



Building Distributed Databases in Go



What is a Database?

File

K/V Store

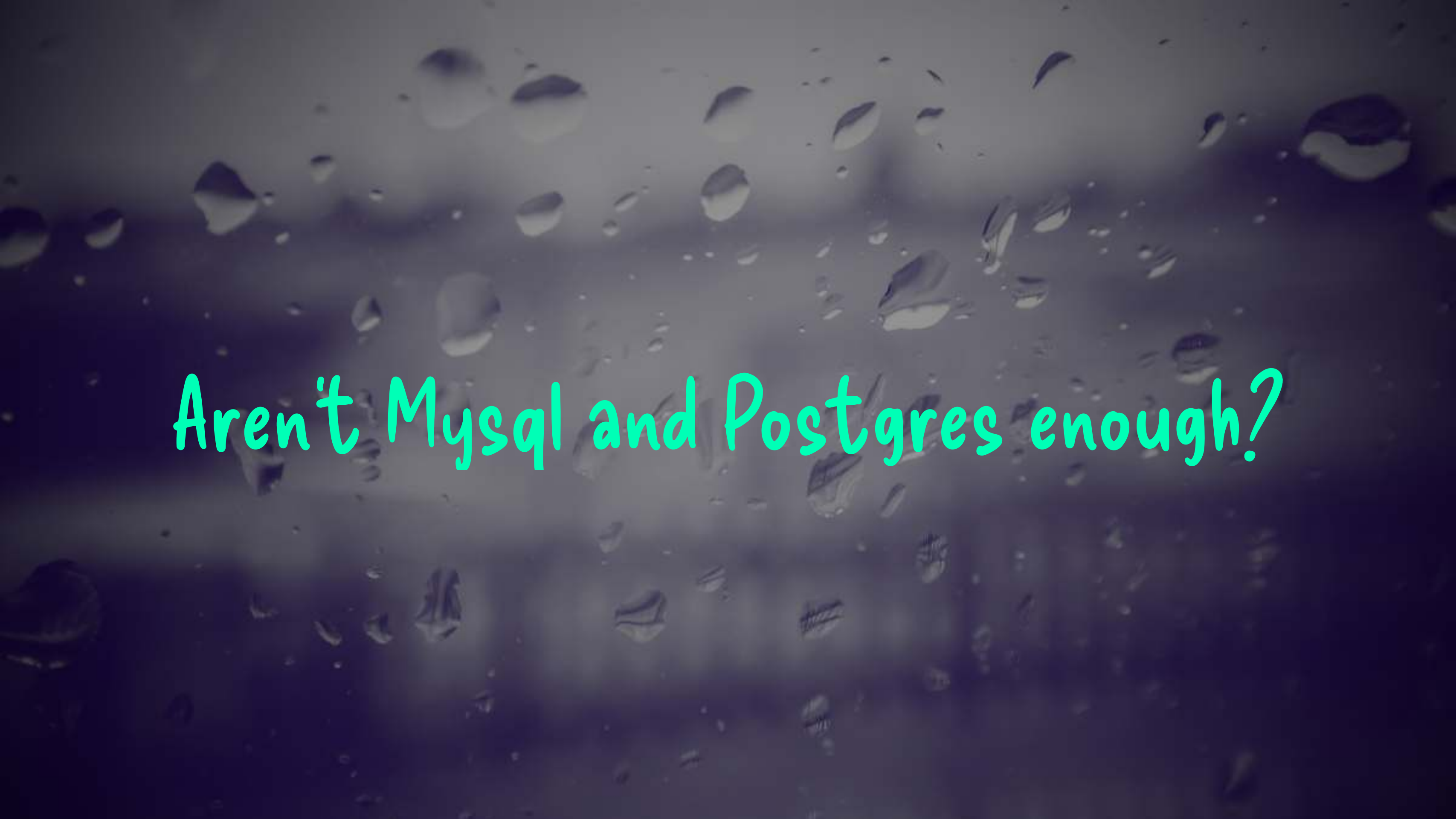
- Berkely DB
- Level DB

Sqlite

- Tables
- Query Language (SQL)

