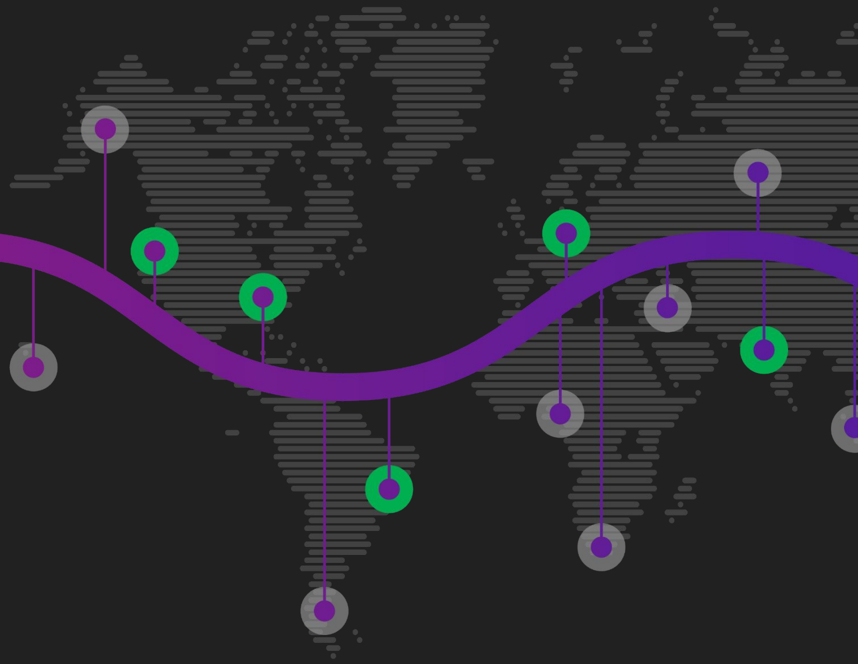
To The Edge And Back

JavaScript’s Role In Distributed ML At Scale



Jaxon Repp

Field CTO, HarperDB

Recovering Developer
Father to 2 Daughters
Denver, Colorado

8 startups
2 Exits
5 Opportunities for Learning

HarperDB
Distributed Application Platform

Formed in 2017

100,000+
Deployments

12,000+
Community Members

Syllabus

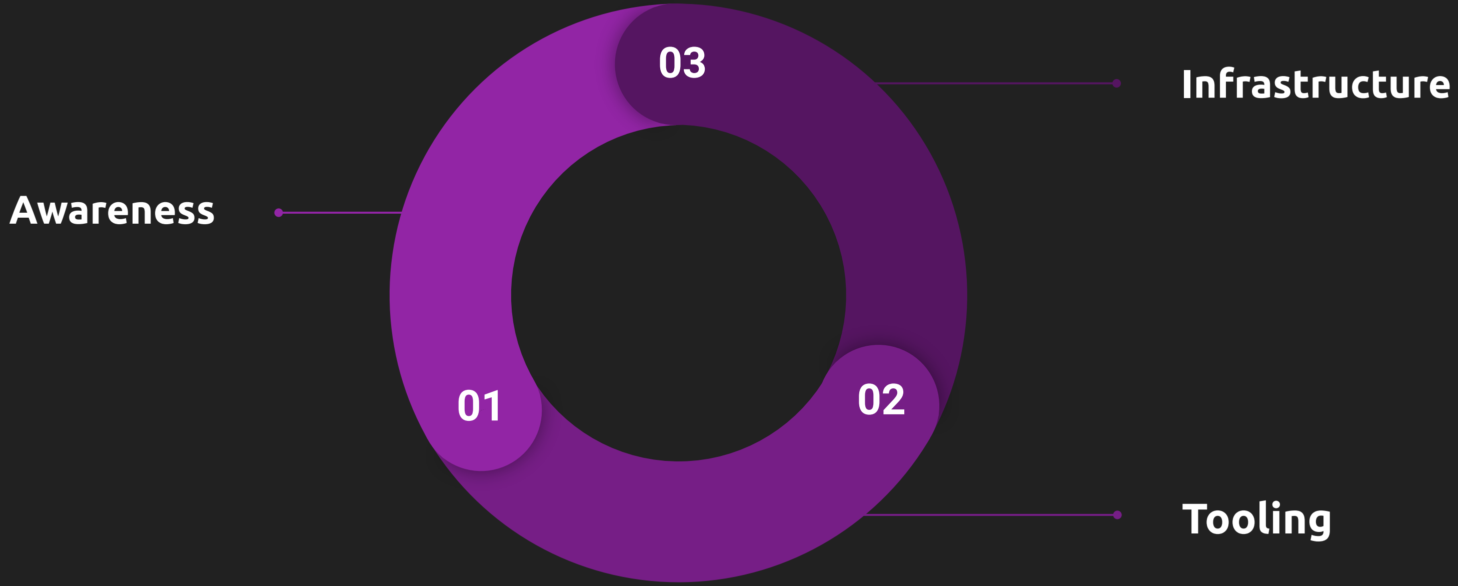
The JavaScript ML Ecosystem

Tactical Architecture

Systems & Methods

The JavaScript ML Ecosystem

A Virtuous Cycle



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Awareness

ChatGPT did more for ML/AI awareness than the last 10 years of esoteric research and turn-key libraries.

Simple

Accessible

Comprehensive

Fast

Terrifying

Tooling

Despite its origins as a server-side resource, there are now lots of libraries that deliver lightweight, fast ML operations to the browser and mobile devices.

TensorFlowJS

ConvNetJS

NeuroJS

KerasJS

Core/CreateML

MLKit

Infrastructure

Lots of the places we want to run ML apps have focused on providing access to the processing power and system resources that make it faster and more effective.

