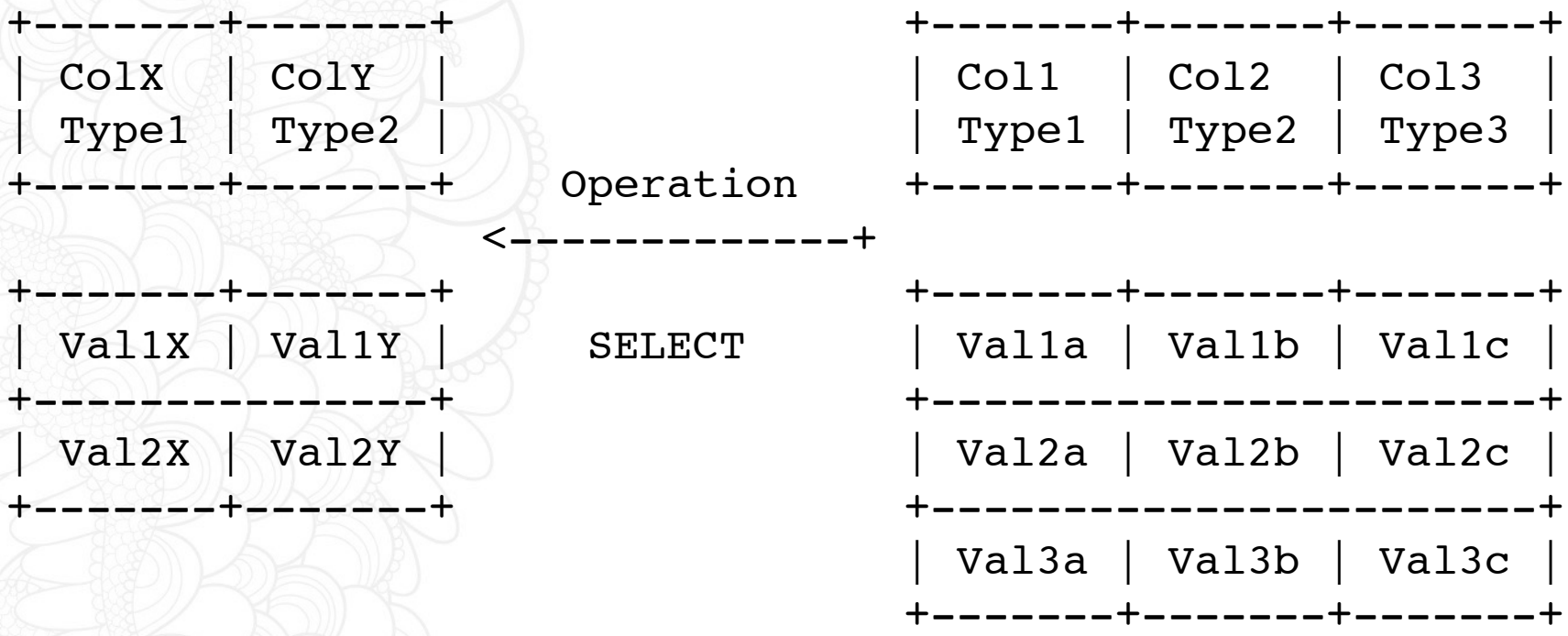
# Schematic SQL Operations



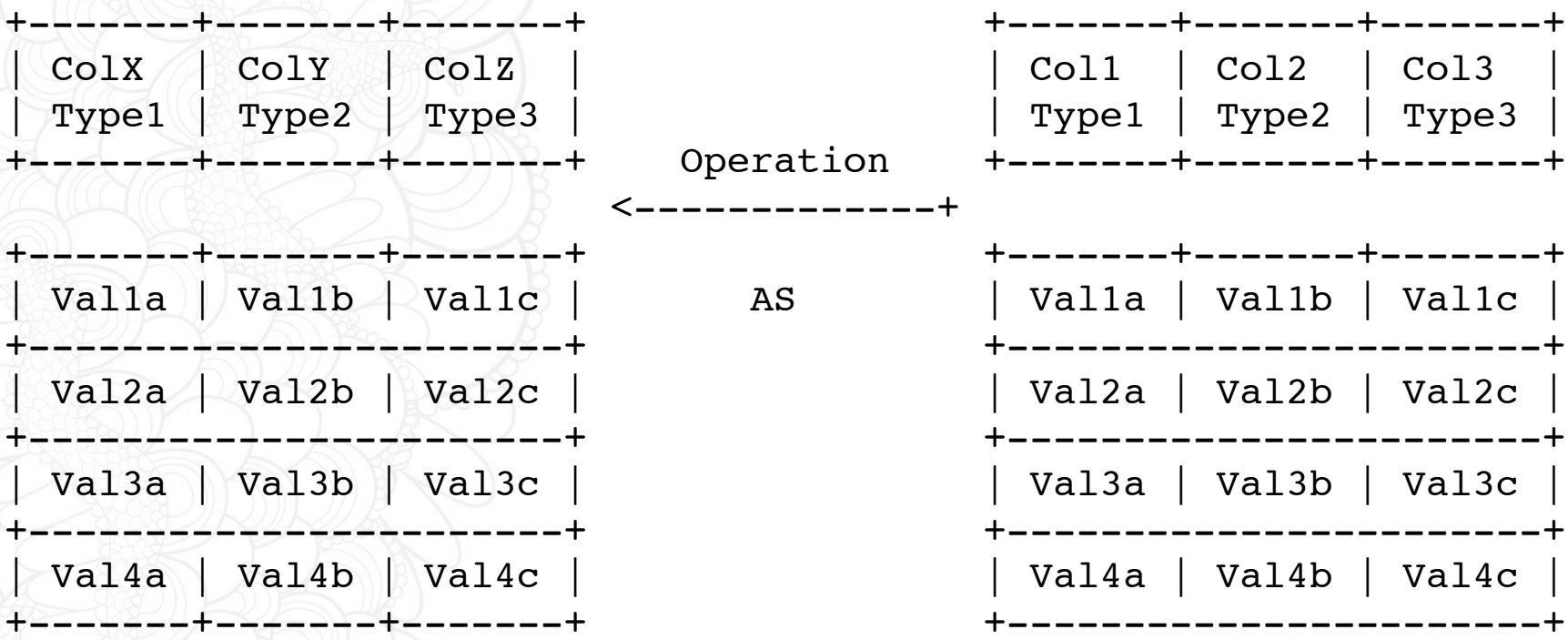
# All the fragments meet this pattern - row ops



# Row and column operations



# Column Name Vector Ops



# Executable Fragments

```
{where, [
    {and_,
     {'=', <<"sequence_number">>, {integer, 2321}},
     {'=', <<"time">>,            {integer, 1400497861762723}}
    }
]}
```

**YASL's all the way down**

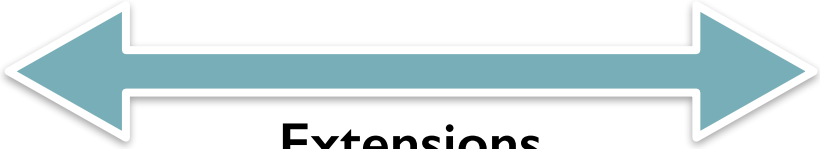
# How much SQL?

- `SELECT`
- `WHERE`
- `GROUP BY`
- `ORDER BY/LIMIT` is being worked on
- functions:
  - `AVG/MEAN`
  - `MAX`
  - `MIN`
  - `SUM`
  - `COUNT`
  - `STDDEV/STDDEV_SAMP`
  - `STDDEV_POP`

# What does ‘decorated with execution hints mean’?

```
SELECT * FROM mytable;
SELECT * FROM mytable LIMIT 1000;
SELECT * FROM mytable WITH frobulate=on;
```

