



# COUCHDB

HTTP based Apache NoSQL database  
ADBMS | ISE

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# CouchDB

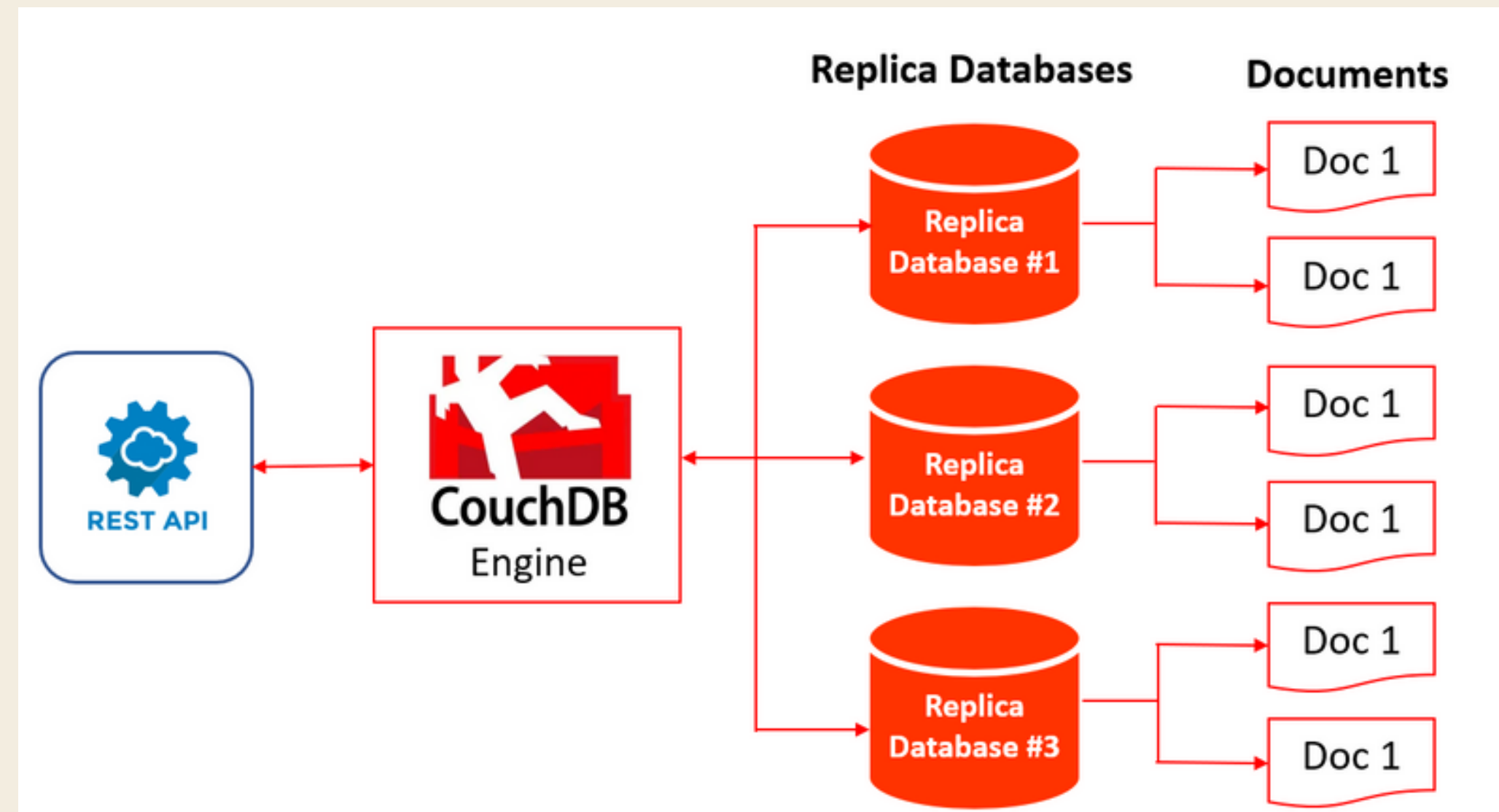
## What is CouchDB?

Apache CouchDB™ is a database that uses JSON for documents, JavaScript for MapReduce indexes, and regular HTTP for its API

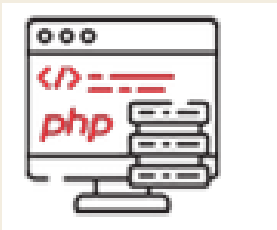
- Document database
- Embraces web approach
- Simple to use
- Written in Erlang [high concurrency & fault tolerance]
- Well documented

# Architecture

1. A client makes an HTTP request to the server, which passes it through a set of modules that perform various functions such as authentication, request parsing, and query processing.
2. The server retrieves the data from the database, which is made up of a set of JSON documents. CouchDB automatically updates the views that have been defined for that database whenever a document is added, removed, or updated.
3. In a cluster environment, peer-to-peer replication is used to keep the data synchronized across all nodes in the cluster, ensuring that the client can retrieve the data from any server in the cluster if needed.