Cloud

Near Edge

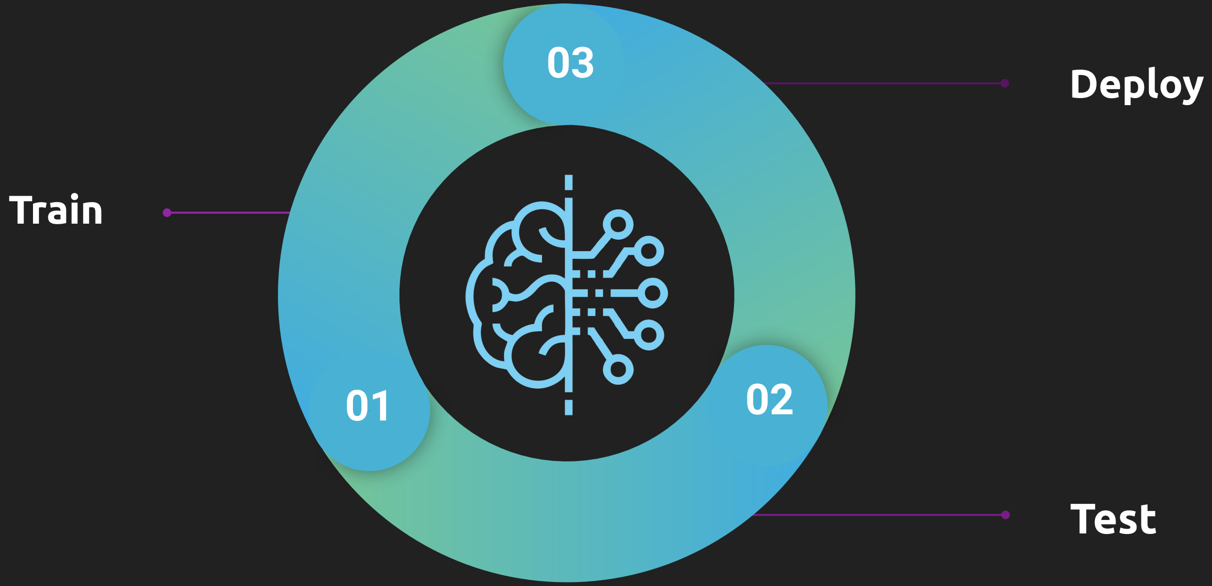
Far Edge

Mobile

Browser

Tactical Architecture

The Basics



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SAMPLE ARCHITECTURE

Cloud-Based

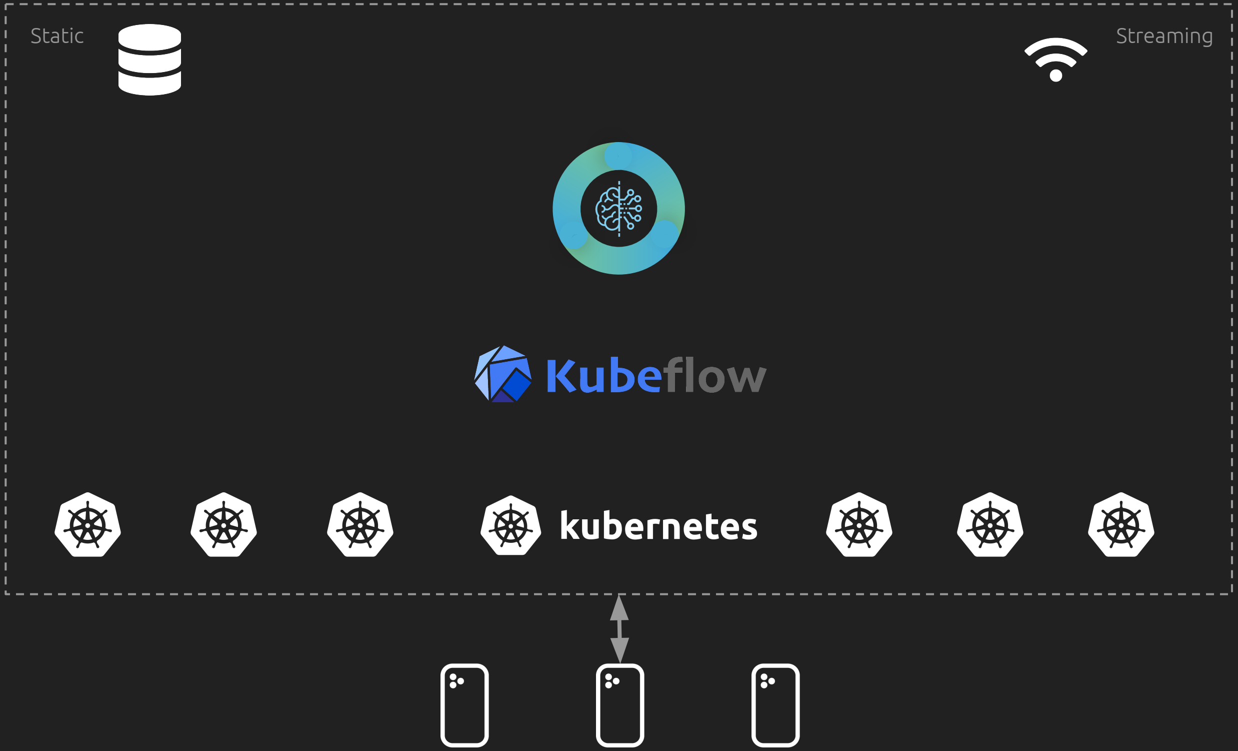
Data Source
Static or Streaming

ML Pipeline
Train/Test

Deploy
MLOps Tooling

Infrastructure
Implementation

Client Devices