**Standard SQL**
**works in Tools**



**Extensions**
**Set as table defaults**

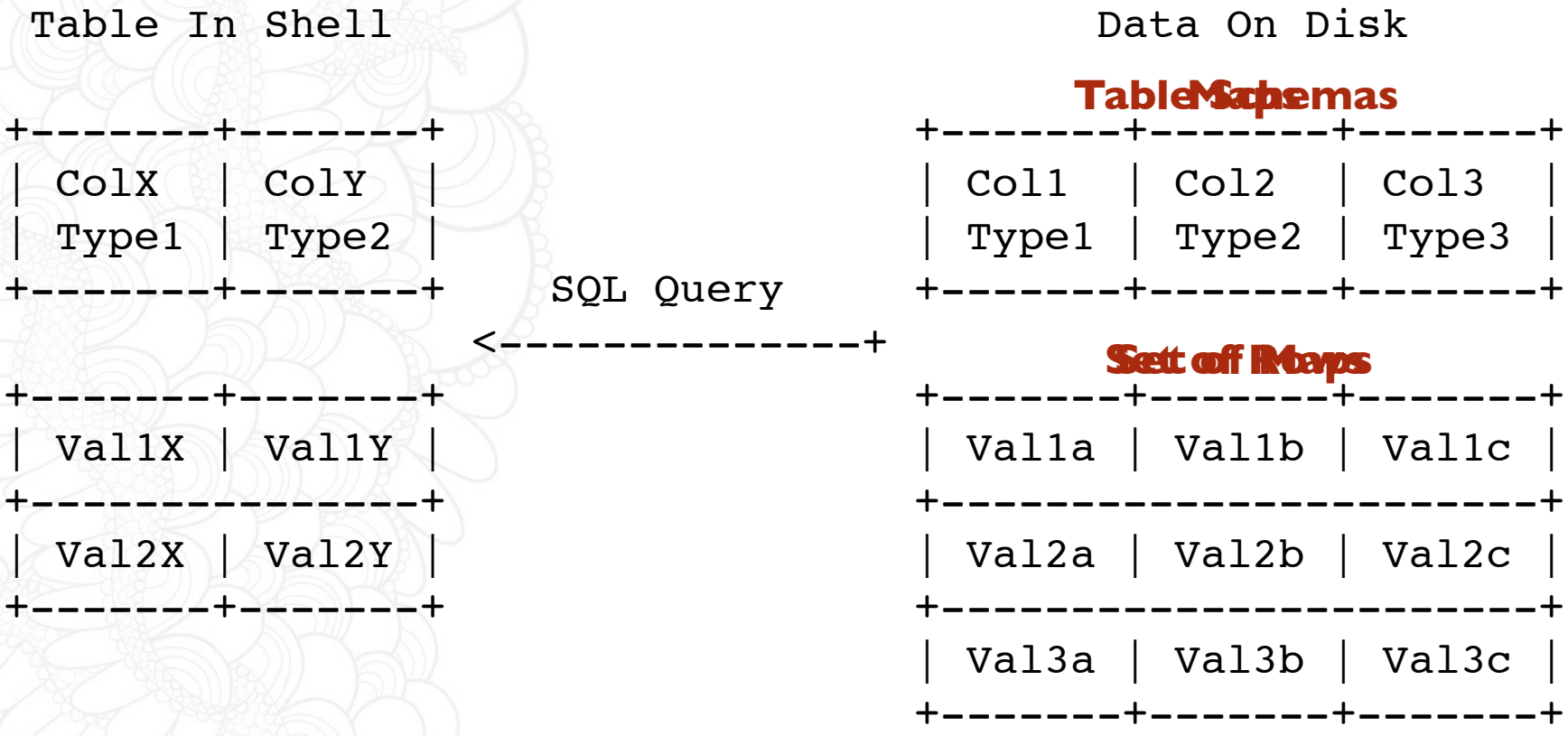
# What does the future hold?