# Apache CouchDB Development **Features**



## HTTP API

All items have a unique URI that gets exposed via HTTP. It uses the HTTP methods like POST, GET, PUT, and DELETE.



## Built for Offline

It can replicate to devices like smartphones that have a feature to go offline and handle data sync for you when the device is back online.



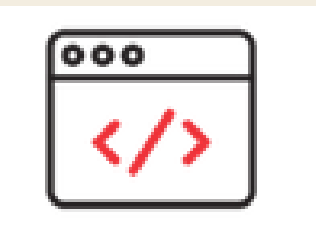
## Eventual Consistency

CouchDB guarantees Final consistency to be able to provide both availability and partition tolerance.



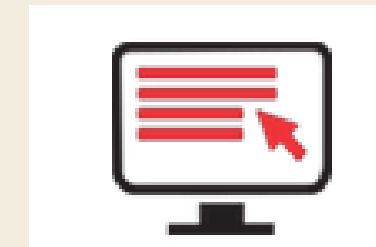
## Document Storage

It is a NoSQL database that follows document storage where each field is uniquely named and contains values of various data types such as text, number, Boolean, lists, etc.



## Reduce Views and Indexes

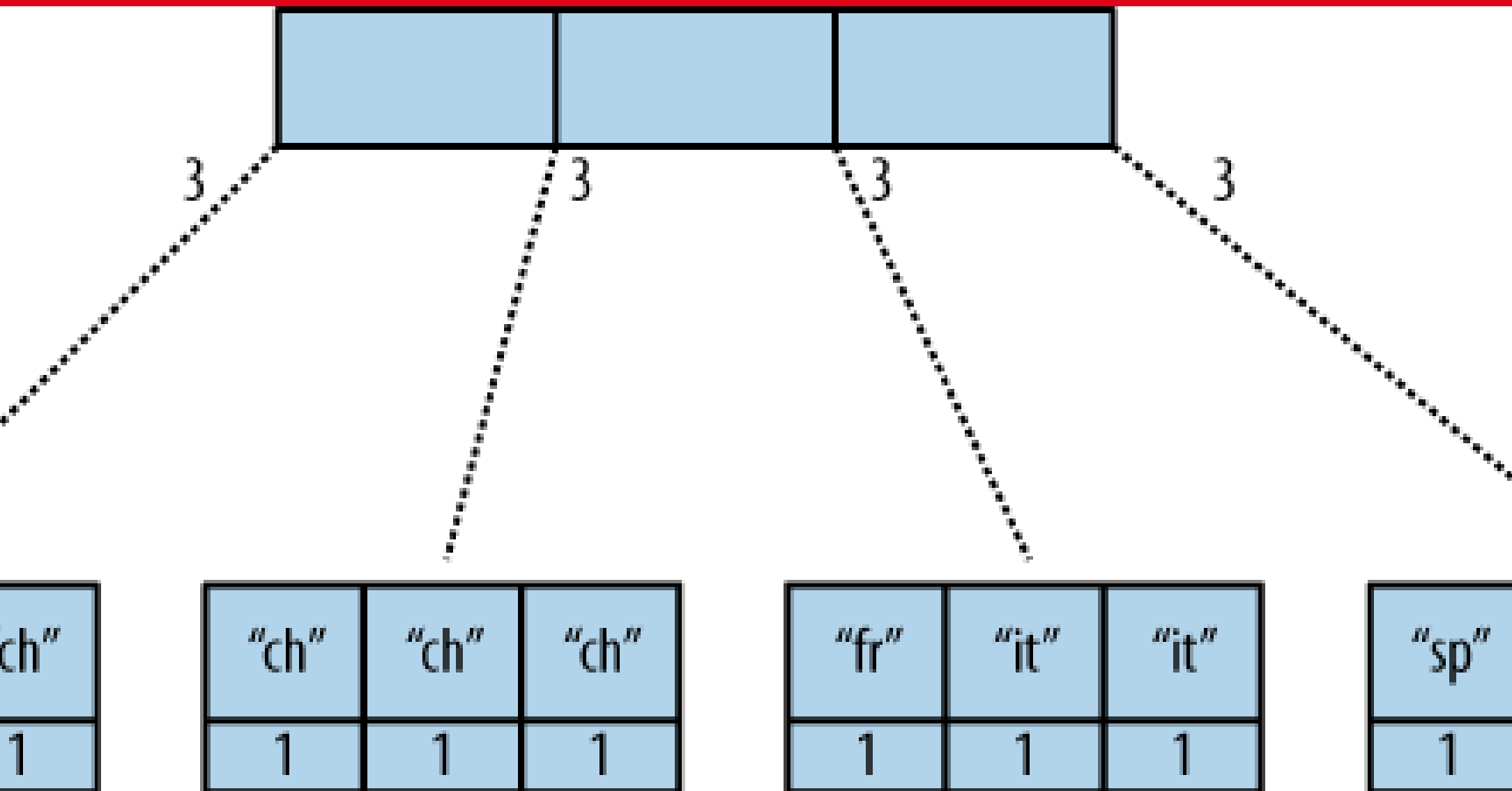
Each view in CouchDB is constructed by a JavaScript function that acts reduce operation and index views and keep those indexes updated as documents are added, removed, or updated.