Relational

- Mysql
- Postgres

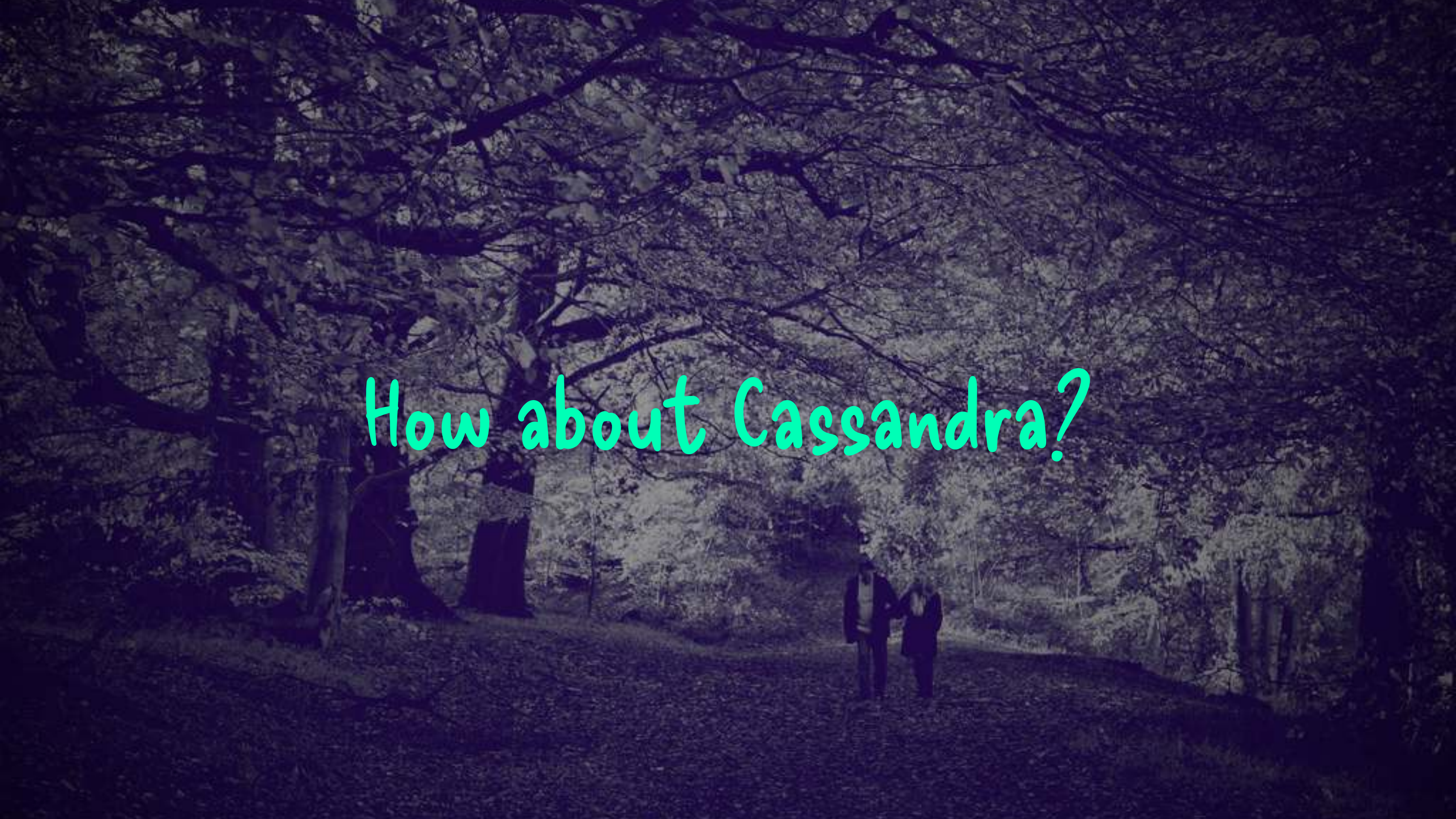


Aren't Mysql and Postgres enough?

30 seconds about me

- Founder Loom Network
- DigitalOcean
- Go Developer 5 years
- Spoken all over the world
- Rode an elephant at my wedding
- ชอบพูดไทยเวลาเมา



A photograph of a forest path with two people walking in the distance, overlaid with the text "How about Cassandra?". The scene is a dense forest with a path covered in fallen leaves. Two people are walking away from the camera in the distance. The text is written in a light blue, cursive font and is centered in the upper half of the image.

How about Cassandra?