Request / Response



SAMPLE ARCHITECTURE

Edge-Based

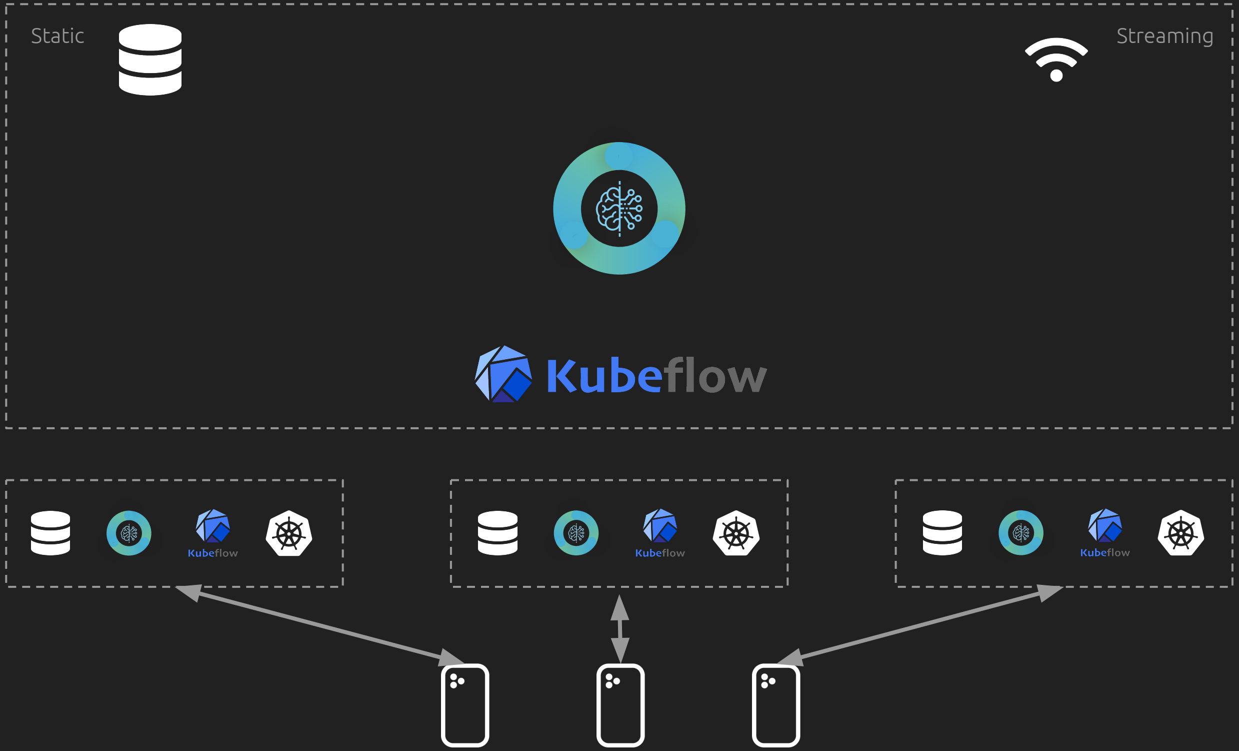
Data Source
Static or Streaming

ML Pipeline
Train/Test

Deploy
MLOps Tooling

Edge
Regional Implement / Retrain

Client Devices
Data In & Out



SAMPLE ARCHITECTURE

Iterative AI

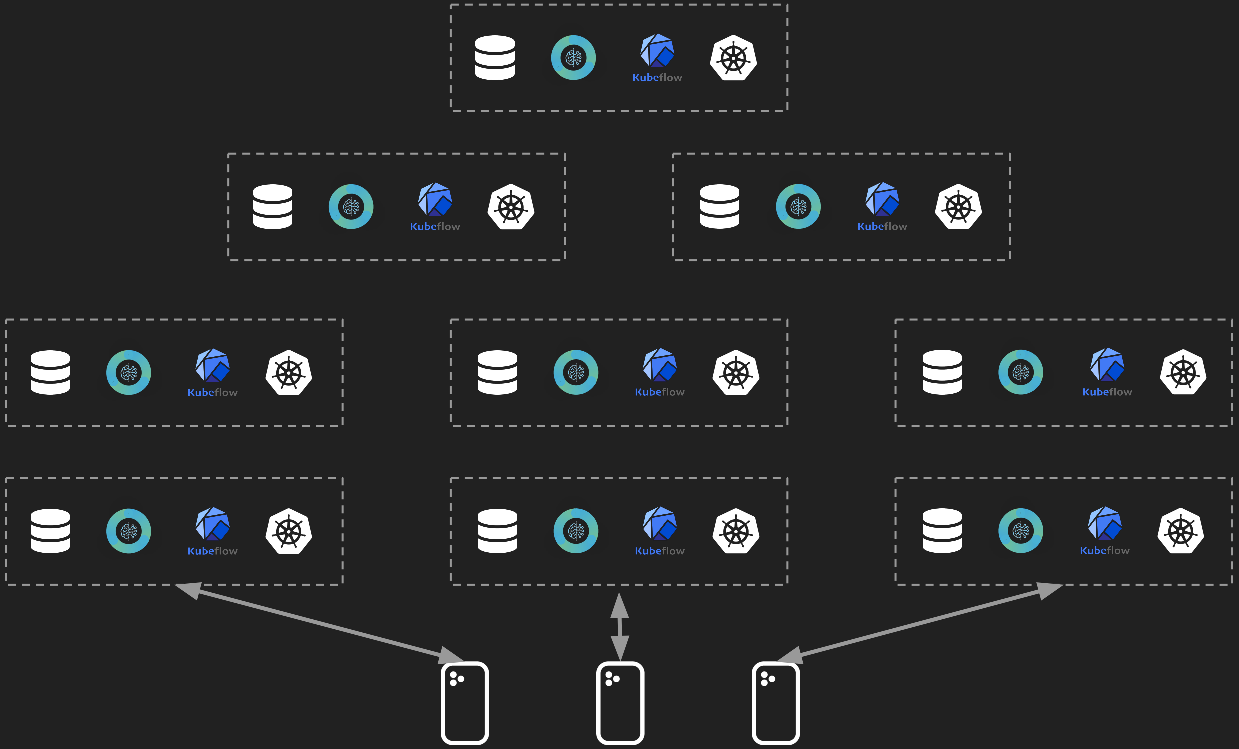
Cloud
Global

Near Edge
Regional

Far Edge
Local

On-Prem
Organizational