## ACID Semantics

Implementing a form of Multi-Version Concurrency Control, meaning that CouchDB can handle a very high volume of concurrent writers and readers without conflict.

# Views in CouchDB



- Adds a structure to semi-structured data, Map Indices -> data
- With views you can
  - Filter documents
  - Extract data
  - Build efficient indices
- Views are built on-demand
- Multiple view allowed for one document

# Literature Survey

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## **Title: CouchDB: The Definitive Guide**

**By J. Anderson and N. Slater, O'Reilly Media Publication, 2010**

- The paper is a guide to learning about CouchDB, published by O'Reilly Media in 2010.
- It covers CouchDB's unique features, including its flexible data model and querying capabilities using MapReduce views.
- The authors provide many examples of how to use MapReduce views to query and analyze data in CouchDB.
- The paper gives in-depth knowledge on CouchDB and its capabilities

# Literature Survey

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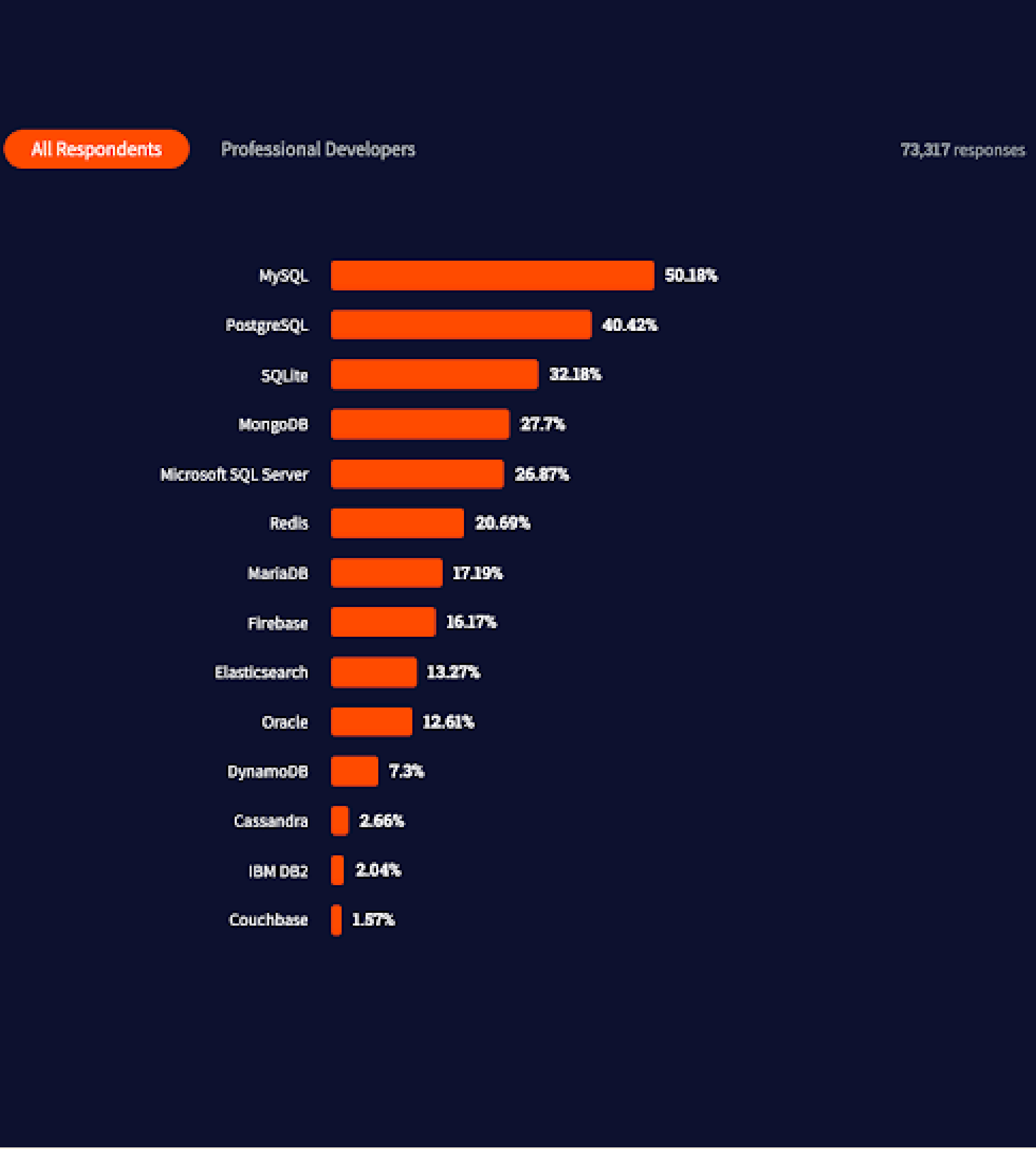