Problems

- Custom Indexes
- Domain driven query language



Use Cases

- Blockchains
- Stock trading
- Logging
- Metrics systems



Blockchains

- Bitcoin
- Ethereum (Written in Go)

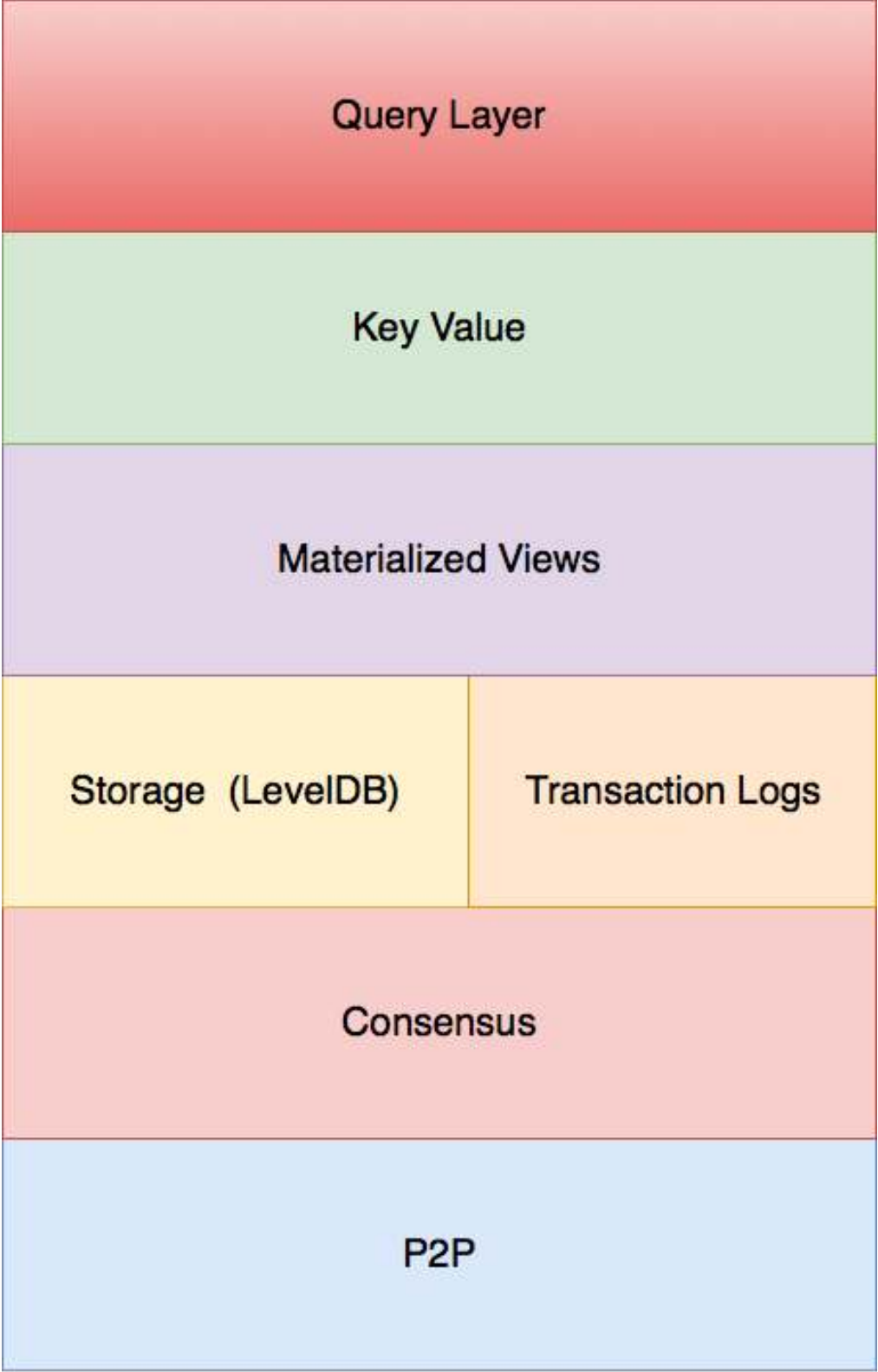
Go Database Projects

- InfluxDB
- Prometheus
- Digital Ocean's Vulcan DB
- Ethereum
- Loom Network Blockchains
- ETCD
- Consul

Awesome how do I start?