Client Devices
Data In & Out



Systems & Methods

Considerations

ML tooling for JavaScript has some limitations to consider when designing an iterative system.

Host Resources

Model Complexity

Data Volume

Client Resources

User Experience

Interoperability

Complexity Kills

Iterative systems have more moving parts, so it’s important to consider strategies that reduce the cognitive load of running and maintaining them.

Data Storage

Business Logic

Training Workflow

MLOps

Infrastructure

Client Apps

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Edge ML Platform

Database

+

Application

+

Distribution

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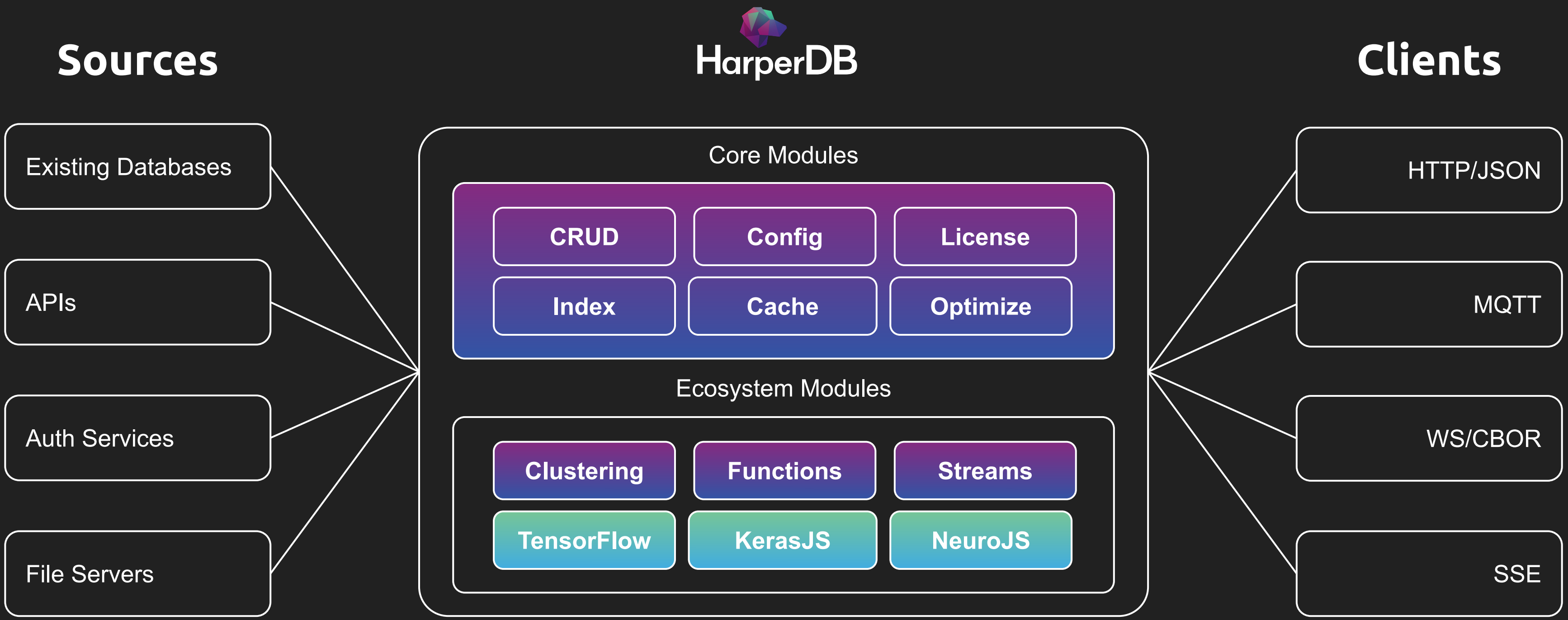
One System To Rule Them All