**Title: Master-Master Replication with CouchDB**

**Authors: D. Boniface and R. McFarlane, 2012**

- The paper describes the master-master replication feature in Apache CouchDB, a NoSQL database, and its benefits for distributed data management.
- It contains a case study of using CouchDB's master-master replication in a cloud computing environment, showing its effectiveness in handling large volumes of data with low latency and high throughput.
- The paper compares master-master replication with other replication techniques used in distributed databases.
- The authors provide experimental results that show the effectiveness of master-master replication in CouchDB for fault tolerance, scalability, and data consistency.





# Market Share

Survey by [learnsql.com](https://learnsql.com)

MySQL and PostgreSQL are most widely used.

CouchDB has a market share of 1.57%

The rankings are based on factors such as search engine results, job postings, social media mentions, and other sources.

# Pros of Couch DB

Couch DB has a number of great features such as



## Data Replication

Couch DB can easily handle data replication and synchronization across multiple servers



## Scalability

Couch DB is scalable and can handle large amounts of data and can be scaled horizontally by adding more nodes to the cluster



## Offline Sync

CouchDB has a built-in feature for offline data sync, which allows users to work with data even when they are not connected to the internet.

# Cons of Couch DB

Couch DB also has some disadvantages, namely:



## Steep Learning Curve

It may take some time for developers to get used to working with a schema-less database and using the MapReduce function for querying data.



## Limited Queries

CouchDB has limited query capabilities since it does not support advanced query features like JOIN, GROUP BY, and HAVING.



## Slow Execution

Couch DB is slow as other databases, especially when dealing with large datasets and complex queries. It is slower when performing operations on a large number of documents



# SCALABILITY AND SECURITY OF COUCH DB

## SCALABILITY

- Apache Couch DB is designed to be highly scalable, with support for distributed databases and replication.
- Apache Couch DB supports incremental replication, which allows data to be synchronized between different devices and servers in real-time.

## SECURITY

- Apache Couch DB provides several security features like role-based access control, SSL encryption, and validation functions.
- It allows developers to control access to specific documents based on user roles

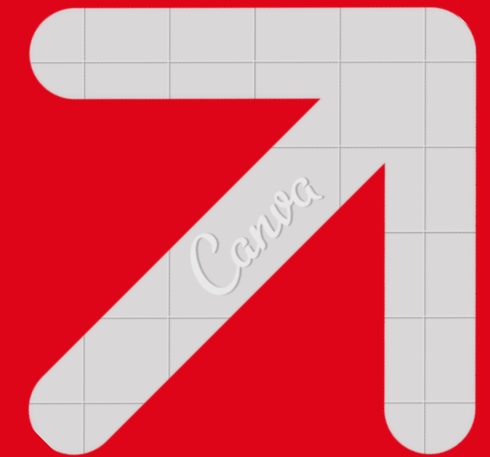
# Backend Comparison

## NoSQL Databases

	MONGO DB		COUCH DB		FIREBASE
Data Model	Document - Oriented (BSON)		Document - Oriented (JSON)		JSON and BSON
Interface	Custom protocol over TCP/IP		HTTP/REST		HTTP/REST
Object Storage	Database contains Collections which contain Documents		Database contains Documents		Database contains Collections which contain Documents
Query Method	Map/Reduce, Object based		Map/Reduce, Range Queries		Object based and Range based
Replication	Master - Slave		Master - Master		Master - Master
Concurrency	In place		Multi-version Concurrency control		Multi-version Concurrency control

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# LET'S SEE HOW COUCH DB WORKS!



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# THANK YOU!

That's it from our end.