Architecture



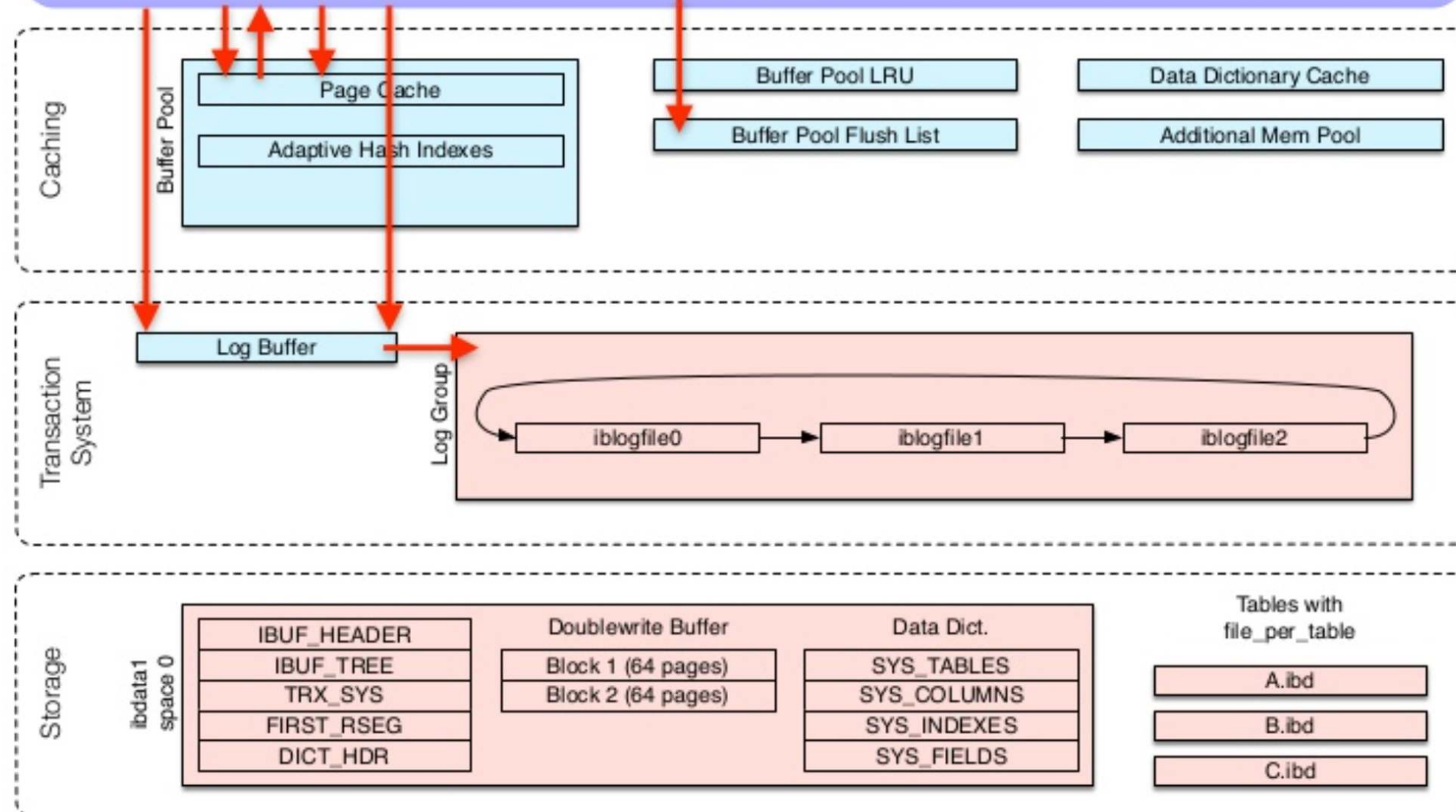


Mysql Architecture

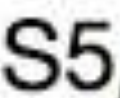
UPDATE a SET col1 =
'new' WHERE id = 10;
commit;