Sources

Existing Databases

APIs

Auth Services

File Servers

HarperDB

Core Modules

CRUD

Config

License

Index

Cache

Optimize

Ecosystem Modules

Clustering

Functions

Streams

TensorFlow

KerasJS

NeuroJS

Clients

HTTP/JSON

MQTT

WS/CBOR

SSE

SAMPLE ARCHITECTURE

Iterative AI on HarperDB

Cloud
Global

Near Edge
Regional

Far Edge
Local

On-Prem
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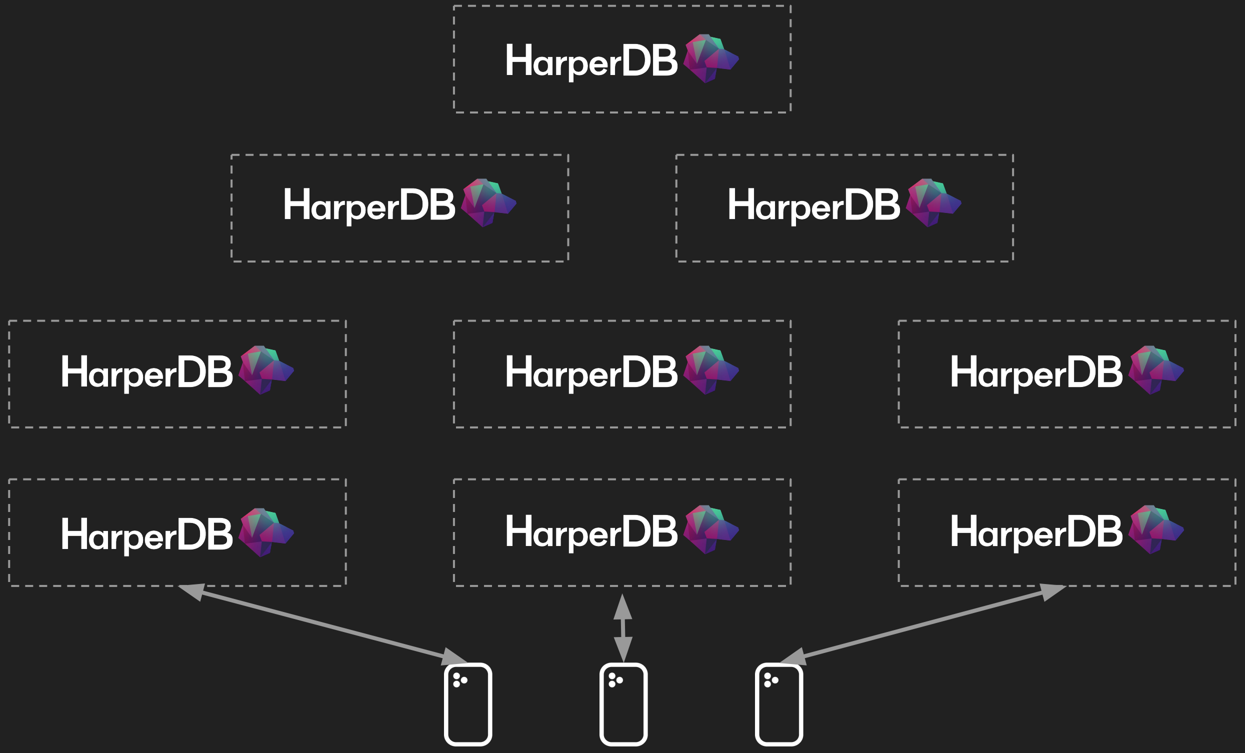
Client Devices
Data In & Out



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Simplicity Without Sacrifice