# Riak has other sorts of co-located data

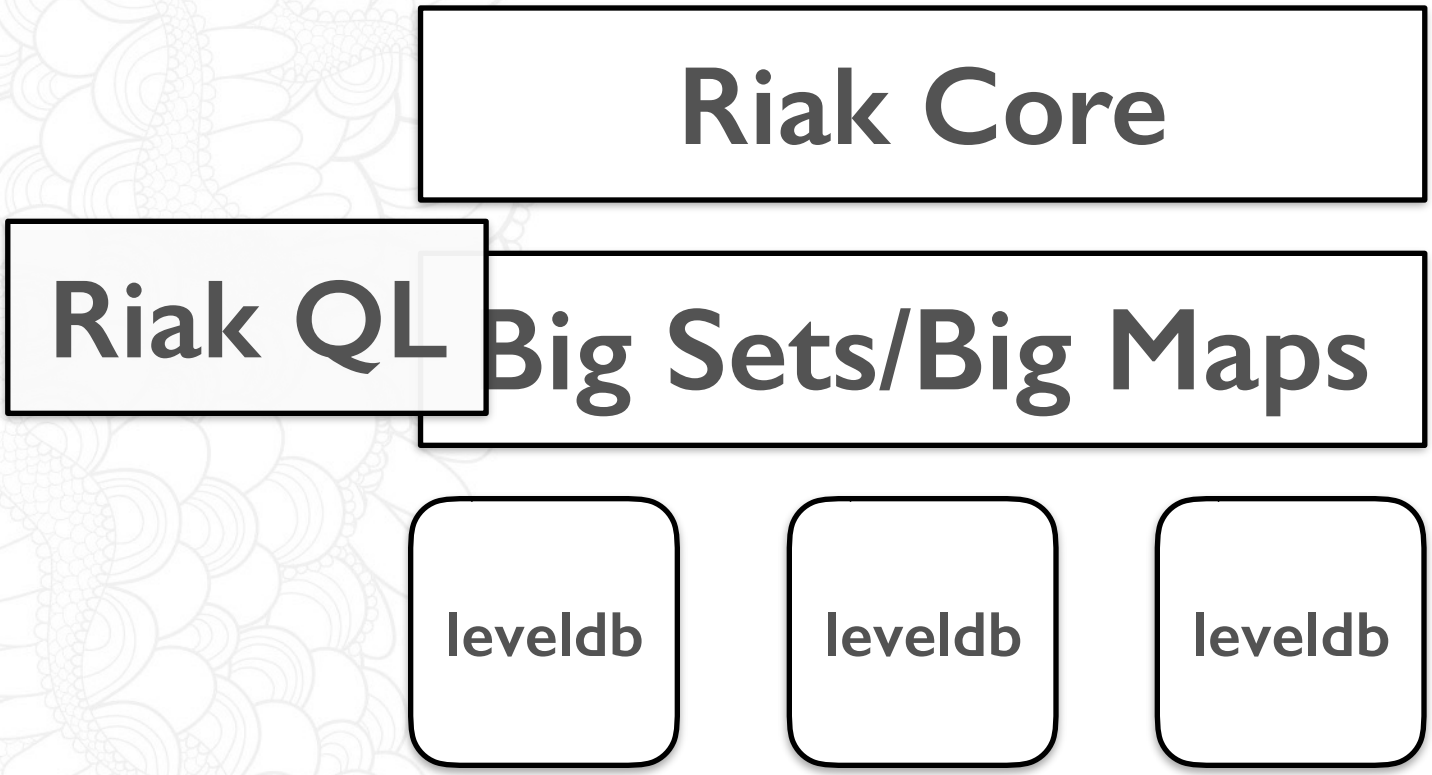
- CRDT sets look like colocation
  - 100,000 elements in a CRDT set
  - written to a vnode under a key
- performance issues
  - monolithic object
  - read 100,000 element set from disk
  - operate on it
  - write it back to disk

**Enter big sets!**

# How would that work?



# High level architecture



## …and because maps are recursive and can contain sets which can be maps

- we have prototyped subsets of relational queries
  - left or inner joins

**Much excites!**

# You still have the 2 query paths…

**Talk to all servers**

**Talk to 2 servers**

Can we ‘steal’ some of the causality information from Delta ops and use that to build single point access eventually consistent indices?

**Dunno!**

Fin

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