mysqld

InnoDB



Consensus

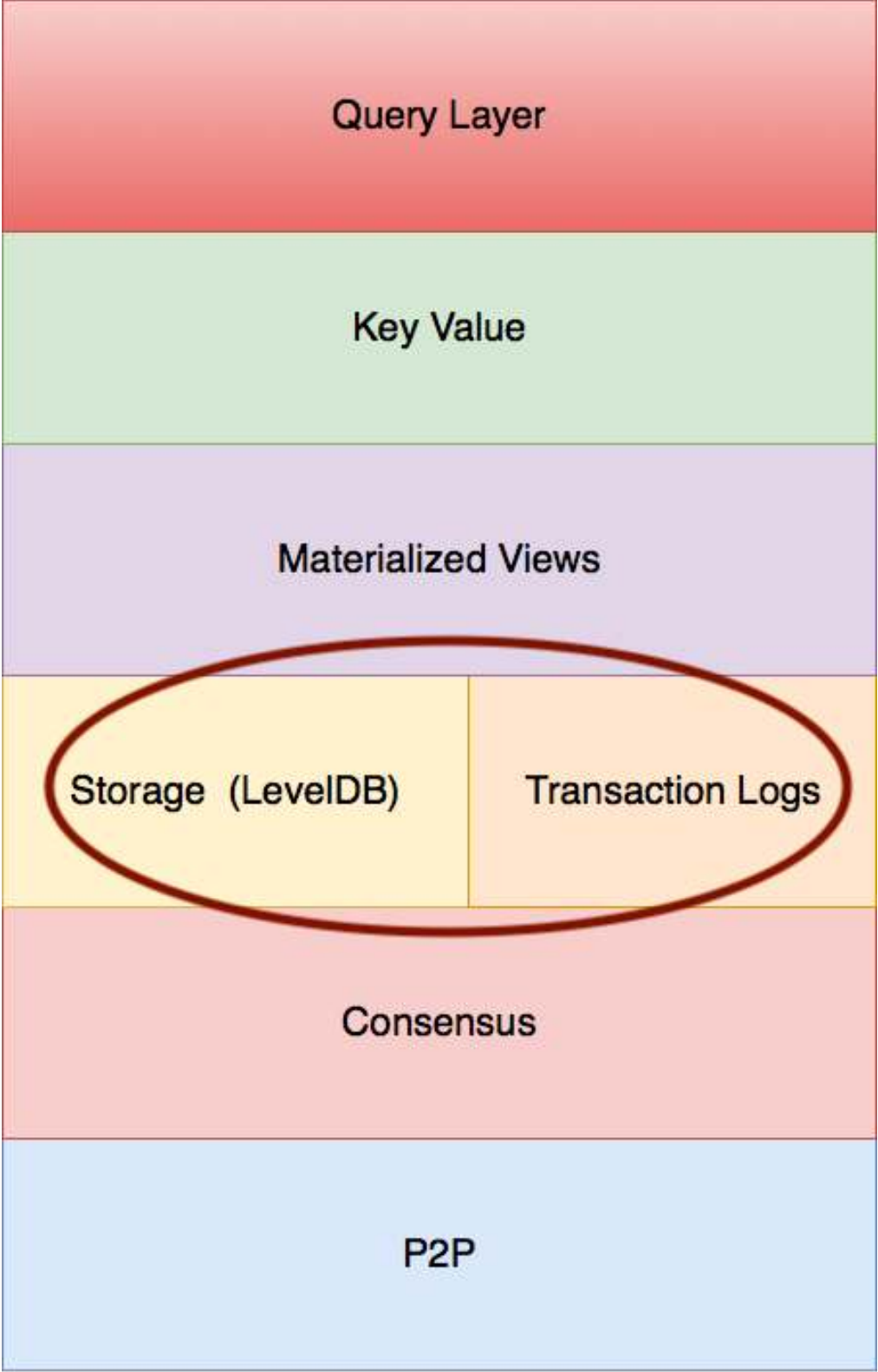


Consensus Layer

- Paxos
- Raft
- Byzantine fault tolerance (Bitcoin and Blockchain)

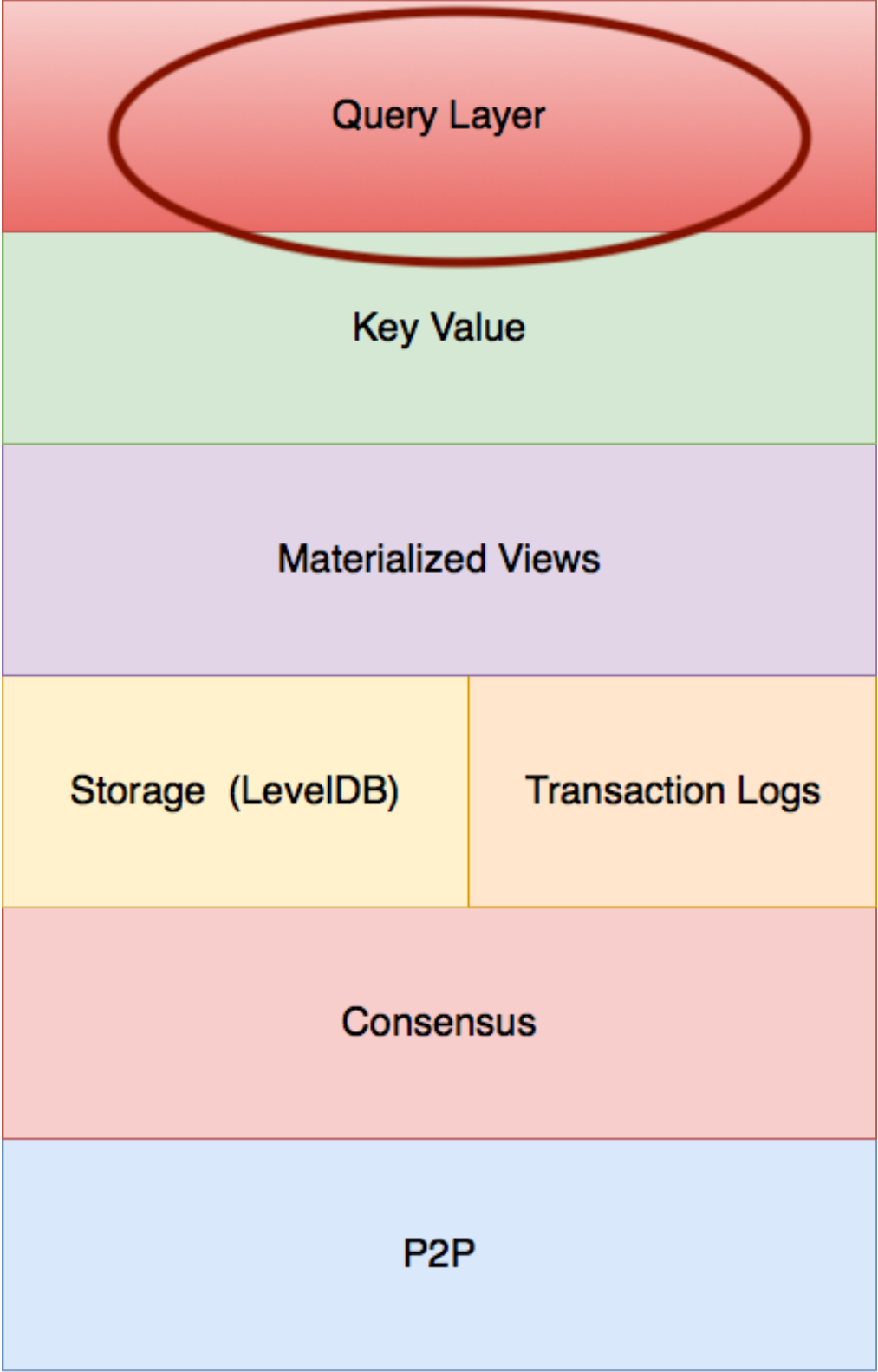
Go implementations

- Hashicorp Raft
- ETCD Raft



Storage Layer

- LevelDB
- RocksDB
- Sqlite
- BoltDB



Query Layer

- Toy Sql Parser
- <https://blog.gopheracademy.com/advent-2014/parsers-lexers/>
- Prometheus Query Language
- Influx Query Language



Julius Volz

@juliusvolz

You ask why [@PrometheusIO](#) has PromQL and not some SQL-like dialect for time series computations? Behold:

PromQL: `errors{job="foo"} / total{job="foo"}`

SQL:

`SELECT errors.job, errors.instance, [...more labels...], errors.value / total.value FROM errors, total WHERE errors.job="foo" AND total.job="foo" JOIN [...some more complicated stuff here...]`

Tying this together



Gotchas

Experiences

Take Aways

- Importance of Custom Build Databases
- Demystified distributed databases
- Libraries for Implementing this in Go

FAIL



Questions?